2021 REGION D WATER PLAN
VOLUME I

Prepared for

The North East Texas Regional Water Planning Group

October 14, 2020

carollo
Engineers...Working Wonders With Water®
TBPE No. F-882

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WSP, USA, Inc.

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Northeast Texas Municipal Water District – Mr. Walt Sears, Jr., Executive Director

In Memoriam

This Plan is dedicated to Johnny Mack Bradley, dedicated member of the North East Texas Regional Water Planning Group.

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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	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	PETPotential 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
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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2021 Region D Water Plan

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, 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 Northeast Texas Municipal Water District (NETMWD), located in Hughes Springs, 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 eleven (11) chapters of the 2021 RWP for the North East Texas Region (Region D). All required DB22 reports are aggregated and presented in Appendix ES.

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

ES.1.1 The Planning Process

The Texas Water Development Board (TWDB) has developed a set of twelve tasks that the Regional Planning Groups (RWPGs) are to accomplish in the RWP. This report addresses these tasks in the following manner:

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 2010 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 requested changes to the projections made where provided by the RWPG. The population and water demand projections were formally adopted for use in development of the 2021 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 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).

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 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 2021 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 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 financing mechanisms for water management strategies in the plan.

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

Chapter 11 provides a description of the level of implementation of previously recommended Water Management Strategies for meeting needs, and a summary comparison of the present 2021 Plan to the previous 2016 Plan.

ES.1.2 Physical Description of the Region

The North East Texas RWPA 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	Van Zandt County
Wood 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.

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.

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.

Wholesale Water Providers (WWP)

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, 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 2021 Region D Plan, and all reporting for WWPs represents reporting for MWPs.

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 2016, 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 2016. 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.

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 in conjunction with the City of Irving, Northeast Texas Municipal Water District, Lamar County Water Supply District, Riverbend Water Resources District, and the City of Greenville. The Texas Water Development Board 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 is in the process of developing 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 "Guidelines for Regional Water Plan Development (Fifth Cycle of Regional Water Planning)", because there are not new decennial census data available in time to be used in the 2021 RWPs, the emphasis of this work is on the transition of the 2017 State Water Plan population projections and the associated water demand projections from political boundaries to utility service area boundaries, and to making limited modifications based on relevant changed conditions that have occurred since the development of the projections used in the 2017 State Water Plan. 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. The population and water demand projections have been formally adopted for use in development of the 2021 RWPs. The new population projections used in the 2021 RWPs increase population projections in some locations while decreasing population projections in other locations, relative to the population projections in the 2016 RWPs. As shown in the Appendix ES, population is projected to grow by approximately 65% from the years 2020 to 2070. Total annual water demand is expected to increase approximately 19%, or 77,900 ac-ft/yr, from 2020 to 2070. The increase in regional water demand will be due to increases in municipal water demand. The largest percentage of water is currently used for municipal, manufacturing, and steam-electric power generation uses.

Approximately 30% to 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 73,600 acre-feet, or 57% over the fifty year planning period (2020 to 2070). 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 200% through the year 2070. Due to population growth (municipal demand), and to a lesser extent manufacturing and steam-electric power generation growth, the Sabine River Basin is projected to have the highest overall water demand of the six river basins within the region. Approximately 132,000 acre-feet of water will be needed in 2070 for the portion of the Sabine River Basin that is in Region D.

Over the fifty year period from 2020 to 2070, 25% to 22% 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 5% over the 2020 to 2070 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 2020 to 2070. In 2020, steam-electric power generation projections represent approximately 23% of water demand for this region. By 2070, steam-electric is anticipated to require 20% 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 on-line 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 9%, 9% and 2% of water demanded in the North East Texas Region in the year 2020, respectively. Irrigation, Livestock, and Mining water demands are expected to slightly decrease over the 50 year planning period, with a reduction in percentage of total water demanded to approximately 7%, 7%, 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 2016 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 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. As required by Texas Administrative Code (TAC) §357.32, for the 2021 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 includes a presentation of the water supply determined to be available by WUG category.

Six aquifers were identified within the North East Texas RWPA. 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 2021 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, 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 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 2021 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 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 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 118,811 acre-ft/yr by the year 2070. 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. 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. 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.

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 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 78 Water User Groups with shortages during the 2020 – 2070 planning period which will require strategies in this plan. A total of 111 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. 29 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 will be partially resolved with the implementation of Advanced Water Conservation measures. 60 shortages will be resolved with additional groundwater supplies, by far the most common recommended water management strategy. There are three (3) instances 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 are two instances of recommended use of domestic livestock local supplies, and one (1) instance of recommended indirect reuse. There are 8 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 – WTP Expansion (15 MGD; 2030).
5. City of Greenville, Hunt County – New WTP (15 MGD; 2070).
6. City of Wolfe City, Hunt County – Greenville Tie-In Pipeline (2050).
7. Irrigation, Lamar County – Pat Mayse Raw Water Pipeline (2020).
8. 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).

Three needs have been identified as remaining unmet in the North East Texas Region for the purposes of the 2021 Plan, for manufacturing in Bowie County, irrigation in Red River County, and an unmet municipal need for Hickory Creek SUD in Hunt County. 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 Plan 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 1000 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 Plan'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 only considered as an applicable strategy for a single municipality, the City of Greenville. 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 the Region D planning area, 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, Titus, and Van Zandt 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 decline from 9% to 7% of the demand over the planning period. Livestock and mining comprise a total of 11% to 9% 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 decline from 23% to 20% 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 2021 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. 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% 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.

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 60 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 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, 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 29 surface water strategies for entities with 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 eight (8) 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, expansion of the City of Greenville's WTP, an eventual new WTP for Greenville, 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) remaining surface water strategies (for 4 WUGs) involving the movement of water supplies within the North East Texas Region.

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 111 strategies were identified for 78 entities in the NETRWPA. There are 60 strategies involving the drilling of wells for use in the immediate vicinity of the well. There are 29 strategies involving contractual movements of surface water which taken from a reservoir (or run-of-river supply source) within the same proximity as the Water User Group. There are 8 Advanced Water Conservation Strategies, 3 strategies entailing the voluntary reallocation of existing supplies, and 8 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 four (4) 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. It is noteworthy that given the extensive population growth between 2020 and 2070, the implementation of several of these strategies may, by 2070, be considered movement between urban to urban 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. At its February 6, 2019 meeting, the NETRWPG formally requested that TWDB perform this analysis. This assessment is included in its entirety in Appendix C6-5.

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 RWPA 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 2020 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 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 NETRWPA.

ES.6.5 Protection of Natural Resources

The NETRWPA 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 North East Texas Regional Water Plan 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 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 where possible.

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 2021 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 2021 Region D Plan reflecting the likely acquisition of additional available groundwater supply beyond the MAG limitation.

ES.6.7 Consistency with State Water Planning Guidelines

The information, data evaluations, and recommendations included in Chapters 1 through 12 of the 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 I 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 I Reservoir was a recommended water management strategy for Region C in 2011 and 2016, and was included in the 2012 and 2017 State Water Plans. A larger Marvin Nichols reservoir has also been included in Region C's drafts as a proposed water management strategy for this round 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 2017 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 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 I, the North East Texas Regional Water Plan 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.

Per the terms of agreement set forth from the October 5, 2015 mediation between Regions C and D and ratified by the NETRWPG at its October 21, 2015 meeting, the NETRWPG does not challenge Marvin Nichols Reservoir as a unique reservoir site for the purposes of this 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 2021 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). However, 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 2021 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.

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 due 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 Region D Regional Water Plan, as well as in the subsequent 2016 Plan, 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.[1] That voluntary approach is taking place in the Cypress Creek Basin.

Over the past 15 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. Over the past 9 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

[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 success of this project to date, NETRWPG considers those regimes as voluntary goals for instream flows for the purposes of this 2021 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. The strategies to meet future water needs of RWPs and the State Water Plan are not to be limited by these voluntary goals for instream flows. Rather, such goals 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 are incorporated in this regional water plan as the voluntary goals for instream flows in that 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).

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

Little Cypress (Harrison)

Red River Basin

Barkman (Bowie)

Big Pine (Lamar and Red River)

Liberty Hills (Bowie)

Pecan Bayou (Red River)

Dimple (Red River)

Sabine River Basin

Big Sandy (Wood and Upshur)

Carl Estes (Van Zandt)

Carthage (Harrison)

Grand Saline Creek

Kilgore II (Gregg and Smith)

Prairie Creek (Gregg and Smith)

Waters Bluff (Wood)

Sulphur River Basin

George Parkhouse I (Delta and Hopkins)

George Parkhouse II (Delta and Lamar)

Marvin Nichols I/IA (Red River & Titus)

Marvin Nichols II (Titus)

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 2017 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, per the terms of agreement set forth from the October 5, 2015 mediation between Regions C and D and ratified by the NETRWPG at its October 21, 2015 meeting, the NETRWPG does not challenge Marvin Nichols Reservoir as a unique reservoir site for the purposes of this 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 2021 Region D Plan.

The NETRWPG recognizes that there are approximately[2] 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.

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

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 includes 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.

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.

The NETRWPG does not recommend protection for any of the potential reservoir sites in Region D, with the exception that the NETRWPG does not challenge Marvin Nichols Reservoir as a unique reservoir site for the purposes of this Plan. At the time of publication of this Initially Prepared Plan, no agreement has been made between Regions C and D for the purposes of the 2021 Region D Plan.

ES.8.4 Legislative Recommendations

TWDB rules for the 2021 regional water planning activities provide that RWPGs may include in their regional water plans recommendations to the legislature. The approved scope of work for the development of the RWP for the North East Texas Region 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 2021 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.

Recommendation: Marvin Nichols I 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 2022 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.

As noted previously, per the terms of agreement set forth from the October 5, 2015 mediation between Regions C and D and ratified by the NETRWPG at its October 21, 2015 meeting, the NETRWPG does not challenge Marvin Nichols Reservoir as a unique reservoir site for the purposes of this 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 2021 Region D Plan.

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.

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.

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.

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 Basin and compensation for the interbasin transfer.

Recommendation: Designation of Wholesale Water Providers

The NETRWPG supports the designation of a WWP as described in the Texas Administrative Code §357.10(43) 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 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.

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.

Recommendation: Economic and Environmental Impacts

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

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 per day (gpcpd) level set as the “floor” by the NETRWPG. Some usage rates are in the 70-80 gpcpd range, a sharp contrast with large urban areas where 200 gpcpd 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 previous rounds, the RWPGs were allowed the capability to establish individual floors, whereby Region D used an amount of 115 gpcpd. It appears inappropriate to assume that usage less than 115 gpcpd 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 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 planning.

b) Analyses in the Sulphur River Basin (SRBA Watershed Study; 2014) suggest that although the historic Drought of Record for the basin is 1951 to 1956, a more significant drought occurs between 2002 and 2006. As a result, the SRBA study suggests the official TCEQ "Sulphur WAM misses the critical drought" that forms the basis for calculations of firm supply, since the official TCEQ WAM for the Sulphur River Basin is based upon historic data from 1940 to 1996. Indeed, an effort is already underway to update the hydrology for Sulphur River Basin WAM that is being funded by the Riverbend Water Resources District. While this effort has not produced a model in time for the purposes of the 2021 Region D Plan, it is likely that the result of this effort will be considered in the next round of water planning for Region D. Further, during the most recent legislative session HB 723 was passed requiring TCEQ to obtain or develop updated water availability models 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. Thus, the NETRWPG recommends that the legislature initiate a process through TCEQ to appropriately update the Sabine, and Cypress 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 North East Texas 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.

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.

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 also known as "municipal per capita usage". Recently, the TWDB 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 present round of 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 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.

ES.9 Chapter 9: Infrastructure Financing Analysis

The Infrastructure Financing Report (IFR) requirement was incorporated into the regional water planning process in response to Senate Bill 2 (77th Texas Legislature). The Texas Administrative Code, 31 TAC 357.44 requires that regional water planning groups shall assess and quantitatively report on how individual local governments, regional authorities, and other political subdivisions in their RWPA propose to finance recommended water management strategies. According to TWDB guidelines, the primary objectives of the IFR are:

- To determine the number of political subdivisions with identified needs for additional water supplies that will be unable to pay for their water infrastructure needs without some form of outside financial assistance.

- To determine how much of the infrastructure costs in the regional water plans cannot be paid for solely using local utility revenue sources.
- To determine the financing options proposed by political subdivisions to meet future water infrastructure needs (including the identification of any State funding sources considered).
- To determine what role(s) the RWPG propose for the State in financing the recommended water supply projects.

The NETRWPG used the IFR survey form and associated digital reporting spreadsheet developed by the TWDB to gather information from the Water User Groups (WUGs) with water management strategies involving capital costs identified in this round of planning. These were then compiled and reported.

For county aggregate WUGs (e.g., manufacturing, agriculture, etc.), with identified shortages during the planning period and where no political subdivision is responsible for providing water supplies, the NETRWPG has assumed that such strategies will likely be financed by private funding mechanisms, unless the strategy is associated with the purchase of supply from a political subdivision.

Thirty-one (31) non-county aggregate WUGs were involved in the IFR survey process. The NETRWPG consultants contacted (or attempted to contact) each of the 31 entities with water management strategies requiring capital costs via phone and/or email. Questions from the TWDB survey form regarding anticipated funding sources that the WUG might access to implement the water management strategy. Once attempts had been made to contact all 31 WUGs, the survey results were compiled into an Excel spreadsheet provided by TWDB, which was then submitted back to TWDB.

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

The final plan was submitted to the TWDB prior to the November 5, 2020, deadline. Chapter 10 contains a summary of the communications and public participation conducted during the RWP development for the North East Texas Region. Records of the public participation for the plan's review are presented in this chapter. 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 20-50 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 the Initially Prepared Plan (IPP) was submitted and released, 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. Copies of the plan were made available in the Office of the County Clerk and in a public library in each of the 19 counties in the region. Comments were received and incorporated in the comments section of this final 2021 Region D Plan.

Included within Chapter 10 and Appendix C10 is a summary discussion and documents pertaining to comments and responses to the 2021 Initially Prepared Plan.

This document is the certified 2021 North East Texas Regional Water Plan, being complete and adopted by the NETRWPG at its September 30, 2020 public meeting.

ES.11 Chapter 11: Implementation and Comparison to the Previous Regional Water Plan

Included within Chapter 11 is a summary of recent implementation of water management strategies identified in the 2016 North East Texas Regional Water Plan, and a brief summary that shows how the 2021 Plan differs from the 2016 Plan. Comparisons including summary tables and other graphics, convey the changes between plans.

Significant differences exist between the 2021 and 2016 Plans. Differences in the projections for demands between the planning periods are primarily due to changes in the methodologies for projecting non-municipal demands – particularly industrial demands - resulting in significantly lower projections of manufacturing and steam-electric power generation demands than those employed for the 2016 Plan. These amounts were previously the predominant source of demand in the North East Texas Region; however, the significant decrease has resulted in municipal demands now being the largest projected demand. Source availability has increased from the 2016 Plan, largely due to refined modeled depictions of sedimentation effects to reservoirs in the region. Supply amounts remained similar between the 2016 and 2021 Plans. The aforementioned decreases in projected industrial demands thus resulted in lower amounts of identified need in the 2021 Plan, affecting the size of resulting water management strategies compared to the amounts contemplated in the 2016 Plan. The accordant recommended water management strategies, albeit smaller in size for industrial users, remain generally similar to those of the 2016 Plan. Several local and regional entities provided additional information allowing for more refined depictions of the strategies than those in the 2016 Plan, illustrating the benefits of the overall planning process.

Appendix ES –

REQUIRED REGION D DB22 REPORTS

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APPENDIX ES

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Region D Water User Group (WUG) Population

	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
BURNS REDBANK WSC	1,576	1,620	1,634	1,634	1,634	1,634
CENTRAL BOWIE COUNTY WSC	1,076	1,149	1,272	1,409	1,561	1,729
DE KALB	260	266	269	271	274	278
HOOKS	3,049	3,173	3,303	3,303	3,303	3,303
NEW BOSTON	1,752	1,802	1,817	1,817	1,817	1,817
RIVERBEND WATER RESOURCES DISTRICT	93	96	97	97	97	97
TEXARKANA	4,485	4,681	4,886	5,101	5,324	5,558
COUNTY-OTHER	4,744	4,025	2,586	2,586	2,586	2,586
RED BASIN TOTAL	**17,035**	**16,812**	**15,864**	**16,218**	**16,596**	**17,002**
CENTRAL BOWIE COUNTY WSC	6,453	6,888	7,631	8,453	9,363	10,372
DE KALB	1,451	1,482	1,500	1,509	1,529	1,549
MACEDONIA EYLAU MUD 1	8,742	8,892	8,939	8,939	8,939	8,939
MAUD	1,358	1,500	1,642	1,642	1,642	1,642
NASH	4,070	4,751	5,431	6,111	6,111	6,111
NEW BOSTON	4,208	4,327	4,363	4,363	4,363	4,363
REDWATER	3,749	4,229	4,709	5,189	5,429	5,429
RIVERBEND WATER RESOURCES DISTRICT	449	462	466	466	466	466
TEXARKANA	33,522	34,993	36,527	38,128	39,800	41,544
WAKE VILLAGE	6,150	6,850	7,550	8,250	8,950	8,950
COUNTY-OTHER	8,516	7,227	4,641	4,641	4,641	4,641
SULPHUR BASIN TOTAL	**78,668**	**81,601**	**83,399**	**87,691**	**91,233**	**94,006**
BOWIE COUNTY TOTAL	**95,703**	**98,413**	**99,263**	**103,909**	**107,829**	**111,008**
BI COUNTY WSC	6,265	7,531	8,521	9,695	10,786	11,850
PITTSBURG	4,712	4,946	5,128	5,345	5,546	5,743
COUNTY-OTHER	2,578	2,396	2,255	2,087	1,932	1,779
CYPRESS BASIN TOTAL	**13,555**	**14,873**	**15,904**	**17,127**	**18,264**	**19,372**
CAMP COUNTY TOTAL	**13,555**	**14,873**	**15,904**	**17,127**	**18,264**	**19,372**
ATLANTA	5,871	6,387	6,903	7,419	7,419	7,419
E M C WSC	793	793	793	793	793	793
EASTERN CASS WSC	1,925	1,939	1,939	1,939	1,939	1,939
HOLLY SPRINGS WSC	1,166	1,175	1,175	1,175	1,175	1,175
HUGHES SPRINGS	2,469	2,487	2,487	2,487	2,487	2,487
LINDEN	2,115	2,129	2,129	2,129	2,129	2,129
MIMS WSC	281	281	281	281	281	281
QUEEN CITY	1,063	1,071	1,071	1,071	1,071	1,071
WESTERN CASS WSC	1,838	1,851	1,851	1,851	1,851	1,851
COUNTY-OTHER	8,946	8,661	8,283	7,904	7,904	7,904
CYPRESS BASIN TOTAL	**26,467**	**26,774**	**26,912**	**27,049**	**27,049**	**27,049**
ATLANTA	6	7	7	8	8	8
EASTERN CASS WSC	149	150	150	150	150	150
QUEEN CITY	638	643	643	643	643	643
WESTERN CASS WSC	488	491	491	491	491	491
COUNTY-OTHER	3,268	3,164	3,026	2,888	2,888	2,888
SULPHUR BASIN TOTAL	**4,549**	**4,455**	**4,317**	**4,180**	**4,180**	**4,180**
CASS COUNTY TOTAL	**31,016**	**31,229**	**31,229**	**31,229**	**31,229**	**31,229**
COOPER	2,026	2,047	2,047	2,047	2,047	2,047
DELTA COUNTY MUD*	1,785	1,810	1,825	1,850	1,902	1,958
NORTH HUNT SUD*	286	290	290	290	290	290

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Region D Water User Group (WUG) Population

	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
COUNTY-OTHER	1,223	1,229	1,214	1,189	1,137	1,081
SULPHUR BASIN TOTAL	**5,320**	**5,376**	**5,376**	**5,376**	**5,376**	**5,376**
DELTA COUNTY TOTAL	**5,320**	**5,376**	**5,376**	**5,376**	**5,376**	**5,376**
CYPRESS SPRINGS SUD	4,235	4,427	4,542	4,655	4,739	4,805
WINNSBORO	744	778	798	818	833	844
COUNTY-OTHER	363	380	390	399	406	413
CYPRESS BASIN TOTAL	**5,342**	**5,585**	**5,730**	**5,872**	**5,978**	**6,062**
CYPRESS SPRINGS SUD	2,743	2,867	2,942	3,015	3,070	3,113
MOUNT VERNON	2,877	3,006	3,084	3,161	3,218	3,263
COUNTY-OTHER	162	169	174	178	181	184
SULPHUR BASIN TOTAL	**5,782**	**6,042**	**6,200**	**6,354**	**6,469**	**6,560**
FRANKLIN COUNTY TOTAL	**11,124**	**11,627**	**11,930**	**12,226**	**12,447**	**12,622**
GLENWOOD WSC	197	213	227	241	254	266
TRYON ROAD SUD	4,598	5,036	5,536	6,101	6,737	7,456
COUNTY-OTHER	232	253	278	307	341	380
CYPRESS BASIN TOTAL	**5,027**	**5,502**	**6,041**	**6,649**	**7,332**	**8,102**
CLARKSVILLE CITY	948	1,038	1,141	1,258	1,389	1,537
CROSS ROADS SUD*	397	435	478	527	582	644
ELDERVILLE WSC*	4,831	5,317	5,845	6,434	7,084	7,804
GLADEWATER	4,376	4,792	5,268	5,806	6,410	7,094
KILGORE*	10,829	11,859	13,038	14,369	15,865	17,559
LIBERTY CITY WSC	4,844	5,305	5,833	6,428	7,097	7,855
LONGVIEW	86,261	94,468	103,852	114,453	126,372	139,860
STARRVILLE-FRIENDSHIP WSC	618	684	753	831	915	1,006
TRYON ROAD SUD	340	372	409	451	498	551
WEST GREGG SUD*	3,549	3,887	4,273	4,710	5,199	5,755
WHITE OAK	6,966	7,628	8,386	9,243	10,205	11,294
COUNTY-OTHER	4,361	4,747	5,223	5,768	6,404	7,142
SABINE BASIN TOTAL	**128,320**	**140,532**	**154,499**	**170,278**	**188,020**	**208,101**
GREGG COUNTY TOTAL	**133,347**	**146,034**	**160,540**	**176,927**	**195,352**	**216,203**
BLOCKER CROSSROADS WSC	141	151	162	177	194	213
DIANA SUD	357	384	411	449	491	540
GUM SPRINGS WSC	2,226	2,391	2,561	2,800	3,061	3,368
HARLETON WSC	3,381	3,632	3,890	4,253	4,649	5,116
LEIGH WSC	1,519	1,631	1,747	1,910	2,088	2,297
MARSHALL	4,358	4,681	5,014	5,482	5,992	6,593
NORTH HARRISON WSC	1,374	1,475	1,580	1,727	1,889	2,078
PANOLA-BETHANY WSC*	142	166	202	254	289	321
SCOTTSVILLE	373	401	430	470	513	565
TALLEY WSC	742	796	853	932	1,020	1,122
TRYON ROAD SUD	878	943	1,011	1,105	1,207	1,329
WASKOM	2,924	3,141	3,365	3,678	4,020	4,424
WEST HARRISON WSC	316	339	363	397	434	478
COUNTY-OTHER	7,751	8,237	8,672	9,276	10,066	11,062
CYPRESS BASIN TOTAL	**26,482**	**28,368**	**30,261**	**32,910**	**35,913**	**39,506**
BLOCKER CROSSROADS WSC	1,312	1,410	1,510	1,651	1,804	1,986
GILL WSC*	1,620	1,739	1,863	2,037	2,226	2,450

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Region D Water User Group (WUG) Population

	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
GUM SPRINGS WSC	6,059	6,508	6,972	7,622	8,330	9,167
HALLSVILLE	4,003	4,298	4,605	5,034	5,503	6,055
LEIGH WSC	333	358	383	419	458	504
LONGVIEW	2,009	2,157	2,311	2,526	2,762	3,038
MARSHALL	20,403	21,913	23,475	25,666	28,054	30,869
PANOLA-BETHANY WSC*	1,274	1,488	1,813	2,278	2,593	2,875
SCOTTSVILLE	768	826	884	967	1,057	1,162
TALLEY WSC	560	601	644	704	769	846
WEST HARRISON WSC	992	1,066	1,141	1,248	1,364	1,501
COUNTY-OTHER	4,522	4,806	5,059	5,412	5,873	6,454
SABINE BASIN TOTAL	**43,855**	**47,170**	**50,660**	**55,564**	**60,793**	**66,907**
HARRISON COUNTY TOTAL	**70,337**	**75,538**	**80,921**	**88,474**	**96,706**	**106,413**
CORNERSVILLE WSC	375	415	442	465	495	525
CYPRESS SPRINGS SUD	352	356	356	356	356	356
COUNTY-OTHER	25	21	18	21	18	19
CYPRESS BASIN TOTAL	**752**	**792**	**816**	**842**	**869**	**900**
BRASHEAR WSC	357	384	410	432	460	487
CASH SUD*	104	112	119	123	131	138
CORNERSVILLE WSC	356	393	419	442	470	498
CUMBY	954	1,108	1,245	1,367	1,517	1,604
JONES WSC	158	191	220	246	278	310
LAKE FORK WSC	158	165	169	168	171	173
MARTIN SPRINGS WSC	2,970	3,475	3,936	4,351	4,847	5,270
MILLER GROVE WSC	1,242	1,334	1,411	1,453	1,535	1,615
SHADY GROVE NO 2 WSC	255	274	292	308	328	347
SHIRLEY WSC	1,626	1,739	1,826	1,884	1,972	2,026
SULPHUR SPRINGS	49	51	54	56	59	61
COUNTY-OTHER	936	788	686	770	681	714
SABINE BASIN TOTAL	**9,165**	**10,014**	**10,787**	**11,600**	**12,449**	**13,243**
BRASHEAR WSC	428	461	491	518	551	584
BRINKER WSC	2,369	2,737	3,071	3,456	3,825	4,198
CUMBY	90	104	118	129	143	151
CYPRESS SPRINGS SUD	709	716	716	716	716	716
GAFFORD CHAPEL WSC	1,215	1,308	1,393	1,491	1,585	1,680
MARTIN SPRINGS WSC	532	622	705	779	868	944
NORTH HOPKINS WSC	6,070	6,757	7,384	8,104	8,799	9,497
SHADY GROVE NO 2 WSC	311	334	356	376	399	424
SULPHUR SPRINGS	15,800	16,598	17,324	18,157	18,961	19,770
COUNTY-OTHER	537	452	394	442	391	410
SULPHUR BASIN TOTAL	**28,061**	**30,089**	**31,952**	**34,168**	**36,238**	**38,374**
HOPKINS COUNTY TOTAL	**37,978**	**40,895**	**43,555**	**46,610**	**49,556**	**52,517**
ABLES SPRINGS WSC*	866	1,327	1,952	2,816	4,046	5,834
B H P WSC*	4,421	5,494	6,950	8,960	11,824	15,986
BLACKLAND WSC*	43	43	43	43	43	43
CADDO BASIN SUD*	7,800	10,341	13,788	18,546	25,327	35,181
CADDO MILLS	1,710	2,214	2,898	3,843	5,190	7,147
CASH SUD*	18,199	21,837	26,206	31,446	37,736	45,281

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Region D Water User Group (WUG) Population

	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
CELESTE	1,012	1,257	1,590	2,051	2,706	3,658
COMBINED CONSUMERS SUD	6,074	7,548	9,548	12,310	16,245	21,962
GREENVILLE	29,871	34,309	40,330	48,645	60,491	77,705
HICKORY CREEK SUD*	2,098	3,067	4,381	6,196	8,781	12,538
JOSEPHINE*	184	325	517	783	783	783
MACBEE SUD*	346	430	544	701	925	1,250
POETRY WSC*	2,303	2,909	3,668	4,729	6,341	8,535
QUINLAN	1,528	1,596	1,688	1,815	1,997	2,259
ROYSE CITY*	372	462	584	753	994	1,345
SHADY GROVE WSC	1,476	1,834	2,320	2,991	3,947	5,336
WEST TAWAKONI	2,679	3,131	3,744	4,592	5,800	7,556
COUNTY-OTHER	5,797	10,055	16,409	21,654	32,937	53,262
SABINE BASIN TOTAL	**86,779**	**108,179**	**137,160**	**172,874**	**226,113**	**305,661**
CASH SUD*	259	311	373	448	537	644
COMMERCE	8,883	9,975	11,456	13,502	16,416	20,651
DELTA COUNTY MUD*	9	9	9	9	9	10
HICKORY CREEK SUD*	1,456	2,128	3,040	4,299	6,094	8,701
NORTH HUNT SUD*	3,522	4,602	6,069	8,092	10,974	15,163
TEXAS A&M UNIVERSITY COMMERCE	926	926	926	926	926	926
WOLFE CITY*	1,720	2,137	2,704	3,486	4,600	6,220
COUNTY-OTHER	381	661	1,078	1,423	2,165	3,501
SULPHUR BASIN TOTAL	**17,156**	**20,749**	**25,655**	**32,185**	**41,721**	**55,816**
FROGNOT WSC*	27	32	38	47	52	59
HICKORY CREEK SUD*	718	1,050	1,499	2,120	3,005	4,291
WEST LEONARD WSC*	50	57	70	90	129	171
COUNTY-OTHER	164	284	464	613	932	1,507
TRINITY BASIN TOTAL	**959**	**1,423**	**2,071**	**2,870**	**4,118**	**6,028**
HUNT COUNTY TOTAL	**104,894**	**130,351**	**164,886**	**207,929**	**271,952**	**367,505**
LAMAR COUNTY WSD	11,919	12,380	12,722	13,031	13,272	13,466
PARIS	10,495	10,901	11,201	11,474	11,686	11,857
RENO (Lamar)	438	455	467	479	487	495
COUNTY-OTHER	812	844	867	888	905	918
RED BASIN TOTAL	**23,664**	**24,580**	**25,257**	**25,872**	**26,350**	**26,736**
BLOSSOM	1,546	1,605	1,649	1,690	1,721	1,746
LAMAR COUNTY WSD	5,053	5,249	5,393	5,524	5,626	5,709
PARIS	16,735	17,382	17,862	18,296	18,635	18,908
RENO (Lamar)	2,881	2,992	3,074	3,148	3,207	3,254
COUNTY-OTHER	2,291	2,381	2,448	2,507	2,553	2,590
SULPHUR BASIN TOTAL	**28,506**	**29,609**	**30,426**	**31,165**	**31,742**	**32,207**
LAMAR COUNTY TOTAL	**52,170**	**54,189**	**55,683**	**57,037**	**58,092**	**58,943**
DIANA SUD	384	384	384	384	384	384
E M C WSC	2,405	2,405	2,405	2,405	2,405	2,405
HARLETON WSC	1,105	1,186	1,271	1,390	1,518	1,671
JEFFERSON	2,321	2,321	2,321	2,321	2,321	2,321
KELLYVILLE-BEREA WSC	1,291	1,291	1,291	1,291	1,291	1,291
MIMS WSC	1,622	1,622	1,622	1,622	1,622	1,622
COUNTY-OTHER	1,473	1,392	1,307	1,188	1,060	907

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Region D Water User Group (WUG) Population

	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
CYPRESS BASIN TOTAL	**10,601**	**10,601**	**10,601**	**10,601**	**10,601**	**10,601**
MARION COUNTY TOTAL	**10,601**	**10,601**	**10,601**	**10,601**	**10,601**	**10,601**
BI COUNTY WSC	1,168	1,190	1,213	1,249	1,277	1,306
DAINGERFIELD	2,602	2,650	2,702	2,782	2,845	2,908
HOLLY SPRINGS WSC	632	636	636	636	636	636
HUGHES SPRINGS	10	10	10	10	10	10
LONE STAR	1,664	1,694	1,729	1,780	1,819	1,860
NAPLES	608	619	632	650	665	680
OMAHA	720	733	748	770	787	805
TRI SUD	1,819	1,852	1,889	1,944	1,989	2,033
COUNTY-OTHER	2,094	2,140	2,192	2,271	2,334	2,394
CYPRESS BASIN TOTAL	**11,317**	**11,524**	**11,751**	**12,092**	**12,362**	**12,632**
NAPLES	736	750	766	787	805	823
OMAHA	491	500	510	525	537	549
COUNTY-OTHER	820	838	859	889	914	938
SULPHUR BASIN TOTAL	**2,047**	**2,088**	**2,135**	**2,201**	**2,256**	**2,310**
MORRIS COUNTY TOTAL	**13,364**	**13,612**	**13,886**	**14,293**	**14,618**	**14,942**
BRIGHT STAR SALEM SUD	2,525	2,677	2,721	2,750	2,762	2,768
CASH SUD*	709	752	764	772	776	778
EAST TAWAKONI	1,158	1,228	1,248	1,262	1,268	1,270
EMORY	2,147	2,276	2,314	2,338	2,349	2,354
GOLDEN WSC	53	56	57	58	58	58
MILLER GROVE WSC	209	225	238	253	267	281
POINT	1,484	1,574	1,599	1,615	1,624	1,627
SHIRLEY WSC	750	803	843	869	910	935
SOUTH RAINS SUD	2,119	2,247	2,284	2,308	2,319	2,324
COUNTY-OTHER	734	767	741	722	674	640
SABINE BASIN TOTAL	**11,888**	**12,605**	**12,809**	**12,947**	**13,007**	**13,035**
RAINS COUNTY TOTAL	**11,888**	**12,605**	**12,809**	**12,947**	**13,007**	**13,035**
410 WSC	421	421	421	421	421	421
RED RIVER COUNTY WSC	1,546	1,642	1,739	1,772	1,790	1,859
COUNTY-OTHER	523	371	218	167	138	29
RED BASIN TOTAL	**2,490**	**2,434**	**2,378**	**2,360**	**2,349**	**2,309**
410 WSC	980	980	980	980	980	980
BOGATA	1,178	1,178	1,178	1,178	1,178	1,178
CLARKSVILLE	3,315	3,315	3,315	3,315	3,315	3,315
RED RIVER COUNTY WSC	4,286	4,554	4,822	4,912	4,963	5,153
COUNTY-OTHER	727	515	303	231	191	41
SULPHUR BASIN TOTAL	**10,486**	**10,542**	**10,598**	**10,616**	**10,627**	**10,667**
RED RIVER COUNTY TOTAL	**12,976**	**12,976**	**12,976**	**12,976**	**12,976**	**12,976**
CARROLL WSC*	322	358	395	435	478	525
CRYSTAL SYSTEMS TEXAS*	3,026	3,384	3,812	4,324	4,950	5,715
JACKSON WSC*	2,244	2,559	2,919	3,338	3,832	4,420
LIBERTY CITY WSC	127	146	166	189	218	251
LINDALE RURAL WSC*	6,814	7,774	8,864	9,604	11,027	12,717
LINDALE*	3,707	4,499	5,396	6,107	7,280	8,674
OVERTON*	73	82	95	109	125	144

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Region D Water User Group (WUG) Population

	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
PINE RIDGE WSC	1,277	1,417	1,564	1,725	1,896	2,081
SAND FLAT WSC	3,417	3,795	4,187	4,616	5,075	5,568
SMITH COUNTY MUD 1	2,033	2,320	2,646	3,025	3,476	4,008
SOUTHERN UTILITIES*	11,488	12,926	14,673	17,320	19,900	22,959
STAR MOUNTAIN WSC	1,392	1,546	1,705	1,882	2,068	2,269
STARRVILLE-FRIENDSHIP WSC	1,504	1,665	1,834	2,023	2,226	2,448
TYLER*	968	1,104	1,259	1,440	1,654	1,907
WEST GREGG SUD*	881	1,005	1,146	1,311	1,505	1,736
WINONA	645	737	839	961	1,103	1,273
COUNTY-OTHER*	4,622	5,504	6,444	7,866	9,280	11,067
SABINE BASIN TOTAL	**44,540**	**50,821**	**57,944**	**66,275**	**76,093**	**87,762**
SMITH COUNTY TOTAL	**44,540**	**50,821**	**57,944**	**66,275**	**76,093**	**87,762**
BI COUNTY WSC	331	375	418	467	518	572
CYPRESS SPRINGS SUD	108	122	136	153	169	186
MOUNT PLEASANT	17,512	19,775	22,118	24,689	27,397	30,257
TRI SUD	10,199	11,518	12,883	14,380	15,956	17,623
COUNTY-OTHER	1,142	1,290	1,443	1,611	1,787	1,974
CYPRESS BASIN TOTAL	**29,292**	**33,080**	**36,998**	**41,300**	**45,827**	**50,612**
CYPRESS SPRINGS SUD	173	195	219	244	271	299
TRI SUD	5,303	5,989	6,698	7,477	8,297	9,163
COUNTY-OTHER	1,875	2,117	2,368	2,644	2,935	3,241
SULPHUR BASIN TOTAL	**7,351**	**8,301**	**9,285**	**10,365**	**11,503**	**12,703**
TITUS COUNTY TOTAL	**36,643**	**41,381**	**46,283**	**51,665**	**57,330**	**63,315**
BI COUNTY WSC	3,546	3,830	4,076	4,329	4,559	4,776
DIANA SUD	4,868	5,259	5,596	5,943	6,260	6,557
EAST MOUNTAIN WATER SYSTEM	557	602	640	679	716	750
GILMER	5,695	6,154	6,548	6,953	7,325	7,673
GLENWOOD WSC	2,810	3,036	3,231	3,431	3,614	3,785
ORE CITY	1,298	1,402	1,492	1,585	1,669	1,748
PRITCHETT WSC	2,251	2,433	2,588	2,749	2,896	3,033
SHARON WSC	1,847	1,996	2,124	2,255	2,375	2,488
UNION GROVE WSC	80	86	92	98	103	108
COUNTY-OTHER	5,450	5,887	6,265	6,655	7,011	7,343
CYPRESS BASIN TOTAL	**28,402**	**30,685**	**32,652**	**34,677**	**36,528**	**38,261**
BIG SANDY	1,467	1,585	1,687	1,790	1,887	1,976
EAST MOUNTAIN WATER SYSTEM	1,445	1,560	1,662	1,763	1,858	1,947
FOUKE WSC	88	95	102	108	114	119
GLADEWATER	2,658	2,872	3,056	3,245	3,419	3,581
GLENWOOD WSC	72	78	83	88	93	97
PRITCHETT WSC	5,422	5,859	6,235	6,621	6,974	7,306
UNION GROVE WSC	2,134	2,306	2,453	2,605	2,745	2,874
COUNTY-OTHER	1,008	1,089	1,159	1,231	1,297	1,358
SABINE BASIN TOTAL	**14,294**	**15,444**	**16,437**	**17,451**	**18,387**	**19,258**
UPSHUR COUNTY TOTAL	**42,696**	**46,129**	**49,089**	**52,128**	**54,915**	**57,519**
BEN WHEELER WSC*	2,537	2,783	2,972	3,160	3,316	3,448
BETHEL ASH WSC*	706	924	1,091	1,258	1,395	1,512
EDOM WSC*	1,191	1,303	1,393	1,486	1,604	1,729

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Region D Water User Group (WUG) Population

	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
LITTLE HOPE MOORE WSC	450	494	527	560	588	612
R P M WSC*	2,065	2,553	2,926	3,296	3,604	3,867
VAN	1,916	2,138	2,308	2,475	2,614	2,733
COUNTY-OTHER	4,856	5,296	5,627	5,932	6,144	6,288
NECHES BASIN TOTAL	**13,721**	**15,491**	**16,844**	**18,167**	**19,265**	**20,189**
ABLES SPRINGS WSC*	33	36	39	41	44	45
CANTON	3,964	4,333	4,616	4,898	5,131	5,329
COMBINED CONSUMERS SUD	1,107	1,214	1,296	1,378	1,447	1,505
EDGEWOOD	1,564	1,683	1,774	1,864	1,939	2,003
FRUITVALE WSC	3,383	3,712	3,964	4,214	4,421	4,599
GOLDEN WSC	680	736	780	823	859	889
GRAND SALINE	3,390	3,532	3,641	3,750	3,839	3,917
LITTLE HOPE MOORE WSC	1,030	1,131	1,207	1,283	1,347	1,400
MACBEE SUD*	2,686	2,948	3,148	3,346	3,511	3,653
MYRTLE SPRINGS WSC	393	431	461	490	514	535
PINE RIDGE WSC	55	61	67	74	81	89
PRUITT SANDFLAT WSC	1,419	1,557	1,663	1,768	1,855	1,930
SOUTH TAWAKONI WSC	4,669	5,309	5,796	6,281	6,683	7,028
VAN	1,063	1,186	1,280	1,373	1,451	1,517
WILLS POINT	1,731	1,749	1,762	1,774	1,785	1,795
COUNTY-OTHER	4,423	4,823	5,126	5,404	5,597	5,728
SABINE BASIN TOTAL	**31,590**	**34,441**	**36,620**	**38,761**	**40,504**	**41,962**
BETHEL ASH WSC*	199	261	308	355	393	426
CANTON	17	19	20	21	22	23
MABANK*	243	271	299	391	546	761
MACBEE SUD*	4,382	4,809	5,135	5,460	5,729	5,959
MYRTLE SPRINGS WSC	1,223	1,343	1,433	1,524	1,599	1,663
WILLS POINT	2,607	2,633	2,653	2,673	2,689	2,703
COUNTY-OTHER	4,473	4,878	5,184	5,465	5,660	5,792
TRINITY BASIN TOTAL	**13,144**	**14,214**	**15,032**	**15,889**	**16,638**	**17,327**
VAN ZANDT COUNTY TOTAL	**58,455**	**64,146**	**68,496**	**72,817**	**76,407**	**79,478**
CYPRESS SPRINGS SUD	438	456	463	475	480	485
SHARON WSC	1,266	1,319	1,340	1,373	1,389	1,400
WINNSBORO	1,135	1,182	1,201	1,231	1,245	1,255
COUNTY-OTHER	774	773	741	714	668	611
CYPRESS BASIN TOTAL	**3,613**	**3,730**	**3,745**	**3,793**	**3,782**	**3,751**
ALGONQUIN WATER RESOURCES OF TEXAS*	1,589	1,765	1,947	2,147	2,360	2,589
BRIGHT STAR SALEM SUD	1,881	1,960	1,991	2,040	2,065	2,080
CORNERSVILLE WSC	190	204	218	233	248	262
FOUKE WSC	6,564	6,837	6,949	7,119	7,203	7,260
GOLDEN WSC	2,603	2,711	2,754	2,822	2,855	2,879
HAWKINS	1,416	1,476	1,499	1,535	1,554	1,566
JONES WSC	4,367	4,550	4,623	4,736	4,792	4,831
LAKE FORK WSC	2,194	2,291	2,336	2,400	2,438	2,468
MINEOLA	5,356	5,581	5,671	5,809	5,878	5,925
NEW HOPE SUD	2,535	2,640	2,682	2,749	2,781	2,804
PRITCHETT WSC	84	88	89	91	92	93
QUITMAN	2,046	2,132	2,166	2,220	2,247	2,264

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Region D Water User Group (WUG) Population

	WUG POPULATION					
	2020	2030	2040	2050	2060	2070
RAMEY WSC	3,687	3,841	3,903	3,999	4,046	4,079
SHARON WSC	2,594	2,703	2,745	2,813	2,847	2,870
SHIRLEY WSC	125	134	140	145	152	156
WINNSBORO	1,804	1,879	1,910	1,956	1,979	1,996
COUNTY-OTHER	2,214	2,213	2,120	2,044	1,910	1,749
SABINE BASIN TOTAL	**41,249**	**43,005**	**43,743**	**44,858**	**45,447**	**45,871**
WOOD COUNTY TOTAL	**44,862**	**46,735**	**47,488**	**48,651**	**49,229**	**49,622**
REGION D POPULATION TOTAL	**831,469**	**907,531**	**988,859**	**1,089,197**	**1,211,979**	**1,370,438**

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Region D Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
BURNS REDBANK WSC	201	199	196	194	193	193
CENTRAL BOWIE COUNTY WSC	88	91	101	112	124	137
DE KALB	45	44	44	44	45	45
HOOKS	281	278	276	271	269	269
NEW BOSTON	409	411	407	406	405	405
RIVERBEND WATER RESOURCES DISTRICT	90	92	92	92	92	92
TEXARKANA	843	859	880	909	947	989
COUNTY-OTHER	567	460	288	287	286	286
MANUFACTURING	4	5	5	5	5	5
LIVESTOCK	687	687	624	535	458	427
IRRIGATION	6,070	6,070	6,070	6,070	6,070	6,070
RED BASIN TOTAL	**9,285**	**9,196**	**8,983**	**8,925**	**8,894**	**8,918**
CENTRAL BOWIE COUNTY WSC	531	548	607	672	745	825
DE KALB	250	248	245	247	249	253
MACEDONIA EYLAU MUD 1	588	598	601	601	601	601
MAUD	211	226	241	238	237	237
NASH	392	458	523	589	589	589
NEW BOSTON	981	988	978	975	974	974
REDWATER	506	553	601	654	682	682
RIVERBEND WATER RESOURCES DISTRICT	433	444	447	445	445	445
TEXARKANA	6,302	6,423	6,579	6,797	7,081	7,391
WAKE VILLAGE	699	750	802	861	932	931
COUNTY-OTHER	1,017	826	518	516	514	514
MANUFACTURING	1,607	2,042	2,042	2,042	2,042	2,042
LIVESTOCK	1,138	1,138	1,033	886	759	709
IRRIGATION	4,303	4,303	4,303	4,303	4,303	4,303
SULPHUR BASIN TOTAL	**18,958**	**19,545**	**19,520**	**19,826**	**20,153**	**20,496**
BOWIE COUNTY TOTAL	**28,243**	**28,741**	**28,503**	**28,751**	**29,047**	**29,414**
BI COUNTY WSC	648	751	830	933	1,035	1,136
PITTSBURG	832	851	864	891	922	955
COUNTY-OTHER	173	161	152	140	130	120
MANUFACTURING	35	52	52	52	52	52
MINING	12	11	10	9	8	7
LIVESTOCK	4,914	4,914	4,914	4,914	4,914	4,914
CYPRESS BASIN TOTAL	**6,614**	**6,740**	**6,822**	**6,939**	**7,061**	**7,184**
CAMP COUNTY TOTAL	**6,614**	**6,740**	**6,822**	**6,939**	**7,061**	**7,184**
ATLANTA	1,016	1,074	1,134	1,208	1,205	1,205
E M C WSC	53	53	53	53	53	53
EASTERN CASS WSC	152	147	142	139	138	138
HOLLY SPRINGS WSC	107	103	99	97	97	97
HUGHES SPRINGS	278	267	257	255	254	254
LINDEN	301	292	285	284	283	283
MIMS WSC	19	19	19	19	19	19
QUEEN CITY	161	157	152	152	152	152
WESTERN CASS WSC	172	165	159	157	156	156
COUNTY-OTHER	796	729	664	623	620	620
MANUFACTURING	244	245	245	245	245	245
MINING	39	58	60	45	30	20

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Region D Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
LIVESTOCK	1,349	1,349	1,349	1,349	1,349	1,349
CYPRESS BASIN TOTAL	**4,687**	**4,658**	**4,618**	**4,626**	**4,601**	**4,591**
ATLANTA	1	1	1	1	1	1
EASTERN CASS WSC	12	11	11	11	11	11
QUEEN CITY	97	94	92	91	91	91
WESTERN CASS WSC	46	44	42	42	42	42
COUNTY-OTHER	291	266	243	227	226	226
MANUFACTURING	32,479	32,554	32,554	32,554	32,554	32,554
LIVESTOCK	1,308	1,308	1,308	1,308	1,308	1,308
SULPHUR BASIN TOTAL	**34,234**	**34,278**	**34,251**	**34,234**	**34,233**	**34,233**
CASS COUNTY TOTAL	**38,921**	**38,936**	**38,869**	**38,860**	**38,834**	**38,824**
COOPER	446	440	431	430	429	429
DELTA COUNTY MUD*	126	122	123	124	128	132
NORTH HUNT SUD*	19	19	19	19	19	19
COUNTY-OTHER	82	83	82	80	76	73
LIVESTOCK	541	541	541	541	541	541
IRRIGATION	2,396	2,396	2,396	2,396	2,396	2,396
SULPHUR BASIN TOTAL	**3,610**	**3,601**	**3,592**	**3,590**	**3,589**	**3,590**
DELTA COUNTY TOTAL	**3,610**	**3,601**	**3,592**	**3,590**	**3,589**	**3,590**
CYPRESS SPRINGS SUD	382	382	379	382	387	392
WINNSBORO	139	142	142	145	147	149
COUNTY-OTHER	68	70	71	73	74	75
MANUFACTURING	5	7	7	7	7	7
LIVESTOCK	1,139	1,139	1,139	1,139	1,139	1,139
IRRIGATION	34	34	34	34	34	34
CYPRESS BASIN TOTAL	**1,767**	**1,774**	**1,772**	**1,780**	**1,788**	**1,796**
IRRIGATION	35	35	35	35	35	35
SABINE BASIN TOTAL	**35**	**35**	**35**	**35**	**35**	**35**
CYPRESS SPRINGS SUD	248	248	246	247	250	254
MOUNT VERNON	564	577	582	591	600	609
COUNTY-OTHER	30	31	32	32	33	34
MINING	5	5	4	4	3	2
LIVESTOCK	1,711	1,711	1,711	1,711	1,711	1,711
IRRIGATION	34	34	34	34	34	34
SULPHUR BASIN TOTAL	**2,592**	**2,606**	**2,609**	**2,619**	**2,631**	**2,644**
FRANKLIN COUNTY TOTAL	**4,394**	**4,415**	**4,416**	**4,434**	**4,454**	**4,475**
GLENWOOD WSC	20	20	21	22	23	24
TRYON ROAD SUD	668	709	761	829	913	1,009
COUNTY-OTHER	30	31	33	37	41	45
MINING	14	22	22	17	13	9
LIVESTOCK	11	11	11	11	11	11
CYPRESS BASIN TOTAL	**743**	**793**	**848**	**916**	**1,001**	**1,098**
CLARKSVILLE CITY	100	105	112	121	133	147
CROSS ROADS SUD*	33	34	36	39	43	47
ELDERVILLE WSC*	325	357	393	432	476	524
GLADEWATER	731	778	838	913	1,006	1,113
KILGORE*	2,336	2,505	2,713	2,967	3,271	3,618
LIBERTY CITY WSC	487	510	543	589	648	716

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Region D Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
LONGVIEW	23,716	25,539	27,736	30,380	33,500	37,060
STARRVILLE-FRIENDSHIP WSC	72	77	83	90	99	109
TRYON ROAD SUD	49	52	56	61	68	75
WEST GREGG SUD*	307	320	340	368	405	447
WHITE OAK	1,347	1,441	1,558	1,703	1,876	2,076
COUNTY-OTHER	565	590	630	693	767	855
MANUFACTURING	1,233	1,517	1,517	1,517	1,517	1,517
MINING	260	411	407	320	233	171
STEAM ELECTRIC POWER	940	940	940	940	940	940
LIVESTOCK	199	199	199	199	199	199
IRRIGATION	40	40	40	40	40	40
SABINE BASIN TOTAL	**32,740**	**35,415**	**38,141**	**41,372**	**45,221**	**49,654**
GREGG COUNTY TOTAL	**33,483**	**36,208**	**38,989**	**42,288**	**46,222**	**50,752**
BLOCKER CROSSROADS WSC	13	13	14	15	16	17
DIANA SUD	31	32	33	35	38	42
GUM SPRINGS WSC	207	211	218	234	254	280
HARLETON WSC	345	354	367	394	429	472
LEIGH WSC	337	355	374	406	443	487
MARSHALL	879	921	968	1,049	1,144	1,258
NORTH HARRISON WSC	141	145	150	161	176	193
PANOLA-BETHANY WSC*	28	32	38	48	54	60
SCOTTSVILLE	81	85	90	97	106	117
TALLEY WSC	56	56	58	63	68	75
TRYON ROAD SUD	127	133	139	150	164	180
WASKOM	435	453	475	512	559	614
WEST HARRISON WSC	31	32	33	35	38	42
COUNTY-OTHER	908	928	949	999	1,080	1,186
MANUFACTURING	14	16	16	16	16	16
MINING	525	437	366	297	229	180
LIVESTOCK	382	402	422	442	464	489
IRRIGATION	419	419	419	419	419	419
CYPRESS BASIN TOTAL	**4,959**	**5,024**	**5,129**	**5,372**	**5,697**	**6,127**
BLOCKER CROSSROADS WSC	120	123	126	135	147	162
GILL WSC*	187	191	198	215	234	258
GUM SPRINGS WSC	563	576	595	637	693	761
HALLSVILLE	545	569	597	645	703	773
LEIGH WSC	74	78	82	89	97	107
LONGVIEW	552	583	617	671	732	805
MARSHALL	4,115	4,311	4,531	4,910	5,356	5,890
PANOLA-BETHANY WSC*	253	288	345	430	489	542
SCOTTSVILLE	166	175	184	201	219	240
TALLEY WSC	42	42	43	47	52	57
WEST HARRISON WSC	97	99	103	111	121	132
COUNTY-OTHER	530	542	553	583	630	692
MANUFACTURING	24,722	27,924	27,924	27,924	27,924	27,924
MINING	1,973	1,640	1,374	1,115	859	675
STEAM ELECTRIC POWER	21,112	21,112	21,112	21,112	21,112	21,112

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Region D Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
LIVESTOCK	254	267	280	294	309	326
IRRIGATION	282	282	282	282	282	282
SABINE BASIN TOTAL	**55,587**	**58,802**	**58,946**	**59,401**	**59,959**	**60,738**
HARRISON COUNTY TOTAL	**60,546**	**63,826**	**64,075**	**64,773**	**65,656**	**66,865**
CORNERSVILLE WSC	49	53	55	57	61	64
CYPRESS SPRINGS SUD	32	31	30	29	29	29
COUNTY-OTHER	3	2	2	2	2	2
MINING	31	34	37	40	43	47
LIVESTOCK	121	121	121	121	121	121
IRRIGATION	1	1	1	1	1	1
CYPRESS BASIN TOTAL	**237**	**242**	**246**	**250**	**257**	**264**
BRASHEAR WSC	67	70	74	77	82	87
CASH SUD*	12	12	13	13	14	15
CORNERSVILLE WSC	47	50	52	55	57	61
CUMBY	122	136	150	163	180	190
JONES WSC	14	16	18	20	22	25
LAKE FORK WSC	16	16	15	15	15	16
MARTIN SPRINGS WSC	360	405	449	490	544	592
MILLER GROVE WSC	171	178	184	188	198	208
SHADY GROVE NO 2 WSC	48	50	53	55	59	62
SHIRLEY WSC	218	226	232	236	247	253
SULPHUR SPRINGS	10	10	10	11	11	11
COUNTY-OTHER	111	90	76	83	73	77
MINING	320	349	379	412	449	489
LIVESTOCK	1,490	1,490	1,490	1,490	1,490	1,490
IRRIGATION	16	16	16	16	16	16
SABINE BASIN TOTAL	**3,022**	**3,114**	**3,211**	**3,324**	**3,457**	**3,592**
BRASHEAR WSC	81	85	89	93	99	105
BRINKER WSC	253	281	307	341	377	413
CUMBY	11	13	14	15	17	18
CYPRESS SPRINGS SUD	64	62	60	59	59	58
GAFFORD CHAPEL WSC	109	111	115	121	128	135
MARTIN SPRINGS WSC	64	73	80	88	98	106
NORTH HOPKINS WSC	474	494	514	554	598	645
SHADY GROVE NO 2 WSC	59	62	65	68	72	76
SULPHUR SPRINGS	3,108	3,189	3,268	3,392	3,536	3,686
COUNTY-OTHER	63	51	43	48	42	44
MANUFACTURING	944	968	968	968	968	968
MINING	680	741	806	877	954	1,041
LIVESTOCK	3,887	3,887	3,887	3,887	3,887	3,887
IRRIGATION	4,752	4,752	4,752	4,752	4,752	4,752
SULPHUR BASIN TOTAL	**14,549**	**14,769**	**14,968**	**15,263**	**15,587**	**15,934**
HOPKINS COUNTY TOTAL	**17,808**	**18,125**	**18,425**	**18,837**	**19,301**	**19,790**
ABLES SPRINGS WSC*	58	89	131	189	272	392
B H P WSC*	330	386	471	602	795	1,074
BLACKLAND WSC*	9	9	8	8	8	8
CADDO BASIN SUD*	870	1,105	1,438	1,914	2,607	3,617

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Region D Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
CADDO MILLS	152	187	237	310	417	573
CASH SUD*	2,090	2,429	2,861	3,403	4,072	4,881
CELESTE	124	147	181	231	304	411
COMBINED CONSUMERS SUD	502	589	718	911	1,197	1,615
GREENVILLE	9,271	10,481	12,187	14,624	18,163	23,319
HICKORY CREEK SUD*	209	293	410	576	814	1,162
JOSEPHINE*	39	68	108	164	164	164
MACBEE SUD*	23	29	37	47	62	84
POETRY WSC*	253	309	382	488	653	878
QUINLAN	134	133	134	140	154	174
ROYSE CITY*	43	52	65	83	110	149
SHADY GROVE WSC	139	164	202	257	338	457
WEST TAWAKONI	276	309	360	436	549	714
COUNTY-OTHER	723	1,212	1,947	2,552	3,873	6,258
MANUFACTURING	404	490	490	490	490	490
MINING	90	83	62	50	41	33
STEAM ELECTRIC POWER	373	373	373	373	373	373
LIVESTOCK	771	771	771	771	771	771
IRRIGATION	264	264	264	264	264	264
SABINE BASIN TOTAL	**17,147**	**19,972**	**23,837**	**28,883**	**36,491**	**47,861**
CASH SUD*	30	35	41	48	58	69
COMMERCE	1,427	1,555	1,749	2,039	2,473	3,108
DELTA COUNTY MUD*	1	1	1	1	1	1
HICKORY CREEK SUD*	145	203	285	399	565	806
NORTH HUNT SUD*	237	309	408	544	738	1,019
TEXAS A&M UNIVERSITY COMMERCE	156	152	150	149	148	148
WOLFE CITY*	169	199	243	311	409	552
COUNTY-OTHER	47	80	128	168	255	411
MANUFACTURING	151	182	182	182	182	182
MINING	35	32	24	19	16	13
LIVESTOCK	288	288	288	288	288	288
IRRIGATION	79	79	79	79	79	79
SULPHUR BASIN TOTAL	**2,765**	**3,115**	**3,578**	**4,227**	**5,212**	**6,676**
FROGNOT WSC*	3	3	4	5	5	6
HICKORY CREEK SUD*	71	100	140	197	279	397
WEST LEONARD WSC*	7	7	9	11	16	21
COUNTY-OTHER	20	34	55	72	110	177
MINING	3	3	2	2	1	1
LIVESTOCK	36	36	36	36	36	36
IRRIGATION	12	12	12	12	12	12
TRINITY BASIN TOTAL	**152**	**195**	**258**	**335**	**459**	**650**
HUNT COUNTY TOTAL	**20,064**	**23,282**	**27,673**	**33,445**	**42,162**	**55,187**
LAMAR COUNTY WSD	1,556	1,572	1,582	1,601	1,626	1,650
PARIS	1,179	1,172	1,163	1,169	1,187	1,204
RENO (Lamar)	72	73	74	75	76	78
COUNTY-OTHER	125	127	130	133	135	137
MANUFACTURING	309	316	316	316	316	316
STEAM ELECTRIC POWER	420	420	420	420	420	420

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Region D Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
LIVESTOCK	617	617	617	617	617	617
IRRIGATION	7,608	7,608	7,608	7,608	7,608	7,608
RED BASIN TOTAL	**11,886**	**11,905**	**11,910**	**11,939**	**11,985**	**12,030**
BLOSSOM	136	134	131	131	133	135
LAMAR COUNTY WSD	660	666	670	679	690	699
PARIS	1,880	1,870	1,854	1,864	1,892	1,919
RENO (Lamar)	476	483	488	495	503	510
COUNTY-OTHER	354	358	368	375	381	387
MANUFACTURING	4,717	4,821	4,821	4,821	4,821	4,821
STEAM ELECTRIC POWER	5,091	5,091	5,091	5,091	5,091	5,091
LIVESTOCK	852	852	852	852	852	852
IRRIGATION	2,518	2,518	2,518	2,518	2,518	2,518
SULPHUR BASIN TOTAL	**16,684**	**16,793**	**16,793**	**16,826**	**16,881**	**16,932**
LAMAR COUNTY TOTAL	**28,570**	**28,698**	**28,703**	**28,765**	**28,866**	**28,962**
DIANA SUD	33	32	31	30	30	30
E M C WSC	162	162	162	162	162	162
HARLETON WSC	113	116	120	129	140	154
JEFFERSON	426	415	406	401	400	400
KELLYVILLE-BEREA WSC	107	101	96	94	94	94
MIMS WSC	109	109	109	109	109	109
COUNTY-OTHER	99	94	88	80	71	61
MINING	489	764	712	595	478	393
STEAM ELECTRIC POWER	4,257	4,257	4,257	4,257	4,257	4,257
LIVESTOCK	188	188	188	188	188	188
IRRIGATION	12	12	12	12	12	12
CYPRESS BASIN TOTAL	**5,995**	**6,250**	**6,181**	**6,057**	**5,941**	**5,860**
MARION COUNTY TOTAL	**5,995**	**6,250**	**6,181**	**6,057**	**5,941**	**5,860**
BI COUNTY WSC	121	119	118	120	123	125
DAINGERFIELD	465	460	459	468	477	488
HOLLY SPRINGS WSC	58	56	53	53	53	53
HUGHES SPRINGS	1	1	1	1	1	1
LONE STAR	189	184	181	184	187	191
NAPLES	70	69	67	69	70	71
OMAHA	127	125	125	127	130	133
TRI SUD	181	177	176	179	183	186
COUNTY-OTHER	253	248	246	254	260	267
MANUFACTURING	25,738	25,743	25,743	25,743	25,743	25,743
STEAM ELECTRIC POWER	50	50	50	50	50	50
LIVESTOCK	836	836	836	836	836	836
IRRIGATION	3	3	3	3	3	3
CYPRESS BASIN TOTAL	**28,092**	**28,071**	**28,058**	**28,087**	**28,116**	**28,147**
NAPLES	85	83	82	83	85	87
OMAHA	86	86	86	87	89	91
COUNTY-OTHER	99	97	96	99	102	104
LIVESTOCK	769	769	769	769	769	769
IRRIGATION	8	8	8	8	8	8
SULPHUR BASIN TOTAL	**1,047**	**1,043**	**1,041**	**1,046**	**1,053**	**1,059**
MORRIS COUNTY TOTAL	**29,139**	**29,114**	**29,099**	**29,133**	**29,169**	**29,206**

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Region D Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
BRIGHT STAR SALEM SUD	203	202	195	195	195	196
CASH SUD*	81	84	83	84	84	84
EAST TAWAKONI	237	246	247	247	248	248
EMORY	791	829	837	842	845	847
GOLDEN WSC	4	4	4	4	4	4
MILLER GROVE WSC	29	30	31	33	34	36
POINT	364	379	380	381	383	383
SHIRLEY WSC	101	104	107	109	114	117
SOUTH RAINS SUD	190	192	188	187	187	188
COUNTY-OTHER	74	75	71	69	64	61
MANUFACTURING	12	12	12	12	12	12
LIVESTOCK	428	428	428	428	428	428
IRRIGATION	65	65	65	65	65	65
SABINE BASIN TOTAL	**2,579**	**2,650**	**2,648**	**2,656**	**2,663**	**2,669**
RAINS COUNTY TOTAL	**2,579**	**2,650**	**2,648**	**2,656**	**2,663**	**2,669**
410 WSC	67	66	64	64	63	63
RED RIVER COUNTY WSC	117	116	117	119	120	125
COUNTY-OTHER	67	45	26	20	16	3
LIVESTOCK	762	762	762	762	762	762
IRRIGATION	1,279	1,279	1,279	1,279	1,279	1,279
RED BASIN TOTAL	**2,292**	**2,268**	**2,248**	**2,244**	**2,240**	**2,232**
410 WSC	157	152	149	148	148	148
BOGATA	123	116	113	112	112	112
CLARKSVILLE	620	602	593	592	590	590
RED RIVER COUNTY WSC	323	322	324	330	334	346
COUNTY-OTHER	92	63	37	28	23	5
MANUFACTURING	3	3	3	3	3	3
MINING	4	4	3	3	3	3
LIVESTOCK	770	770	770	770	770	770
IRRIGATION	2,588	2,588	2,588	2,588	2,588	2,588
SULPHUR BASIN TOTAL	**4,680**	**4,620**	**4,580**	**4,574**	**4,571**	**4,565**
RED RIVER COUNTY TOTAL	**6,972**	**6,888**	**6,828**	**6,818**	**6,811**	**6,797**
CARROLL WSC*	37	40	43	47	52	57
CRYSTAL SYSTEMS TEXAS*	945	1,045	1,175	1,331	1,522	1,757
JACKSON WSC*	205	222	244	274	314	361
LIBERTY CITY WSC	13	14	15	17	20	23
LINDALE RURAL WSC*	532	576	635	675	772	888
LINDALE*	841	1,005	1,195	1,347	1,604	1,910
OVERTON*	15	17	19	22	25	29
PINE RIDGE WSC	149	160	172	188	206	226
SAND FLAT WSC	243	255	281	310	341	374
SMITH COUNTY MUD 1	910	1,030	1,169	1,334	1,531	1,765
SOUTHERN UTILITIES*	1,964	2,152	2,395	2,799	3,209	3,700
STAR MOUNTAIN WSC	233	252	274	300	329	361
STARRVILLE-FRIENDSHIP WSC	176	187	202	220	241	265
TYLER*	185	206	232	263	301	347
WEST GREGG SUD*	76	83	91	103	117	135

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Region D Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
WINONA	133	149	166	189	217	250
COUNTY-OTHER*	544	627	718	868	1,021	1,216
MANUFACTURING*	4	5	5	5	5	5
MINING*	287	309	341	394	438	497
LIVESTOCK*	514	514	514	514	514	514
IRRIGATION*	324	324	324	324	324	324
SABINE BASIN TOTAL	**8,330**	**9,172**	**10,210**	**11,524**	**13,103**	**15,004**
SMITH COUNTY TOTAL	**8,330**	**9,172**	**10,210**	**11,524**	**13,103**	**15,004**
BI COUNTY WSC	34	37	41	45	50	55
CYPRESS SPRINGS SUD	10	10	12	13	14	15
MOUNT PLEASANT	3,890	4,302	4,745	5,260	5,828	6,433
TRI SUD	1,013	1,102	1,203	1,325	1,465	1,616
COUNTY-OTHER	179	197	220	245	271	299
MANUFACTURING	4,063	4,155	4,155	4,155	4,155	4,155
MINING	1,512	1,632	1,756	1,890	2,038	2,200
STEAM ELECTRIC POWER	61,931	61,931	61,931	61,931	61,931	61,931
LIVESTOCK	1,356	1,356	1,356	1,356	1,356	1,356
IRRIGATION	110	110	110	110	110	110
CYPRESS BASIN TOTAL	**74,098**	**74,832**	**75,529**	**76,330**	**77,218**	**78,170**
CYPRESS SPRINGS SUD	15	17	18	20	22	25
TRI SUD	526	573	625	689	762	841
COUNTY-OTHER	295	323	360	401	445	491
MINING	132	143	153	165	178	192
LIVESTOCK	1,591	1,591	1,591	1,591	1,591	1,591
IRRIGATION	943	943	943	943	943	943
SULPHUR BASIN TOTAL	**3,502**	**3,590**	**3,690**	**3,809**	**3,941**	**4,083**
TITUS COUNTY TOTAL	**77,600**	**78,422**	**79,219**	**80,139**	**81,159**	**82,253**
BI COUNTY WSC	367	382	397	417	437	458
DIANA SUD	422	435	447	466	488	511
EAST MOUNTAIN WATER SYSTEM	67	70	72	75	79	83
GILMER	1,123	1,184	1,237	1,301	1,368	1,432
GLENWOOD WSC	280	290	297	311	327	341
ORE CITY	155	160	166	173	182	190
PRITCHETT WSC	199	204	208	217	227	238
SHARON WSC	147	149	150	158	166	174
UNION GROVE WSC	6	6	6	7	7	7
COUNTY-OTHER	620	646	668	699	734	769
MANUFACTURING	69	76	76	76	76	76
MINING	299	573	608	480	355	263
LIVESTOCK	1,222	1,222	1,222	1,222	1,222	1,222
IRRIGATION	170	170	170	170	170	170
CYPRESS BASIN TOTAL	**5,146**	**5,567**	**5,724**	**5,772**	**5,838**	**5,934**
BIG SANDY	224	234	244	255	269	281
EAST MOUNTAIN WATER SYSTEM	173	180	187	196	206	215
FOUKE WSC	10	10	11	11	12	12
GLADEWATER	444	466	486	510	537	562
GLENWOOD WSC	7	7	8	8	8	9

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Region D Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
PRITCHETT WSC	478	490	502	521	547	572
UNION GROVE WSC	151	155	165	175	184	193
COUNTY-OTHER	115	119	123	129	136	142
MINING	80	153	163	129	95	70
LIVESTOCK	429	429	429	429	429	429
SABINE BASIN TOTAL	**2,111**	**2,243**	**2,318**	**2,363**	**2,423**	**2,485**
UPSHUR COUNTY TOTAL	**7,257**	**7,810**	**8,042**	**8,135**	**8,261**	**8,419**
BEN WHEELER WSC*	214	223	230	240	250	260
BETHEL ASH WSC*	72	90	105	119	132	143
EDOM WSC*	130	137	142	150	161	173
LITTLE HOPE MOORE WSC	45	47	49	51	54	55
R P M WSC*	225	268	301	336	366	393
VAN	237	255	269	286	301	315
COUNTY-OTHER	502	527	546	568	586	600
MINING	81	86	97	107	116	127
LIVESTOCK	1,015	1,015	1,015	1,015	1,015	1,015
IRRIGATION	500	500	500	500	500	500
NECHES BASIN TOTAL	**3,021**	**3,148**	**3,254**	**3,372**	**3,481**	**3,581**
ABLES SPRINGS WSC*	2	2	3	3	3	3
CANTON	961	1,032	1,084	1,143	1,196	1,242
COMBINED CONSUMERS SUD	92	95	98	102	107	111
EDGEWOOD	272	285	295	307	318	329
FRUITVALE WSC	305	318	329	343	359	373
GOLDEN WSC	55	56	57	58	61	63
GRAND SALINE	387	388	387	392	400	408
LITTLE HOPE MOORE WSC	102	108	111	117	122	127
MACBEE SUD*	181	198	212	225	236	245
MYRTLE SPRINGS WSC	29	30	31	33	35	36
PINE RIDGE WSC	6	7	7	8	9	10
PRUITT SANDFLAT WSC	156	164	171	179	187	195
SOUTH TAWAKONI WSC	438	472	498	530	562	590
VAN	132	142	150	158	167	174
WILLS POINT	300	296	292	290	291	293
COUNTY-OTHER	457	480	498	517	534	546
MANUFACTURING	503	753	753	753	753	753
MINING	141	150	168	186	202	221
LIVESTOCK	661	661	661	661	661	661
SABINE BASIN TOTAL	**5,180**	**5,637**	**5,805**	**6,005**	**6,203**	**6,380**
BETHEL ASH WSC*	20	26	29	34	37	40
CANTON	4	4	5	5	5	5
MABANK*	48	53	58	75	104	145
MACBEE SUD*	294	323	345	367	385	401
MYRTLE SPRINGS WSC	89	93	96	102	107	112
WILLS POINT	453	445	439	437	439	441
COUNTY-OTHER	462	486	503	523	540	552
MANUFACTURING	3	4	4	4	4	4
MINING	78	83	93	103	112	122

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Region D Water User Group (WUG) Demand

	WUG DEMAND (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
LIVESTOCK	213	213	213	213	213	213
TRINITY BASIN TOTAL	**1,664**	**1,730**	**1,785**	**1,863**	**1,946**	**2,035**
VAN ZANDT COUNTY TOTAL	**9,865**	**10,515**	**10,844**	**11,240**	**11,630**	**11,996**
CYPRESS SPRINGS SUD	40	39	39	39	39	40
SHARON WSC	101	98	94	96	97	98
WINNSBORO	212	215	214	217	220	221
COUNTY-OTHER	75	74	70	67	63	58
MINING	2	2	2	2	2	2
LIVESTOCK	483	483	483	483	483	483
IRRIGATION	36	36	36	36	36	36
CYPRESS BASIN TOTAL	**949**	**947**	**938**	**940**	**940**	**938**
ALGONQUIN WATER RESOURCES OF TEXAS*	107	119	131	144	159	174
BRIGHT STAR SALEM SUD	151	148	142	145	146	147
CORNERSVILLE WSC	25	26	27	29	30	32
FOUKE WSC	717	723	718	725	731	737
GOLDEN WSC	209	206	200	200	202	203
HAWKINS	362	370	370	377	381	384
JONES WSC	393	388	378	378	381	384
LAKE FORK WSC	218	218	214	216	219	222
MINEOLA	847	857	850	860	868	875
NEW HOPE SUD	329	332	329	333	336	339
PRITCHETT WSC	7	7	7	7	7	7
QUITMAN	316	319	317	321	324	326
RAMEY WSC	278	273	265	269	272	274
SHARON WSC	206	202	194	198	199	200
SHIRLEY WSC	17	17	18	18	19	20
WINNSBORO	336	342	341	346	349	352
COUNTY-OTHER	213	210	201	193	180	164
MANUFACTURING	2,532	3,085	3,085	3,085	3,085	3,085
MINING	23	23	21	19	18	17
LIVESTOCK	2,741	2,741	2,741	2,741	2,741	2,741
IRRIGATION	453	453	453	453	453	453
SABINE BASIN TOTAL	**10,480**	**11,059**	**11,002**	**11,057**	**11,100**	**11,136**
WOOD COUNTY TOTAL	**11,429**	**12,006**	**11,940**	**11,997**	**12,040**	**12,074**
REGION D DEMAND TOTAL	**401,419**	**415,399**	**425,078**	**438,381**	**455,969**	**479,321**

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Region D Water User Group (WUG) Category Summary

MUNICIPAL	2020	2030	2040	2050	2060	2070
POPULATION	736,652	806,858	882,597	973,210	1,079,438	1,210,903
DEMAND (acre-feet per year)	118,659	126,460	135,899	148,746	164,956	185,303
EXISTING SUPPLIES (acre-feet per year)	214,334	231,187	230,708	230,418	229,378	232,657
NEEDS (acre-feet per year)*	16,835	19,857	23,863	29,229	36,155	45,045

COUNTY-OTHER	2020	2030	2040	2050	2060	2070
POPULATION	94,817	100,673	106,262	115,987	132,541	159,535
DEMAND (acre-feet per year)	10,649	10,982	11,435	12,483	14,394	17,557
EXISTING SUPPLIES (acre-feet per year)	28,141	28,810	29,500	30,085	31,252	32,066
NEEDS (acre-feet per year)*	653	561	647	1,139	2,259	4,286

MANUFACTURING	2020	2030	2040	2050	2060	2070
DEMAND (acre-feet per year)	99,795	104,975	104,975	104,975	104,975	104,975
EXISTING SUPPLIES (acre-feet per year)	289,279	281,493	276,805	278,505	287,794	281,975
NEEDS (acre-feet per year)*	2,914	5,578	5,455	5,465	5,735	5,865

MINING	2020	2030	2040	2050	2060	2070
DEMAND (acre-feet per year)	7,115	7,748	7,670	7,280	6,914	6,795
EXISTING SUPPLIES (acre-feet per year)	13,053	14,052	14,592	14,888	14,676	14,385
NEEDS (acre-feet per year)*	2,390	2,278	1,916	1,534	1,224	1,039

STEAM ELECTRIC POWER	2020	2030	2040	2050	2060	2070
DEMAND (acre-feet per year)	94,174	94,174	94,174	94,174	94,174	94,174
EXISTING SUPPLIES (acre-feet per year)	75,026	74,414	73,896	73,561	73,881	73,999
NEEDS (acre-feet per year)*	30,066	30,866	31,766	32,566	32,814	33,083

LIVESTOCK	2020	2030	2040	2050	2060	2070
DEMAND (acre-feet per year)	35,673	35,706	35,571	35,369	35,202	35,163
EXISTING SUPPLIES (acre-feet per year)	24,304	24,391	24,363	24,296	24,182	24,163
NEEDS (acre-feet per year)*	14,542	14,552	14,540	14,455	14,477	14,491

IRRIGATION	2020	2030	2040	2050	2060	2070
DEMAND (acre-feet per year)	35,354	35,354	35,354	35,354	35,354	35,354
EXISTING SUPPLIES (acre-feet per year)	33,387	33,382	33,390	33,394	33,392	33,402
NEEDS (acre-feet per year)*	13,188	13,206	13,208	13,209	13,211	13,213

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Category Summary report are calculated by first deducting the WUG split's projected demand from its total existing water supply volume. If the WUG split has a greater existing supply volume than projected demand in any given decade, this amount is considered a surplus volume. Before aggregating the difference between supplies and demands to the WUG category level, calculated surpluses are updated to zero so that only the WUGs with needs in the decade are included with the Needs totals.

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Region D Source Availability

GROUNDWATER SOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY *	2020	2030	2040	2050	2060	2070
BLOSSOM AQUIFER	BOWIE	RED	FRESH	21	21	21	21	21	21
BLOSSOM AQUIFER	BOWIE	SULPHUR	FRESH	180	180	180	180	180	180
BLOSSOM AQUIFER	LAMAR	RED	FRESH	323	323	323	323	323	323
BLOSSOM AQUIFER	LAMAR	SULPHUR	FRESH	71	71	71	71	71	71
BLOSSOM AQUIFER	RED RIVER	RED	FRESH	665	665	665	665	665	665
BLOSSOM AQUIFER	RED RIVER	SULPHUR	FRESH	1,013	1,013	1,013	1,013	1,013	1,013
CARRIZO-WILCOX AQUIFER	BOWIE	SULPHUR	FRESH	9,872	9,558	9,278	9,278	8,999	8,999
CARRIZO-WILCOX AQUIFER	CAMP	CYPRESS	FRESH	4,050	4,050	4,050	4,050	4,050	4,050
CARRIZO-WILCOX AQUIFER	CASS	CYPRESS	FRESH	15,159	15,132	15,132	15,119	15,106	15,094
CARRIZO-WILCOX AQUIFER	CASS	SULPHUR	FRESH	2,864	2,794	2,731	2,667	2,596	2,532
CARRIZO-WILCOX AQUIFER	FRANKLIN	CYPRESS	FRESH	7,765	7,765	7,765	7,765	7,765	7,765
CARRIZO-WILCOX AQUIFER	FRANKLIN	SULPHUR	FRESH	2,021	2,021	2,021	2,021	2,021	2,021
CARRIZO-WILCOX AQUIFER	GREGG	CYPRESS	FRESH	862	862	862	862	862	862
CARRIZO-WILCOX AQUIFER	GREGG	SABINE	FRESH	7,179	7,179	7,179	7,179	7,179	7,179
CARRIZO-WILCOX AQUIFER	HARRISON	CYPRESS	FRESH	6,183	6,109	6,070	6,036	6,016	5,990
CARRIZO-WILCOX AQUIFER	HARRISON	SABINE	FRESH	4,851	4,851	4,851	4,837	4,837	4,837
CARRIZO-WILCOX AQUIFER	HOPKINS	CYPRESS	FRESH	313	313	313	313	313	313
CARRIZO-WILCOX AQUIFER	HOPKINS	SABINE	FRESH	2,842	2,842	2,842	2,842	2,842	2,842
CARRIZO-WILCOX AQUIFER	HOPKINS	SULPHUR	FRESH	7,119	7,205	7,228	7,045	7,010	6,795
CARRIZO-WILCOX AQUIFER	MARION	CYPRESS	FRESH	2,726	2,726	2,726	2,726	2,726	2,726
CARRIZO-WILCOX AQUIFER	MORRIS	CYPRESS	FRESH	2,166	2,166	2,166	2,166	2,166	2,166
CARRIZO-WILCOX AQUIFER	MORRIS	SULPHUR	FRESH	402	402	402	402	402	402
CARRIZO-WILCOX AQUIFER	RAINS	SABINE	FRESH	1,839	1,839	1,839	1,802	1,802	1,745
CARRIZO-WILCOX AQUIFER	RED RIVER	SULPHUR	FRESH	0	0	0	0	0	0
CARRIZO-WILCOX AQUIFER	SMITH	SABINE	FRESH	13,246	13,220	13,220	13,220	13,206	13,196
CARRIZO-WILCOX AQUIFER	TITUS	CYPRESS	FRESH	7,215	7,064	6,974	7,211	7,252	7,194
CARRIZO-WILCOX AQUIFER	TITUS	SULPHUR	FRESH	2,838	2,838	2,838	2,838	2,838	2,838
CARRIZO-WILCOX AQUIFER	UPSHUR	CYPRESS	FRESH	5,442	5,442	5,442	5,442	5,442	5,442
CARRIZO-WILCOX AQUIFER	UPSHUR	SABINE	FRESH	1,689	1,689	1,689	1,689	1,689	1,689
CARRIZO-WILCOX AQUIFER	VAN ZANDT	NECHES	FRESH	4,317	4,317	4,317	4,317	4,317	4,317
CARRIZO-WILCOX AQUIFER	VAN ZANDT	SABINE	FRESH	4,767	4,729	4,556	4,497	4,497	4,370
CARRIZO-WILCOX AQUIFER	VAN ZANDT	TRINITY	FRESH	1,384	1,384	1,384	1,384	1,384	1,384
CARRIZO-WILCOX AQUIFER	WOOD	CYPRESS	FRESH	2,053	2,053	2,053	2,053	2,053	2,053
CARRIZO-WILCOX AQUIFER	WOOD	SABINE	FRESH	19,404	19,360	19,285	19,263	19,239	19,184
NACATOCH AQUIFER	BOWIE	RED	FRESH	3,071	3,071	3,071	3,071	3,071	3,071
NACATOCH AQUIFER	BOWIE	SULPHUR	FRESH	1,942	1,942	1,942	1,942	1,942	1,942
NACATOCH AQUIFER	DELTA	SULPHUR	FRESH	575	575	575	575	575	575
NACATOCH AQUIFER	FRANKLIN	SULPHUR	FRESH	30	30	30	30	30	30
NACATOCH AQUIFER	HOPKINS	SABINE	FRESH	291	291	291	291	291	291
NACATOCH AQUIFER	HOPKINS	SULPHUR	FRESH	916	916	916	916	916	916
NACATOCH AQUIFER	HUNT	SABINE	FRESH	3,303	3,303	3,303	3,303	3,303	3,303
NACATOCH AQUIFER	HUNT	SULPHUR	FRESH	491	491	513	868	1,347	2,052
NACATOCH AQUIFER	LAMAR	SULPHUR	FRESH	110	110	110	110	110	110
NACATOCH AQUIFER	RAINS	SABINE	FRESH	1	1	1	1	1	1
NACATOCH AQUIFER	RED RIVER	RED	FRESH	58	58	58	58	58	58

* Salinity field indicates whether the source availability is considered ‘fresh’ (less than 1,000 mg/L), ‘brackish’ (1,000 to 10,000 mg/L), ‘saline’ (10,001 mg/L to 34,999 mg/L), or ‘seawater’ (35,000 mg/L or greater). Sources can also be labeled as ‘fresh/brackish’ or ‘brackish/saline’, if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

Region D Source Availability

GROUNDWATER SOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY ***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
NACATOCH AQUIFER	RED RIVER	SULPHUR	FRESH	2,925	2,924	2,923	2,923	2,923	2,923
QUEEN CITY AQUIFER	CAMP	CYPRESS	FRESH	4,306	4,306	4,150	4,150	4,150	4,150
QUEEN CITY AQUIFER	CASS	CYPRESS	FRESH	35,499	35,499	35,499	35,499	35,499	35,499
QUEEN CITY AQUIFER	CASS	SULPHUR	FRESH	3,010	3,010	3,010	3,010	3,010	3,010
QUEEN CITY AQUIFER	GREGG	CYPRESS	FRESH	1,359	1,359	1,359	1,359	1,359	1,359
QUEEN CITY AQUIFER	GREGG	SABINE	FRESH	5,625	5,625	5,625	5,625	5,625	5,625
QUEEN CITY AQUIFER	HARRISON	CYPRESS	FRESH	7,762	7,762	7,762	7,762	7,762	7,762
QUEEN CITY AQUIFER	HARRISON	SABINE	FRESH	2,310	2,310	2,310	2,310	2,310	2,310
QUEEN CITY AQUIFER	MARION	CYPRESS	FRESH	15,407	15,407	15,407	15,407	15,338	15,271
QUEEN CITY AQUIFER	MORRIS	CYPRESS	FRESH	9,469	9,469	9,469	9,469	9,469	9,362
QUEEN CITY AQUIFER	SMITH	SABINE	FRESH	28,343	28,343	28,343	28,213	28,018	27,887
QUEEN CITY AQUIFER	TITUS	CYPRESS	FRESH	144	144	144	144	144	144
QUEEN CITY AQUIFER	UPSHUR	CYPRESS	FRESH	19,642	19,642	19,448	19,448	19,448	19,396
QUEEN CITY AQUIFER	UPSHUR	SABINE	FRESH	7,749	7,749	7,749	7,749	7,749	7,749
QUEEN CITY AQUIFER	VAN ZANDT	NECHES	FRESH	4,791	4,791	4,791	4,791	4,791	4,791
QUEEN CITY AQUIFER	WOOD	CYPRESS	FRESH	986	986	986	986	986	986
QUEEN CITY AQUIFER	WOOD	SABINE	FRESH	9,060	9,060	9,060	9,060	9,060	9,060
TRINITY AQUIFER	DELTA	SULPHUR	FRESH	56	56	56	56	56	56
TRINITY AQUIFER	HUNT	SABINE	FRESH	213	213	213	213	213	213
TRINITY AQUIFER	HUNT	SULPHUR	FRESH	3	3	3	3	3	3
TRINITY AQUIFER	HUNT	TRINITY	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	LAMAR	RED	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	LAMAR	SULPHUR	FRESH	8	8	8	8	8	8
TRINITY AQUIFER	RED RIVER	RED	FRESH	52	52	52	52	52	52
TRINITY AQUIFER	RED RIVER	SULPHUR	FRESH	234	233	234	233	234	233
WOODBINE AQUIFER	HUNT	SABINE	FRESH	269	268	269	268	269	268
WOODBINE AQUIFER	HUNT	SULPHUR	FRESH	165	165	165	165	165	165
WOODBINE AQUIFER	HUNT	TRINITY	FRESH	330	329	330	329	330	329
WOODBINE AQUIFER	LAMAR	RED	FRESH	22	22	22	22	22	22
WOODBINE AQUIFER	LAMAR	SULPHUR	FRESH	49	49	49	49	49	49
WOODBINE AQUIFER	RED RIVER	RED	FRESH	2	2	2	2	2	2
			GROUNDWATER SOURCE AVAILABILITY TOTAL	**313,419**	**312,757**	**311,734**	**311,767**	**311,570**	**311,291**

REUSE SOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY ***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
DIRECT REUSE	GREGG	SABINE	FRESH	6,161	6,161	6,161	6,161	6,161	6,161
DIRECT REUSE	LAMAR	RED	FRESH	12	12	12	12	12	12
DIRECT REUSE	MORRIS	CYPRESS	FRESH	72,086	66,660	61,344	62,600	71,474	65,248
DIRECT REUSE	TITUS	CYPRESS	FRESH	160	160	160	160	160	160
			REUSE SOURCE AVAILABILITY TOTAL	**78,419**	**72,993**	**67,677**	**68,933**	**77,807**	**71,581**

SURFACE WATER SOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY ***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
BIG CREEK LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	2,162	2,162	2,162	2,162	2,162	2,162
BIG SANDY CREEK LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	2,685	2,685	2,685	2,685	2,685	2,685

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region D Source Availability

SURFACE WATER SOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY *	2020	2030	2040	2050	2060	2070
BOB SANDLIN LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	36,600	37,100	36,800	36,800	36,100	35,300
BRANDY BRANCH LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	19,889	19,889	19,889	19,889	19,889	19,889
CADDO LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	10,000	10,000	10,000	10,000	10,000	10,000
CANEY CREEK LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	964	964	964	964	964	964
CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	RESERVOIR**	SULPHUR	FRESH	71,890	70,805	69,301	67,874	66,745	65,298
CROOK LAKE/RESERVOIR	RESERVOIR**	RED	FRESH	7,290	7,290	7,290	7,290	7,290	7,290
CYPRESS LIVESTOCK LOCAL SUPPLY	CAMP	CYPRESS	FRESH	534	534	571	636	698	724
CYPRESS LIVESTOCK LOCAL SUPPLY	CASS	CYPRESS	FRESH	565	565	565	565	565	565
CYPRESS LIVESTOCK LOCAL SUPPLY	FRANKLIN	CYPRESS	FRESH	291	291	291	291	291	291
CYPRESS LIVESTOCK LOCAL SUPPLY	HARRISON	CYPRESS	FRESH	276	302	329	358	387	421
CYPRESS LIVESTOCK LOCAL SUPPLY	HOPKINS	CYPRESS	FRESH	108	108	108	108	108	108
CYPRESS LIVESTOCK LOCAL SUPPLY	MORRIS	CYPRESS	FRESH	215	215	215	215	215	215
CYPRESS LIVESTOCK LOCAL SUPPLY	UPSHUR	CYPRESS	FRESH	975	975	975	975	975	975
CYPRESS LIVESTOCK LOCAL SUPPLY	WOOD	CYPRESS	FRESH	271	271	271	271	271	271
CYPRESS RUN-OF-RIVER	CAMP	CYPRESS	FRESH	1	1	1	1	1	1
CYPRESS RUN-OF-RIVER	CASS	CYPRESS	FRESH	175	175	175	175	175	175
CYPRESS RUN-OF-RIVER	GREGG	CYPRESS	FRESH	41	41	41	41	41	41
CYPRESS RUN-OF-RIVER	HARRISON	CYPRESS	FRESH	9,724	9,724	9,724	9,724	9,724	9,724
CYPRESS RUN-OF-RIVER	MARION	CYPRESS	FRESH	1,072	1,072	1,072	1,072	1,072	1,072
CYPRESS RUN-OF-RIVER	MORRIS	CYPRESS	FRESH	59	59	59	59	59	59
CYPRESS RUN-OF-RIVER	TITUS	CYPRESS	FRESH	408	408	408	408	408	408
CYPRESS RUN-OF-RIVER	UPSHUR	CYPRESS	FRESH	22	22	22	22	22	22
CYPRESS SPRINGS LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	11,800	11,300	10,800	10,400	9,900	9,500
EDGEWOOD CITY LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	160	160	160	160	160	160
ELLIOT CREEK LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	1,892	1,892	1,892	1,892	1,892	1,892
ELLISON CREEK LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	33,643	33,643	33,643	33,643	33,643	33,643
FORK LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	171,982	170,192	168,378	166,644	164,793	162,920
GILMER LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	6,180	6,180	6,180	6,180	6,180	6,180
GLADEWATER LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	4,840	4,736	3,865	3,438	3,046	2,690
GRAYS CREEK RUN-OF-RIVER	HARRISON	CYPRESS	FRESH	12	12	12	12	12	12
GREENVILLE CITY LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	3,421	3,421	3,421	3,421	3,421	3,421
JOHNSON CREEK LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	2,280	2,280	2,280	2,280	2,280	2,280
LANGFORD LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	440	300	0	0	0	0
LOMA LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	1,777	1,777	1,777	1,777	1,777	1,777
MILL CREEK LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	1,192	1,192	1,192	1,192	1,192	1,192
MONTICELLO LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	5,000	4,400	3,800	3,300	2,700	2,200
NECHES LIVESTOCK LOCAL SUPPLY	VAN ZANDT	NECHES	FRESH	1,136	1,136	1,136	1,136	1,136	1,136
NECHES RUN-OF-RIVER	VAN ZANDT	NECHES	FRESH	166	166	166	166	166	166
O' THE PINES LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	169,700	169,900	167,000	165,700	164,300	163,000
PAT MAYSE LAKE/RESERVOIR	RESERVOIR**	RED	FRESH	59,670	59,670	59,670	59,670	59,670	59,670
RED LIVESTOCK LOCAL SUPPLY	BOWIE	RED	FRESH	17	17	14	23	36	43
RED LIVESTOCK LOCAL SUPPLY	LAMAR	RED	FRESH	0	0	0	0	0	0
RED LIVESTOCK LOCAL SUPPLY	RED RIVER	RED	FRESH	474	474	474	474	474	474
RED RUN-OF-RIVER	BOWIE	RED	FRESH	9,219	9,219	9,219	9,219	9,219	9,219

* Salinity field indicates whether the source availability is considered ‘fresh’ (less than 1,000 mg/L), ‘brackish’ (1,000 to 10,000 mg/L), ‘saline’ (10,001 mg/L to 34,999 mg/L), or ‘seawater’ (35,000 mg/L or greater). Sources can also be labeled as ‘fresh/brackish’ or ‘brackish/saline’, if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

Region D Source Availability

SURFACE WATER SOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY ***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
RED RUN-OF-RIVER	LAMAR	RED	FRESH	8,609	8,609	8,609	8,609	8,609	8,609
RED RUN-OF-RIVER	RED RIVER	RED	FRESH	2,089	2,089	2,089	2,089	2,089	2,089
RHINES LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	1,170	1,170	1,170	1,170	1,170	1,170
SABINE LIVESTOCK LOCAL SUPPLY	FRANKLIN	SABINE	FRESH	1	1	1	1	1	1
SABINE LIVESTOCK LOCAL SUPPLY	HOPKINS	SABINE	FRESH	1,208	1,208	1,208	1,208	1,208	1,208
SABINE LIVESTOCK LOCAL SUPPLY	HUNT	SABINE	FRESH	812	812	812	812	812	812
SABINE LIVESTOCK LOCAL SUPPLY	RAINS	SABINE	FRESH	675	675	675	675	675	675
SABINE LIVESTOCK LOCAL SUPPLY	UPSHUR	SABINE	FRESH	352	352	352	352	352	352
SABINE LIVESTOCK LOCAL SUPPLY	VAN ZANDT	SABINE	FRESH	1,035	1,035	1,035	1,035	1,035	1,035
SABINE LIVESTOCK LOCAL SUPPLY	WOOD	SABINE	FRESH	1,897	1,897	1,897	1,897	1,897	1,897
SABINE OTHER LOCAL SUPPLY	GREGG	SABINE	FRESH	2,500	2,500	2,500	2,500	2,500	2,500
SABINE OTHER LOCAL SUPPLY	VAN ZANDT	SABINE	FRESH	847	1,007	1,170	1,337	1,498	1,661
SABINE RUN-OF-RIVER	GREGG	SABINE	FRESH	12,792	12,792	12,792	12,792	12,792	12,792
SABINE RUN-OF-RIVER	HARRISON	SABINE	FRESH	95,019	95,019	95,019	95,019	95,019	95,019
SABINE RUN-OF-RIVER	HOPKINS	SABINE	FRESH	19	19	19	19	19	19
SABINE RUN-OF-RIVER	HUNT	SABINE	FRESH	19	19	19	19	19	19
SABINE RUN-OF-RIVER	RAINS	SABINE	FRESH	211	211	211	211	211	211
SABINE RUN-OF-RIVER	SMITH	SABINE	FRESH	994	994	994	994	994	994
SABINE RUN-OF-RIVER	UPSHUR	SABINE	FRESH	207	207	207	207	207	207
SABINE RUN-OF-RIVER	VAN ZANDT	SABINE	FRESH	715	715	715	715	715	715
SABINE RUN-OF-RIVER	WOOD	SABINE	FRESH	1,031	1,031	1,031	1,031	1,031	1,031
SULPHUR LIVESTOCK LOCAL SUPPLY	BOWIE	SULPHUR	FRESH	625	625	559	465	385	353
SULPHUR LIVESTOCK LOCAL SUPPLY	CASS	SULPHUR	FRESH	114	114	114	115	115	115
SULPHUR LIVESTOCK LOCAL SUPPLY	DELTA	SULPHUR	FRESH	231	231	231	231	231	231
SULPHUR LIVESTOCK LOCAL SUPPLY	FRANKLIN	SULPHUR	FRESH	393	393	393	393	393	393
SULPHUR LIVESTOCK LOCAL SUPPLY	HOPKINS	SULPHUR	FRESH	1,570	1,493	1,324	1,314	1,130	1,049
SULPHUR LIVESTOCK LOCAL SUPPLY	HUNT	SULPHUR	FRESH	300	300	300	300	300	300
SULPHUR LIVESTOCK LOCAL SUPPLY	LAMAR	SULPHUR	FRESH	1,623	1,623	1,623	1,623	1,623	1,623
SULPHUR LIVESTOCK LOCAL SUPPLY	MORRIS	SULPHUR	FRESH	207	207	207	207	212	212
SULPHUR LIVESTOCK LOCAL SUPPLY	RED RIVER	SULPHUR	FRESH	911	911	911	911	911	911
SULPHUR LIVESTOCK LOCAL SUPPLY	TITUS	SULPHUR	FRESH	156	156	156	156	156	156
SULPHUR OTHER LOCAL SUPPLY	DELTA	SULPHUR	FRESH	25	26	26	26	26	26
SULPHUR RUN-OF-RIVER	BOWIE	SULPHUR	FRESH	205	205	205	205	205	205
SULPHUR RUN-OF-RIVER	DELTA	SULPHUR	FRESH	9,188	9,188	9,188	9,188	9,188	9,188
SULPHUR RUN-OF-RIVER	FRANKLIN	SULPHUR	FRESH	474	474	474	474	474	474
SULPHUR RUN-OF-RIVER	HOPKINS	SULPHUR	FRESH	184	184	184	184	184	184
SULPHUR RUN-OF-RIVER	HUNT	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER	LAMAR	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER	RED RIVER	SULPHUR	FRESH	8,953	8,953	8,953	8,953	8,953	8,953
SULPHUR RUN-OF-RIVER	TITUS	SULPHUR	FRESH	1,465	1,465	1,465	1,465	1,465	1,465
SULPHUR SPRINGS LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	11,464	11,464	11,464	11,464	11,464	11,464
TANKERSLEY LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	1,500	1,500	1,500	1,500	1,500	1,500
TAWAKONI LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	229,647	227,796	225,922	224,051	222,167	220,273
TRINITY LIVESTOCK LOCAL SUPPLY	HUNT	TRINITY	FRESH	34	34	34	34	35	35
TRINITY LIVESTOCK LOCAL SUPPLY	VAN ZANDT	TRINITY	FRESH	599	527	449	340	282	193

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** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region D Source Availability

SURFACE WATER SOURCE TYPE				SOURCE AVAILABILITY (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY ***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TURKEY CREEK LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	200	200	200	200	200	200
WELSH LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	3,000	2,800	2,500	2,200	1,900	1,700
WRIGHT PATMAN LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	347,566	335,665	323,757	311,788	299,726	287,530
SURFACE WATER SOURCE AVAILABILITY TOTAL				**1,404,054**	**1,386,621**	**1,363,661**	**1,343,791**	**1,322,922**	**1,301,984**

REGION D SOURCE AVAILABILITY TOTAL	**1,795,892**	**1,772,371**	**1,743,072**	**1,724,491**	**1,712,299**	**1,684,856**

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
BURNS REDBANK WSC	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
CENTRAL BOWIE COUNTY WSC	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
DE KALB	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
HOOKS	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
NEW BOSTON	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
TEXARKANA	D	RED RUN-OF-RIVER	0	0	0	0	0	0
TEXARKANA	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	D	NACATOCH AQUIFER | BOWIE COUNTY	1,105	1,128	1,149	1,130	1,119	1,119
COUNTY-OTHER	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
MANUFACTURING	D	RED RUN-OF-RIVER	7	7	7	7	7	7
MANUFACTURING	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	17	17	14	23	36	43
LIVESTOCK	D	NACATOCH AQUIFER | BOWIE COUNTY	418	418	381	316	254	228
IRRIGATION	D	RED RUN-OF-RIVER	6,992	6,992	6,992	6,992	6,992	6,992
		RED BASIN TOTAL	**8,539**	**8,562**	**8,543**	**8,468**	**8,408**	**8,389**
CENTRAL BOWIE COUNTY WSC	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
DE KALB	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
MACEDONIA EYLAU MUD 1	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
MAUD	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
NASH	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
NEW BOSTON	D	SULPHUR RUN-OF-RIVER	0	0	0	0	0	0
NEW BOSTON	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
REDWATER	D	CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	66	66	66	66	66	66
REDWATER	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	D	CANEY CREEK LAKE/RESERVOIR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	D	ELLIOT CREEK LAKE/RESERVOIR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
TEXARKANA	D	RED RUN-OF-RIVER	0	0	0	0	0	0
TEXARKANA	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
WAKE VILLAGE	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	2,396	2,442	2,484	2,440	2,416	2,416
COUNTY-OTHER	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	28	28	28	28	28	28
MANUFACTURING	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	672	672	610	502	396	354
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	49	49	45	59	85	95
IRRIGATION	D	SULPHUR RUN-OF-RIVER	169	169	169	169	169	169
		SULPHUR BASIN TOTAL	**3,380**	**3,426**	**3,402**	**3,264**	**3,160**	**3,128**
		BOWIE COUNTY TOTAL	**11,919**	**11,988**	**11,945**	**11,732**	**11,568**	**11,517**
BI COUNTY WSC	D	CARRIZO-WILCOX AQUIFER | CAMP COUNTY	937	937	937	937	937	937
BI COUNTY WSC	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	50	50	50	50	50	50
BI COUNTY WSC	D	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	100	100	100	100	100	100
BI COUNTY WSC	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	50	50	50	50	50	50
PITTSBURG	D	BOB SANDLIN LAKE/RESERVOIR	1,244	1,244	1,244	1,244	1,244	1,244

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
PITTSBURG	D	CARRIZO-WILCOX AQUIFER | CAMP COUNTY	433	433	433	433	433	433
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | CAMP COUNTY	432	444	453	461	469	478
MANUFACTURING	D	BOB SANDLIN LAKE/RESERVOIR	100	100	100	100	100	100
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | CAMP COUNTY	2	2	2	2	2	2
MINING	D	CARRIZO-WILCOX AQUIFER | CAMP COUNTY	23	23	23	23	23	23
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | CAMP COUNTY	335	335	335	335	335	335
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	481	481	481	481	481	481
LIVESTOCK	D	QUEEN CITY AQUIFER | CAMP COUNTY	136	136	136	136	136	136
		CYPRESS BASIN TOTAL	**4,323**	**4,335**	**4,344**	**4,352**	**4,360**	**4,369**
		CAMP COUNTY TOTAL	**4,323**	**4,335**	**4,344**	**4,352**	**4,360**	**4,369**
ATLANTA	D	WRIGHT PATMAN LAKE/RESERVOIR	1,016	1,074	1,134	1,208	1,205	1,205
E M C WSC	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	43	43	43	43	43	43
E M C WSC	D	CARRIZO-WILCOX AQUIFER | MARION COUNTY	20	20	20	20	20	20
EASTERN CASS WSC	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	581	581	581	581	581	581
HOLLY SPRINGS WSC	D	O' THE PINES LAKE/RESERVOIR	60	60	60	59	59	59
HUGHES SPRINGS	D	O' THE PINES LAKE/RESERVOIR	562	562	562	562	562	562
LINDEN	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	444	444	444	444	444	444
MIMS WSC	D	O' THE PINES LAKE/RESERVOIR	133	133	133	133	133	133
QUEEN CITY	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	169	169	169	169	169	169
WESTERN CASS WSC	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	895	895	895	895	895	895
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	212	212	212	212	212	212
COUNTY-OTHER	D	O' THE PINES LAKE/RESERVOIR	302	302	302	302	302	302
MANUFACTURING	D	WRIGHT PATMAN LAKE/RESERVOIR	244	245	245	245	245	245
MINING	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	33	33	33	20	20	20
MINING	D	QUEEN CITY AQUIFER | CASS COUNTY	806	829	851	884	906	932
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	19	19	19	19	19	19
LIVESTOCK	D	CYPRESS RUN-OF-RIVER	7	7	7	7	7	7
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	458	458	458	458	458	458
		CYPRESS BASIN TOTAL	**6,004**	**6,086**	**6,168**	**6,261**	**6,280**	**6,306**
ATLANTA	D	WRIGHT PATMAN LAKE/RESERVOIR	1	1	1	1	1	1
EASTERN CASS WSC	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	38	38	38	38	38	38
QUEEN CITY	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	100	100	100	100	100	100
WESTERN CASS WSC	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	188	188	188	188	188	188
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	80	80	80	80	80	80
COUNTY-OTHER	D	WRIGHT PATMAN LAKE/RESERVOIR	44	44	44	44	44	44
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	51	50	48	47	47	46
MANUFACTURING	D	WRIGHT PATMAN LAKE/RESERVOIR	32,479	32,554	32,554	32,554	32,554	32,554
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | CASS COUNTY	20	20	20	20	20	20
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	221	221	221	222	222	222
LIVESTOCK	D	QUEEN CITY AQUIFER | CASS COUNTY	114	114	114	115	115	115
		SULPHUR BASIN TOTAL	**33,336**	**33,410**	**33,408**	**33,409**	**33,409**	**33,408**
		CASS COUNTY TOTAL	**39,340**	**39,496**	**39,576**	**39,670**	**39,689**	**39,714**
COOPER	D	BIG CREEK LAKE/RESERVOIR	980	980	980	980	980	980
DELTA COUNTY MUD*	D	BIG CREEK LAKE/RESERVOIR	126	122	123	124	128	132
NORTH HUNT SUD*	D	TAWAKONI LAKE/RESERVOIR	9	7	6	4	3	3
NORTH HUNT SUD*	D	WOODBINE AQUIFER | HUNT COUNTY	4	3	2	2	1	1
COUNTY-OTHER	D	BIG CREEK LAKE/RESERVOIR	82	83	82	80	76	73
COUNTY-OTHER	D	NACATOCH AQUIFER | DELTA COUNTY	84	85	86	86	86	86

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
COUNTY-OTHER	D	TRINITY AQUIFER | DELTA COUNTY	28	16	16	16	16	16
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	231	231	231	231	231	231
LIVESTOCK	D	NACATOCH AQUIFER | DELTA COUNTY	20	20	20	20	20	20
LIVESTOCK	D	TRINITY AQUIFER | DELTA COUNTY	28	40	40	40	40	40
IRRIGATION	D	NACATOCH AQUIFER | DELTA COUNTY	38	51	61	66	66	78
IRRIGATION	D	SULPHUR RUN-OF-RIVER	9,125	9,125	9,125	9,125	9,125	9,125
		SULPHUR BASIN TOTAL	**10,755**	**10,763**	**10,772**	**10,774**	**10,772**	**10,785**
		DELTA COUNTY TOTAL	**10,755**	**10,763**	**10,772**	**10,774**	**10,772**	**10,785**
CYPRESS SPRINGS SUD	D	CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	67	67	67	67	67	67
CYPRESS SPRINGS SUD	D	CYPRESS SPRINGS LAKE/RESERVOIR	2,067	1,983	1,892	1,825	1,735	1,660
WINNSBORO	D	CYPRESS SPRINGS LAKE/RESERVOIR	384	370	355	343	328	316
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	72	77	82	82	82	82
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	7	7	7	7	7	7
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	133	133	133	133	133	133
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	292	292	292	292	292	292
IRRIGATION	D	SULPHUR RUN-OF-RIVER	103	103	103	103	103	103
		CYPRESS BASIN TOTAL	**3,125**	**3,032**	**2,931**	**2,852**	**2,747**	**2,660**
IRRIGATION	D	SULPHUR RUN-OF-RIVER	107	107	107	107	107	107
		SABINE BASIN TOTAL	**107**	**107**	**107**	**107**	**107**	**107**
CYPRESS SPRINGS SUD	D	CYPRESS SPRINGS LAKE/RESERVOIR	1,341	1,288	1,228	1,180	1,122	1,076
MOUNT VERNON	D	CYPRESS SPRINGS LAKE/RESERVOIR	2,852	2,731	2,610	2,514	2,393	2,296
MOUNT VERNON	D	SULPHUR RUN-OF-RIVER	160	160	160	160	160	160
COUNTY-OTHER	D	BOB SANDLIN LAKE/RESERVOIR	14	0	0	0	0	0
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	111	123	133	133	133	133
MINING	D	CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	1,040	1,016	994	974	954	954
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	228	228	228	228	228	228
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	393	393	393	393	393	393
IRRIGATION	D	SULPHUR RUN-OF-RIVER	104	104	104	104	104	104
		SULPHUR BASIN TOTAL	**6,243**	**6,043**	**5,850**	**5,686**	**5,487**	**5,344**
		FRANKLIN COUNTY TOTAL	**9,475**	**9,182**	**8,888**	**8,645**	**8,341**	**8,111**
GLENWOOD WSC	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	25	24	25	25	25	25
TRYON ROAD SUD	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	165	165	165	164	153	139
TRYON ROAD SUD	D	O' THE PINES LAKE/RESERVOIR	948	948	948	948	948	948
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	196	207	220	237	261	278
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	19	19	19	19	19	19
COUNTY-OTHER	D	FORK LAKE/RESERVOIR	17	31	33	37	41	45
COUNTY-OTHER	D	O' THE PINES LAKE/RESERVOIR	3	2	2	3	3	3
MINING	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	14	22	22	17	13	9
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	11	11	11	11	11	11
		CYPRESS BASIN TOTAL	**1,398**	**1,429**	**1,445**	**1,461**	**1,474**	**1,477**
CLARKSVILLE CITY	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	245	245	245	245	245	245
CROSS ROADS SUD*	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	52	51	50	50	51	52
CROSS ROADS SUD*	D	FORK LAKE/RESERVOIR	32	34	36	39	43	47
ELDERVILLE WSC*	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	396	396	396	396	396	396
ELDERVILLE WSC*	I	CHEROKEE LAKE/RESERVOIR	186	185	185	185	186	170
ELDERVILLE WSC*	D	FORK LAKE/RESERVOIR	188	188	188	188	188	189
GLADEWATER	D	GLADEWATER LAKE/RESERVOIR	982	987	999	1,013	1,030	1,113
KILGORE*	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	1,144	1,139	1,139	1,140	1,143	1,148

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
KILGORE*	D	FORK LAKE/RESERVOIR	1,415	4,352	4,163	3,934	3,723	4,003
LIBERTY CITY WSC	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	858	858	858	858	858	858
LONGVIEW	I	CHEROKEE LAKE/RESERVOIR	7,463	7,467	7,471	7,472	7,474	7,475
LONGVIEW	D	FORK LAKE/RESERVOIR	6,304	15,153	15,194	15,228	15,267	15,303
LONGVIEW	D	O' THE PINES LAKE/RESERVOIR	17,150	17,150	17,150	17,150	17,150	17,150
LONGVIEW	D	SABINE RUN-OF-RIVER	11,324	11,327	11,334	11,336	11,338	11,340
STARRVILLE-FRIENDSHIP WSC	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	60	60	60	60	60	60
STARRVILLE-FRIENDSHIP WSC	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	38	38	38	38	38	38
TRYON ROAD SUD	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	128	128	128	128	128	128
TRYON ROAD SUD	D	O' THE PINES LAKE/RESERVOIR	740	740	740	740	740	740
WEST GREGG SUD*	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	521	521	521	521	521	517
WHITE OAK	D	BIG SANDY CREEK LAKE/RESERVOIR	2,595	2,595	2,595	2,595	2,595	2,595
COUNTY-OTHER	D	BIG SANDY CREEK LAKE/RESERVOIR	50	50	50	50	50	50
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	722	789	867	972	1,124	1,134
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	18	18	18	18	18	18
COUNTY-OTHER	D	FORK LAKE/RESERVOIR	94	590	630	693	767	855
COUNTY-OTHER	D	GLADEWATER LAKE/RESERVOIR	154	154	154	154	154	54
COUNTY-OTHER	D	O' THE PINES LAKE/RESERVOIR	47	48	48	47	47	47
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	30	30	30	30	30	30
MANUFACTURING	D	LOCAL SURFACE WATER SUPPLY	450	450	450	450	450	450
MANUFACTURING	D	SABINE RUN-OF-RIVER	1,092	1,094	1,094	1,094	1,094	1,094
MINING	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	246	389	385	303	220	162
MINING	D	SABINE RUN-OF-RIVER	3	3	3	3	3	3
STEAM ELECTRIC POWER	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	242	242	242	242	242	242
STEAM ELECTRIC POWER	I	CHEROKEE LAKE/RESERVOIR	2,000	2,000	2,000	2,000	2,000	2,000
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	204	204	204	204	204	204
IRRIGATION	D	CYPRESS RUN-OF-RIVER	41	41	41	41	41	41
IRRIGATION	D	SABINE RUN-OF-RIVER	151	151	151	151	151	151
		SABINE BASIN TOTAL	**57,365**	**69,867**	**69,857**	**69,768**	**69,769**	**70,102**
		GREGG COUNTY TOTAL	**58,763**	**71,296**	**71,302**	**71,229**	**71,243**	**71,579**
BLOCKER CROSSROADS WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	21	20	21	21	21	20
DIANA SUD	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	47	47	47	47	47	47
DIANA SUD	D	O' THE PINES LAKE/RESERVOIR	47	47	47	47	47	47
GUM SPRINGS WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	300	300	300	300	300	300
GUM SPRINGS WSC	I	CHEROKEE LAKE/RESERVOIR	52	52	52	52	52	52
GUM SPRINGS WSC	D	FORK LAKE/RESERVOIR	201	200	200	200	200	201
GUM SPRINGS WSC	D	O' THE PINES LAKE/RESERVOIR	538	536	536	537	536	538
HARLETON WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	247	247	247	247	247	247
HARLETON WSC	D	O' THE PINES LAKE/RESERVOIR	51	51	51	51	51	51
LEIGH WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	357	357	357	357	357	357
MARSHALL	D	CYPRESS RUN-OF-RIVER	1,262	1,262	1,262	1,262	1,262	1,262
MARSHALL	D	O' THE PINES LAKE/RESERVOIR	1,158	1,158	1,158	1,158	1,158	1,158
NORTH HARRISON WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	161	161	161	161	161	161
PANOLA-BETHANY WSC*	I	CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	29	29	29	29	29	29
SCOTTSVILLE	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	71	71	71	70	70	71
TALLEY WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	114	114	114	114	112	112
TRYON ROAD SUD	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	0	0	0	1	12	26
TRYON ROAD SUD	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	20	20	20	20	20	20

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TRYON ROAD SUD	D	O' THE PINES LAKE/RESERVOIR	134	134	134	134	134	134
WASKOM	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	339	339	339	339	339	339
WEST HARRISON WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	87	88	88	86	86	87
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	15	15	15	15	15	15
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	2,032	2,088	2,130	2,179	2,252	2,307
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	30	30	30	30	30	30
COUNTY-OTHER	D	O' THE PINES LAKE/RESERVOIR	253	253	253	253	253	253
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	147	147	147	147	147	147
MANUFACTURING	D	CYPRESS RUN-OF-RIVER	2,386	2,386	2,386	2,386	2,386	2,386
MINING	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	217	233	241	250	257	267
MINING	D	CYPRESS RUN-OF-RIVER	67	67	67	67	67	67
MINING	D	QUEEN CITY AQUIFER | HARRISON COUNTY	7	0	0	0	0	0
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	167	196	225	255	287	317
LIVESTOCK	D	CYPRESS RUN-OF-RIVER	90	90	90	90	90	90
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	276	302	329	358	366	366
LIVESTOCK	D	QUEEN CITY AQUIFER | HARRISON COUNTY	26	26	26	26	26	26
IRRIGATION	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	25	25	25	25	25	25
IRRIGATION	D	CYPRESS RUN-OF-RIVER	10	10	10	10	10	10
		CYPRESS BASIN TOTAL	**10,984**	**11,101**	**11,208**	**11,324**	**11,452**	**11,565**
BLOCKER CROSSROADS WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	191	192	191	191	191	192
GILL WSC*	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	250	250	250	250	250	250
GILL WSC*	D	O' THE PINES LAKE/RESERVOIR	67	67	67	67	67	67
GUM SPRINGS WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	127	127	127	127	127	127
GUM SPRINGS WSC	I	CHEROKEE LAKE/RESERVOIR	142	142	142	142	142	142
GUM SPRINGS WSC	D	FORK LAKE/RESERVOIR	545	546	546	546	546	545
GUM SPRINGS WSC	D	O' THE PINES LAKE/RESERVOIR	1,462	1,464	1,464	1,463	1,464	1,462
HALLSVILLE	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	77	77	77	77	77	77
HALLSVILLE	I	CHEROKEE LAKE/RESERVOIR	403	403	403	403	403	403
HALLSVILLE	D	FORK LAKE/RESERVOIR	334	334	334	334	334	334
LEIGH WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	78	78	78	78	78	78
LONGVIEW	I	CHEROKEE LAKE/RESERVOIR	174	170	166	165	163	162
LONGVIEW	D	FORK LAKE/RESERVOIR	331	325	317	315	311	310
LONGVIEW	D	O' THE PINES LAKE/RESERVOIR	400	400	400	400	400	400
LONGVIEW	D	SABINE RUN-OF-RIVER	264	259	252	250	248	246
MARSHALL	D	CYPRESS RUN-OF-RIVER	5,909	5,909	5,909	5,909	5,909	5,909
MARSHALL	D	O' THE PINES LAKE/RESERVOIR	5,419	5,419	5,419	5,419	5,419	5,419
PANOLA-BETHANY WSC*	I	CARRIZO-WILCOX AQUIFER | PANOLA COUNTY	253	242	242	241	241	241
SCOTTSVILLE	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	145	145	145	146	146	145
TALLEY WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	84	84	84	84	86	86
WEST HARRISON WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	273	272	272	274	274	273
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	1,350	1,425	1,482	1,549	1,646	1,720
COUNTY-OTHER	D	O' THE PINES LAKE/RESERVOIR	70	70	70	70	70	70
MANUFACTURING	I	CHEROKEE LAKE/RESERVOIR	5,524	5,524	5,524	5,524	5,524	5,524
MANUFACTURING	D	FORK LAKE/RESERVOIR	3,500	3,157	3,124	3,092	3,057	3,022
MANUFACTURING	D	GRAYS CREEK RUN-OF-RIVER	12	12	12	12	12	12
MANUFACTURING	D	O' THE PINES LAKE/RESERVOIR	2,400	2,400	2,400	2,400	2,400	2,400
MANUFACTURING	D	SABINE RUN-OF-RIVER	94,403	94,403	94,403	94,403	94,403	94,403
MINING	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	96	105	115	124	132	141

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
MINING	D	SABINE RUN-OF-RIVER	405	405	405	405	405	405
STEAM ELECTRIC POWER	D	BRANDY BRANCH LAKE/RESERVOIR	2,347	2,347	2,347	2,347	2,347	2,347
STEAM ELECTRIC POWER	D	DIRECT REUSE	6,161	6,161	6,161	6,161	6,161	6,161
STEAM ELECTRIC POWER	D	O' THE PINES LAKE/RESERVOIR	18,000	18,000	18,000	18,000	18,000	18,000
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	405	425	447	469	492	514
IRRIGATION	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	14	14	14	14	14	14
IRRIGATION	D	SABINE RUN-OF-RIVER	120	120	120	120	120	120
		SABINE BASIN TOTAL	**151,735**	**151,473**	**151,509**	**151,571**	**151,659**	**151,721**
		HARRISON COUNTY TOTAL	**162,719**	**162,574**	**162,717**	**162,895**	**163,111**	**163,286**
CORNERSVILLE WSC	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	97	99	99	97	99	98
CYPRESS SPRINGS SUD	D	CYPRESS SPRINGS LAKE/RESERVOIR	173	161	150	139	130	123
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	179	179	178	178	178	178
MINING	D	NACATOCH AQUIFER | HOPKINS COUNTY	18	19	18	19	19	19
MINING	D	SULPHUR SPRINGS LAKE/RESERVOIR	6	7	7	8	9	9
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	38	38	38	38	38	38
LIVESTOCK	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	33	34	38	38	42	44
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	108	108	108	108	108	108
IRRIGATION	D	SABINE RUN-OF-RIVER	1	1	1	1	1	1
		CYPRESS BASIN TOTAL	**653**	**646**	**637**	**626**	**624**	**618**
BRASHEAR WSC	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	67	70	74	77	82	87
CASH SUD*	D	FORK LAKE/RESERVOIR	1	0	0	0	0	0
CASH SUD*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	4	4	4	3	3	2
CASH SUD*	D	TAWAKONI LAKE/RESERVOIR	7	6	4	5	6	1
CASH SUD*	C	TRINITY INDIRECT REUSE	3	3	3	3	2	2
CORNERSVILLE WSC	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	93	93	93	94	92	93
CUMBY	D	NACATOCH AQUIFER | HOPKINS COUNTY	109	109	109	109	109	109
JONES WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	29	34	38	43	46	52
LAKE FORK WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	49	49	47	46	46	48
MARTIN SPRINGS WSC	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	376	375	374	376	377	377
MARTIN SPRINGS WSC	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	188	188	188	189	189	188
MILLER GROVE WSC	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	164	164	164	163	164	164
SHADY GROVE NO 2 WSC	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	24	25	27	28	30	31
SHADY GROVE NO 2 WSC	D	SULPHUR SPRINGS LAKE/RESERVOIR	24	25	26	27	29	31
SHIRLEY WSC	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	230	231	230	230	230	230
SHIRLEY WSC	D	CARRIZO-WILCOX AQUIFER | RAINS COUNTY	98	98	98	98	98	98
SULPHUR SPRINGS	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	15	14	14	15	14	14
SULPHUR SPRINGS	D	SULPHUR SPRINGS LAKE/RESERVOIR	1	1	1	1	1	1
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	464	465	466	464	461	461
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | RAINS COUNTY	112	112	112	112	112	112
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	7	7	7	7	7	7
COUNTY-OTHER	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	48	53	50	15	0	0
MINING	D	NACATOCH AQUIFER | HOPKINS COUNTY	187	192	193	193	195	195
MINING	D	SULPHUR SPRINGS LAKE/RESERVOIR	62	68	74	81	88	96
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	249	249	249	249	249	249

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
LIVESTOCK	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	399	420	466	469	519	541
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	1,208	1,208	1,208	1,208	1,208	1,208
IRRIGATION	D	SABINE RUN-OF-RIVER	18	18	18	18	18	18
		SABINE BASIN TOTAL	**4,236**	**4,281**	**4,337**	**4,323**	**4,375**	**4,415**
BRASHEAR WSC	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	81	85	89	93	99	105
BRINKER WSC	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	252	251	251	252	253	253
BRINKER WSC	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	77	77	77	77	77	77
CUMBY	D	NACATOCH AQUIFER | HOPKINS COUNTY	11	11	11	11	11	11
CYPRESS SPRINGS SUD	D	CYPRESS SPRINGS LAKE/RESERVOIR	346	322	300	282	265	246
GAFFORD CHAPEL WSC	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	109	111	115	121	128	135
GAFFORD CHAPEL WSC	D	NACATOCH AQUIFER | HOPKINS COUNTY	52	52	52	52	52	52
GAFFORD CHAPEL WSC	D	NACATOCH AQUIFER | HUNT COUNTY	3	3	3	3	3	3
MARTIN SPRINGS WSC	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	69	69	69	69	69	69
MARTIN SPRINGS WSC	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	35	35	35	34	34	35
NORTH HOPKINS WSC	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	921	921	921	921	921	921
SHADY GROVE NO 2 WSC	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	30	31	32	34	36	38
SHADY GROVE NO 2 WSC	D	SULPHUR SPRINGS LAKE/RESERVOIR	29	31	33	34	36	38
SULPHUR SPRINGS	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	4,552	4,553	4,553	4,552	4,553	4,553
SULPHUR SPRINGS	D	SULPHUR SPRINGS LAKE/RESERVOIR	434	434	434	434	434	434
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	390	392	393	390	387	387
COUNTY-OTHER	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	28	30	29	9	0	0
COUNTY-OTHER	D	NACATOCH AQUIFER | HOPKINS COUNTY	114	91	88	87	85	85
MANUFACTURING	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	1,526	1,561	1,592	1,611	1,701	1,802
MANUFACTURING	D	SULPHUR SPRINGS LAKE/RESERVOIR	215	269	323	376	425	473
MINING	D	NACATOCH AQUIFER | HOPKINS COUNTY	399	410	411	412	414	414
MINING	D	SULPHUR SPRINGS LAKE/RESERVOIR	132	145	159	172	188	205
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	130	130	130	130	131	131
LIVESTOCK	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	1,042	1,097	1,216	1,223	1,353	1,411
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	1,570	1,493	1,324	1,314	1,130	1,049
LIVESTOCK	D	NACATOCH AQUIFER | HOPKINS COUNTY	77	77	77	77	77	77
IRRIGATION	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	49	49	49	49	49	49
IRRIGATION	D	SULPHUR RUN-OF-RIVER	76	76	76	76	76	76
		SULPHUR BASIN TOTAL	**12,749**	**12,806**	**12,842**	**12,895**	**12,987**	**13,129**
		HOPKINS COUNTY TOTAL	**17,638**	**17,733**	**17,816**	**17,844**	**17,986**	**18,162**
ABLES SPRINGS WSC*	D	FORK LAKE/RESERVOIR	4	0	0	0	0	0
ABLES SPRINGS WSC*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	30	41	55	71	92	121
ABLES SPRINGS WSC*	D	TAWAKONI LAKE/RESERVOIR	3	2	3	3	5	6
ABLES SPRINGS WSC*	C	TRINITY INDIRECT REUSE	21	32	45	60	77	102
B H P WSC*	D	FORK LAKE/RESERVOIR	24	0	0	0	0	0
B H P WSC*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	171	179	196	225	269	332
B H P WSC*	D	TAWAKONI LAKE/RESERVOIR	17	9	10	11	13	17

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
B H P WSC*	C	TRINITY INDIRECT REUSE	118	138	162	189	225	280
BLACKLAND WSC*	D	FORK LAKE/RESERVOIR	1	0	0	0	0	0
BLACKLAND WSC*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	5	4	3	3	3	2
BLACKLAND WSC*	C	TRINITY INDIRECT REUSE	3	3	3	2	2	2
CADDO BASIN SUD*	D	FORK LAKE/RESERVOIR	64	0	0	0	0	0
CADDO BASIN SUD*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	442	512	601	718	880	1,118
CADDO BASIN SUD*	D	TAWAKONI LAKE/RESERVOIR	45	26	30	36	44	55
CADDO BASIN SUD*	C	TRINITY INDIRECT REUSE	314	395	493	600	738	941
CADDO MILLS	D	TAWAKONI LAKE/RESERVOIR	178	186	201	242	309	319
CASH SUD*	D	FORK LAKE/RESERVOIR	97	0	0	0	0	3,095
CASH SUD*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	328	343	248	204	297	365
CASH SUD*	D	TAWAKONI LAKE/RESERVOIR	1,241	1,151	1,007	1,239	1,897	279
CASH SUD*	C	TRINITY INDIRECT REUSE	465	569	648	690	625	579
CELESTE	D	WOODBINE AQUIFER | HUNT COUNTY	95	95	95	95	95	95
COMBINED CONSUMERS SUD	D	TAWAKONI LAKE/RESERVOIR	502	589	718	911	1,197	1,615
GREENVILLE	D	GREENVILLE CITY LAKE/RESERVOIR	3,318	3,318	3,318	3,318	3,318	3,318
GREENVILLE	D	TAWAKONI LAKE/RESERVOIR	2,714	2,537	2,338	2,123	1,932	1,735
HICKORY CREEK SUD*	D	WOODBINE AQUIFER | HUNT COUNTY	177	179	182	183	185	185
JOSEPHINE*	D	FORK LAKE/RESERVOIR	3	0	0	0	0	0
JOSEPHINE*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	20	31	45	62	55	51
JOSEPHINE*	D	TAWAKONI LAKE/RESERVOIR	2	2	2	3	3	2
JOSEPHINE*	C	TRINITY INDIRECT REUSE	14	24	37	51	46	43
MACBEE SUD*	D	TAWAKONI LAKE/RESERVOIR	23	29	37	47	62	84
POETRY WSC*	D	FORK LAKE/RESERVOIR	20	0	0	0	0	0
POETRY WSC*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	129	143	160	183	220	272
POETRY WSC*	D	TAWAKONI LAKE/RESERVOIR	14	8	8	9	11	14
POETRY WSC*	C	TRINITY INDIRECT REUSE	91	110	131	153	185	228
QUINLAN	D	TAWAKONI LAKE/RESERVOIR	134	133	134	140	154	174
ROYSE CITY*	D	FORK LAKE/RESERVOIR	3	0	0	0	0	0
ROYSE CITY*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	22	24	27	31	37	46
ROYSE CITY*	D	TAWAKONI LAKE/RESERVOIR	2	1	1	2	2	2
ROYSE CITY*	C	TRINITY INDIRECT REUSE	15	19	22	26	31	39
SHADY GROVE WSC	D	TAWAKONI LAKE/RESERVOIR	139	164	202	257	338	457
WEST TAWAKONI	D	TAWAKONI LAKE/RESERVOIR	276	804	797	738	784	777
COUNTY-OTHER	D	BIG CREEK LAKE/RESERVOIR	4	6	8	12	19	21
COUNTY-OTHER	D	NACATOCH AQUIFER | HUNT COUNTY	444	445	445	445	445	445
COUNTY-OTHER	D	TAWAKONI LAKE/RESERVOIR	1,114	1,195	1,337	1,529	1,823	2,351
COUNTY-OTHER	D	WOODBINE AQUIFER | HUNT COUNTY	15	15	15	15	15	15
MANUFACTURING	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	50	50	50	50	50	50
MANUFACTURING	D	GREENVILLE CITY LAKE/RESERVOIR	103	103	103	103	103	103
MANUFACTURING	D	NACATOCH AQUIFER | HUNT COUNTY	200	200	200	200	200	200
MANUFACTURING	D	TAWAKONI LAKE/RESERVOIR	598	747	928	1,101	1,220	1,406
MINING	D	NACATOCH AQUIFER | HUNT COUNTY	36	34	30	28	22	20
MINING	D	TAWAKONI LAKE/RESERVOIR	13	14	16	17	19	16
STEAM ELECTRIC POWER	D	TAWAKONI LAKE/RESERVOIR	373	373	373	373	373	373
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	812	812	812	812	812	812
IRRIGATION	D	NACATOCH AQUIFER | HUNT COUNTY	94	94	94	94	94	94

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
IRRIGATION	D	SABINE RUN-OF-RIVER	19	19	19	19	19	19
		SABINE BASIN TOTAL	**15,159**	**15,907**	**16,389**	**17,423**	**19,345**	**22,675**
CASH SUD*	D	FORK LAKE/RESERVOIR	1	0	0	0	0	0
CASH SUD*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	9	11	11	12	11	10
CASH SUD*	D	TAWAKONI LAKE/RESERVOIR	18	17	15	18	27	3
CASH SUD*	C	TRINITY INDIRECT REUSE	6	8	10	10	9	8
COMMERCE	D	NACATOCH AQUIFER | DELTA COUNTY	122	122	122	122	122	122
COMMERCE	D	NACATOCH AQUIFER | HUNT COUNTY	122	122	122	122	122	122
COMMERCE	D	TAWAKONI LAKE/RESERVOIR	1,427	4,586	4,609	4,249	2,694	3,078
DELTA COUNTY MUD*	D	BIG CREEK LAKE/RESERVOIR	1	1	1	1	1	1
HICKORY CREEK SUD*	D	WOODBINE AQUIFER | HUNT COUNTY	109	112	113	114	114	114
NORTH HUNT SUD*	D	TAWAKONI LAKE/RESERVOIR	120	124	128	132	135	137
NORTH HUNT SUD*	D	WOODBINE AQUIFER | HUNT COUNTY	45	46	48	49	50	51
TEXAS A&M UNIVERSITY COMMERCE	D	NACATOCH AQUIFER | HUNT COUNTY	156	156	156	156	156	156
WOLFE CITY*	D	TURKEY CREEK LAKE/RESERVOIR	190	190	190	190	190	190
WOLFE CITY*	C	WOODBINE AQUIFER | FANNIN COUNTY	70	70	70	69	70	69
COUNTY-OTHER	D	NACATOCH AQUIFER | HUNT COUNTY	13	13	13	13	13	13
COUNTY-OTHER	D	TAWAKONI LAKE/RESERVOIR	34	67	99	48	72	115
MANUFACTURING	D	TAWAKONI LAKE/RESERVOIR	151	182	182	182	182	182
MINING	D	TAWAKONI LAKE/RESERVOIR	5	5	6	6	9	13
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	300	300	300	300	300	300
IRRIGATION	D	SULPHUR RUN-OF-RIVER	0	0	0	0	0	0
		SULPHUR BASIN TOTAL	**2,899**	**6,132**	**6,195**	**5,793**	**4,277**	**4,684**
FROGNOT WSC*	C	WOODBINE AQUIFER | COLLIN COUNTY	6	6	6	6	6	6
HICKORY CREEK SUD*	D	WOODBINE AQUIFER | HUNT COUNTY	54	55	55	55	56	56
WEST LEONARD WSC*	C	WOODBINE AQUIFER | FANNIN COUNTY	14	13	16	18	20	21
COUNTY-OTHER	D	NACATOCH AQUIFER | HUNT COUNTY	1	0	0	0	0	0
COUNTY-OTHER	D	TAWAKONI LAKE/RESERVOIR	0	12	30	20	31	49
COUNTY-OTHER	D	TRINITY AQUIFER | HUNT COUNTY	3	3	3	3	3	3
COUNTY-OTHER	D	WOODBINE AQUIFER | HUNT COUNTY	24	19	14	4	0	0
MINING	D	TAWAKONI LAKE/RESERVOIR	1	1	1	1	1	1
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	34	34	34	34	35	35
LIVESTOCK	D	TRINITY AQUIFER | HUNT COUNTY	0	0	0	0	0	0
IRRIGATION	D	NACATOCH AQUIFER | HUNT COUNTY	12	12	12	12	12	12
		TRINITY BASIN TOTAL	**149**	**155**	**171**	**153**	**164**	**183**
		HUNT COUNTY TOTAL	**18,207**	**22,194**	**22,755**	**23,369**	**23,786**	**27,542**
LAMAR COUNTY WSD	D	PAT MAYSE LAKE/RESERVOIR	5,334	5,278	5,229	5,193	5,159	5,108
PARIS	D	CROOK LAKE/RESERVOIR	806	806	806	806	806	806
PARIS	D	PAT MAYSE LAKE/RESERVOIR	10,352	10,234	10,119	10,023	9,839	9,742
RENO (Lamar)	D	PAT MAYSE LAKE/RESERVOIR	115	128	138	149	160	171
COUNTY-OTHER	D	PAT MAYSE LAKE/RESERVOIR	5	6	6	6	6	6
COUNTY-OTHER	D	TRINITY AQUIFER | LAMAR COUNTY	0	0	0	0	0	0
COUNTY-OTHER	D	WOODBINE AQUIFER | LAMAR COUNTY	0	0	0	0	0	0
MANUFACTURING	D	DIRECT REUSE	12	12	12	12	12	12
MANUFACTURING	D	PAT MAYSE LAKE/RESERVOIR	858	900	941	976	1,042	1,077
STEAM ELECTRIC POWER	D	PAT MAYSE LAKE/RESERVOIR	683	683	683	683	683	683
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	0	0	0	0	0	0

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
LIVESTOCK	D	TRINITY AQUIFER | LAMAR COUNTY	0	0	0	0	0	0
LIVESTOCK	D	WOODBINE AQUIFER | LAMAR COUNTY	0	0	0	0	0	0
IRRIGATION	D	RED RUN-OF-RIVER	6,468	6,468	6,468	6,468	6,468	6,468
		RED BASIN TOTAL	**24,633**	**24,515**	**24,402**	**24,316**	**24,175**	**24,073**
BLOSSOM	D	PAT MAYSE LAKE/RESERVOIR	216	230	245	245	245	245
LAMAR COUNTY WSD	D	PAT MAYSE LAKE/RESERVOIR	3,557	3,518	3,486	3,462	3,438	3,404
PARIS	D	CROOK LAKE/RESERVOIR	1,210	1,210	1,210	1,210	1,210	1,210
PARIS	D	PAT MAYSE LAKE/RESERVOIR	15,528	15,351	15,179	15,035	14,759	14,614
RENO (Lamar)	D	PAT MAYSE LAKE/RESERVOIR	513	571	616	665	713	764
COUNTY-OTHER	D	PAT MAYSE LAKE/RESERVOIR	269	274	279	277	275	273
COUNTY-OTHER	D	TRINITY AQUIFER | LAMAR COUNTY	1	1	1	1	1	1
MANUFACTURING	D	PAT MAYSE LAKE/RESERVOIR	5,091	5,340	5,580	5,787	6,183	6,386
STEAM ELECTRIC POWER	D	PAT MAYSE LAKE/RESERVOIR	8,278	8,278	8,278	8,278	8,278	8,278
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	1,623	1,623	1,623	1,623	1,623	1,623
LIVESTOCK	D	TRINITY AQUIFER | LAMAR COUNTY	1	1	1	1	1	1
IRRIGATION	D	RED RUN-OF-RIVER	2,141	2,141	2,141	2,141	2,141	2,141
IRRIGATION	D	WOODBINE AQUIFER | LAMAR COUNTY	49	49	49	49	49	49
		SULPHUR BASIN TOTAL	**38,477**	**38,587**	**38,688**	**38,774**	**38,916**	**38,989**
		LAMAR COUNTY TOTAL	**63,110**	**63,102**	**63,090**	**63,090**	**63,091**	**63,062**
DIANA SUD	D	CARRIZO-WILCOX AQUIFER | MARION COUNTY	27	27	27	27	27	27
DIANA SUD	D	O' THE PINES LAKE/RESERVOIR	24	24	24	24	24	24
E M C WSC	D	CARRIZO-WILCOX AQUIFER | MARION COUNTY	243	243	243	243	243	243
HARLETON WSC	D	CARRIZO-WILCOX AQUIFER | HARRISON COUNTY	81	81	81	81	81	81
HARLETON WSC	D	O' THE PINES LAKE/RESERVOIR	17	17	17	17	17	17
JEFFERSON	D	CYPRESS RUN-OF-RIVER	148	148	148	148	148	148
JEFFERSON	D	O' THE PINES LAKE/RESERVOIR	1,509	1,509	1,509	1,509	1,509	1,509
KELLYVILLE-BEREA WSC	D	CARRIZO-WILCOX AQUIFER | MARION COUNTY	148	148	148	148	148	148
MIMS WSC	D	O' THE PINES LAKE/RESERVOIR	763	763	763	763	763	763
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | MARION COUNTY	1,553	1,553	1,553	1,553	1,553	1,553
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	35	35	35	35	35	35
COUNTY-OTHER	D	O' THE PINES LAKE/RESERVOIR	169	169	169	169	169	169
MINING	D	CARRIZO-WILCOX AQUIFER | MARION COUNTY	116	119	122	124	126	128
STEAM ELECTRIC POWER	D	CARRIZO-WILCOX AQUIFER | MARION COUNTY	75	75	75	75	75	75
STEAM ELECTRIC POWER	D	JOHNSON CREEK LAKE/RESERVOIR	2,280	2,280	2,280	2,280	2,280	2,280
STEAM ELECTRIC POWER	D	O' THE PINES LAKE/RESERVOIR	1,902	2,090	2,472	2,937	3,505	3,892
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | MARION COUNTY	130	130	130	130	130	130
LIVESTOCK	D	QUEEN CITY AQUIFER | MARION COUNTY	281	281	281	281	281	281
IRRIGATION	D	CARRIZO-WILCOX AQUIFER | MARION COUNTY	12	12	12	12	12	12
IRRIGATION	D	CYPRESS RUN-OF-RIVER	309	309	309	309	309	309
		CYPRESS BASIN TOTAL	**9,822**	**10,013**	**10,398**	**10,865**	**11,435**	**11,824**
		MARION COUNTY TOTAL	**9,822**	**10,013**	**10,398**	**10,865**	**11,435**	**11,824**
BI COUNTY WSC	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	132	132	132	132	132	132
DAINGERFIELD	D	O' THE PINES LAKE/RESERVOIR	1,582	1,582	1,582	1,582	1,582	1,582
HOLLY SPRINGS WSC	D	O' THE PINES LAKE/RESERVOIR	32	32	32	33	33	33
HUGHES SPRINGS	D	O' THE PINES LAKE/RESERVOIR	2	2	2	2	2	2
LONE STAR	D	O' THE PINES LAKE/RESERVOIR	747	747	747	747	747	747
NAPLES	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	108	116	116	116	116	116
OMAHA	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	165	165	165	165	165	165

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
TRI SUD	D	BOB SANDLIN LAKE/RESERVOIR	181	177	176	179	183	186
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	353	353	353	353	353	353
MANUFACTURING	D	DIRECT REUSE	72,086	66,660	61,344	62,600	71,474	65,248
MANUFACTURING	D	ELLISON CREEK LAKE/RESERVOIR	13,037	13,037	13,037	13,037	13,037	13,037
MANUFACTURING	D	O' THE PINES LAKE/RESERVOIR	32,400	32,400	32,400	32,400	32,400	32,400
MANUFACTURING	D	QUEEN CITY AQUIFER | MORRIS COUNTY	4,383	4,383	4,383	4,383	4,383	4,383
STEAM ELECTRIC POWER	D	ELLISON CREEK LAKE/RESERVOIR	820	820	820	820	820	820
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	81	78	78	78	78	78
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	185	188	188	188	188	188
LIVESTOCK	D	QUEEN CITY AQUIFER | MORRIS COUNTY	60	60	60	60	60	60
IRRIGATION	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	3	3	3	3	3	3
IRRIGATION	D	CYPRESS RUN-OF-RIVER	59	59	59	59	59	59
		CYPRESS BASIN TOTAL	**126,416**	**120,994**	**115,677**	**116,937**	**125,815**	**119,592**
NAPLES	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	117	109	109	109	109	109
OMAHA	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	125	125	125	125	125	125
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	187	187	187	187	187	187
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	74	72	72	72	72	72
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	171	173	173	173	173	173
LIVESTOCK	D	QUEEN CITY AQUIFER | MORRIS COUNTY	55	55	55	55	55	55
IRRIGATION	D	CARRIZO-WILCOX AQUIFER | MORRIS COUNTY	8	8	8	8	8	8
		SULPHUR BASIN TOTAL	**737**	**729**	**729**	**729**	**729**	**729**
		MORRIS COUNTY TOTAL	**127,153**	**121,723**	**116,406**	**117,666**	**126,544**	**120,321**
BRIGHT STAR SALEM SUD	D	CARRIZO-WILCOX AQUIFER | RAINS COUNTY	344	344	344	344	344	344
BRIGHT STAR SALEM SUD	D	FORK LAKE/RESERVOIR	354	758	750	742	734	725
CASH SUD*	D	FORK LAKE/RESERVOIR	4	0	0	0	0	0
CASH SUD*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	26	25	23	20	15	12
CASH SUD*	D	TAWAKONI LAKE/RESERVOIR	49	40	29	31	39	5
CASH SUD*	C	TRINITY INDIRECT REUSE	18	19	19	17	13	10
EAST TAWAKONI	D	TAWAKONI LAKE/RESERVOIR	237	246	247	247	248	248
EMORY	D	TAWAKONI LAKE/RESERVOIR	791	829	837	842	845	847
GOLDEN WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	9	9	9	9	9	9
MILLER GROVE WSC	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	28	28	28	29	28	28
POINT	D	TAWAKONI LAKE/RESERVOIR	364	379	380	381	383	383
SHIRLEY WSC	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	106	106	106	106	106	106
SHIRLEY WSC	D	CARRIZO-WILCOX AQUIFER | RAINS COUNTY	46	46	46	46	46	46
SOUTH RAINS SUD	D	CARRIZO-WILCOX AQUIFER | RAINS COUNTY	90	90	90	90	90	90
SOUTH RAINS SUD	D	TAWAKONI LAKE/RESERVOIR	190	192	188	187	187	188
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	113	113	113	113	113	113
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | RAINS COUNTY	204	217	220	218	215	215
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	7	7	7	7	7	7
COUNTY-OTHER	D	NACATOCH AQUIFER | HOPKINS COUNTY	69	75	77	76	74	74
MANUFACTURING	D	TAWAKONI LAKE/RESERVOIR	12	12	12	12	12	12
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	506	506	506	506	506	506
IRRIGATION	D	SABINE RUN-OF-RIVER	211	211	211	211	211	211
		SABINE BASIN TOTAL	**3,778**	**4,252**	**4,242**	**4,234**	**4,225**	**4,179**
		RAINS COUNTY TOTAL	**3,778**	**4,252**	**4,242**	**4,234**	**4,225**	**4,179**
410 WSC	D	PAT MAYSE LAKE/RESERVOIR	67	66	64	64	63	63
RED RIVER COUNTY WSC	D	BLOSSOM AQUIFER | RED RIVER COUNTY	29	30	30	30	30	30

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
RED RIVER COUNTY WSC	D	PAT MAYSE LAKE/RESERVOIR	184	184	184	184	184	184
RED RIVER COUNTY WSC	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	D	PAT MAYSE LAKE/RESERVOIR	44	33	34	35	34	32
COUNTY-OTHER	D	TRINITY AQUIFER | RED RIVER COUNTY	23	23	23	23	23	23
COUNTY-OTHER	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
LIVESTOCK	D	BLOSSOM AQUIFER | RED RIVER COUNTY	94	94	94	94	94	94
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	474	474	474	474	474	474
LIVESTOCK	D	NACATOCH AQUIFER | RED RIVER COUNTY	8	8	8	8	8	8
LIVESTOCK	D	WOODBINE AQUIFER | RED RIVER COUNTY	2	2	2	2	2	2
IRRIGATION	D	RED RUN-OF-RIVER	2,089	2,089	2,089	2,089	2,089	2,089
		RED BASIN TOTAL	**3,014**	**3,003**	**3,002**	**3,003**	**3,001**	**2,999**
410 WSC	D	PAT MAYSE LAKE/RESERVOIR	157	152	149	148	148	148
BOGATA	D	NACATOCH AQUIFER | RED RIVER COUNTY	510	510	510	510	510	510
CLARKSVILLE	D	BLOSSOM AQUIFER | RED RIVER COUNTY	383	371	371	371	371	371
RED RIVER COUNTY WSC	D	BLOSSOM AQUIFER | RED RIVER COUNTY	212	223	223	223	223	223
RED RIVER COUNTY WSC	D	NACATOCH AQUIFER | RED RIVER COUNTY	188	188	188	188	188	188
RED RIVER COUNTY WSC	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
COUNTY-OTHER	D	NACATOCH AQUIFER | RED RIVER COUNTY	56	55	54	54	54	54
COUNTY-OTHER	D	PAT MAYSE LAKE/RESERVOIR	36	47	48	48	50	52
COUNTY-OTHER	D	TRINITY AQUIFER | RED RIVER COUNTY	0	0	0	0	0	0
COUNTY-OTHER	D	WRIGHT PATMAN LAKE/RESERVOIR	0	0	0	0	0	0
MANUFACTURING	D	BLOSSOM AQUIFER | RED RIVER COUNTY	1	1	1	1	1	1
MANUFACTURING	D	LANGFORD LAKE/RESERVOIR	7	7	0	0	0	0
MANUFACTURING	D	SULPHUR RUN-OF-RIVER	8,519	8,519	8,519	8,519	8,519	8,519
MINING	D	BLOSSOM AQUIFER | RED RIVER COUNTY	4	4	3	3	3	3
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	911	911	911	911	911	911
LIVESTOCK	D	NACATOCH AQUIFER | RED RIVER COUNTY	38	38	38	38	38	38
IRRIGATION	D	SULPHUR RUN-OF-RIVER	434	434	434	434	434	434
		SULPHUR BASIN TOTAL	**11,456**	**11,460**	**11,449**	**11,448**	**11,450**	**11,452**
		RED RIVER COUNTY TOTAL	**14,470**	**14,463**	**14,451**	**14,451**	**14,451**	**14,451**
CARROLL WSC*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	37	40	43	47	52	57
CRYSTAL SYSTEMS TEXAS*	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	959	924	903	889	884	886
CRYSTAL SYSTEMS TEXAS*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	375	361	353	347	346	346
JACKSON WSC*	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	205	222	244	274	314	361
LIBERTY CITY WSC	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	23	23	23	23	23	23
LINDALE RURAL WSC*	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	1,011	1,011	1,011	1,011	1,011	1,011
LINDALE*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	796	779	773	756	762	773
OVERTON*	I	CARRIZO-WILCOX AQUIFER | RUSK COUNTY	15	17	19	22	25	29
PINE RIDGE WSC	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	272	271	272	271	271	271
SAND FLAT WSC	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	546	546	546	546	546	546
SMITH COUNTY MUD 1	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	887	887	887	887	887	887
SMITH COUNTY MUD 1	D	QUEEN CITY AQUIFER | SMITH COUNTY	269	269	269	269	269	269
SOUTHERN UTILITIES*	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	1,964	2,152	2,395	2,799	3,209	3,700
STAR MOUNTAIN WSC	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	213	213	213	213	213	213
STARRVILLE-FRIENDSHIP WSC	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	147	147	147	147	147	147
STARRVILLE-FRIENDSHIP WSC	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	92	92	92	92	92	92
TYLER*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	21	24	27	30	35	40
TYLER*	I	PALESTINE LAKE/RESERVOIR	80	88	99	114	129	149

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
TYLER*	I	TYLER LAKE/RESERVOIR	91	101	113	128	147	170
WEST GREGG SUD*	D	CARRIZO-WILCOX AQUIFER | GREGG COUNTY	0	0	0	0	0	3
WEST GREGG SUD*	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	132	132	132	132	132	132
WINONA	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	169	169	169	169	169	169
COUNTY-OTHER*	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	544	627	718	868	1,021	1,216
COUNTY-OTHER*	D	GLADEWATER LAKE/RESERVOIR	23	23	23	23	23	23
MANUFACTURING*	I	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	4	5	5	5	5	5
MINING*	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	176	193	222	289	350	425
MINING*	D	QUEEN CITY AQUIFER | SMITH COUNTY	272	272	272	272	272	272
LIVESTOCK*	D	QUEEN CITY AQUIFER | SMITH COUNTY	514	514	514	514	514	514
IRRIGATION*	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	148	148	148	148	148	148
IRRIGATION*	I	QUEEN CITY AQUIFER | SMITH COUNTY	176	176	176	176	176	176
		SABINE BASIN TOTAL	**10,161**	**10,426**	**10,808**	**11,461**	**12,172**	**13,053**
		SMITH COUNTY TOTAL	**10,161**	**10,426**	**10,808**	**11,461**	**12,172**	**13,053**
BI COUNTY WSC	D	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	76	76	76	76	76	76
CYPRESS SPRINGS SUD	D	CYPRESS SPRINGS LAKE/RESERVOIR	54	52	60	62	63	64
MOUNT PLEASANT	D	BOB SANDLIN LAKE/RESERVOIR	13,677	13,423	13,174	12,940	12,551	12,242
MOUNT PLEASANT	D	CYPRESS RUN-OF-RIVER	404	404	404	404	404	404
MOUNT PLEASANT	D	CYPRESS SPRINGS LAKE/RESERVOIR	2,769	2,651	2,534	2,440	2,323	2,229
MOUNT PLEASANT	D	TANKERSLEY LAKE/RESERVOIR	950	950	950	950	950	950
TRI SUD	D	BOB SANDLIN LAKE/RESERVOIR	1,013	1,102	1,203	1,325	1,465	1,616
COUNTY-OTHER	D	BOB SANDLIN LAKE/RESERVOIR	87	0	0	0	0	0
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	415	438	457	475	439	416
MANUFACTURING	D	BOB SANDLIN LAKE/RESERVOIR	2,795	0	0	0	0	0
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	1,887	2,027	2,150	2,140	1,881	1,751
MANUFACTURING	D	DIRECT REUSE	160	160	160	160	160	160
MANUFACTURING	D	TANKERSLEY LAKE/RESERVOIR	550	550	550	550	550	550
MINING	D	BOB SANDLIN LAKE/RESERVOIR	867	697	654	696	841	735
MINING	D	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	2,714	3,109	3,376	3,559	3,273	3,376
MINING	D	CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	80	80	80	80	80	80
MINING	D	MONTICELLO LAKE/RESERVOIR	538	538	538	538	461	0
STEAM ELECTRIC POWER	D	BOB SANDLIN LAKE/RESERVOIR	10,000	10,000	10,000	10,000	10,000	10,000
STEAM ELECTRIC POWER	D	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	3	3	3	3	578	548
STEAM ELECTRIC POWER	D	MONTICELLO LAKE/RESERVOIR	4,462	3,862	3,262	2,762	2,239	2,200
STEAM ELECTRIC POWER	D	O' THE PINES LAKE/RESERVOIR	14,400	14,400	14,400	14,400	14,400	14,400
STEAM ELECTRIC POWER	D	WELSH LAKE/RESERVOIR	3,000	2,800	2,500	2,200	1,900	1,700
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	433	433	433	433	428	428
IRRIGATION	D	CYPRESS RUN-OF-RIVER	4	4	4	4	4	4
IRRIGATION	D	SULPHUR RUN-OF-RIVER	153	153	153	153	153	153
		CYPRESS BASIN TOTAL	**61,491**	**57,912**	**57,121**	**56,350**	**55,219**	**54,082**
CYPRESS SPRINGS SUD	D	CYPRESS SPRINGS LAKE/RESERVOIR	81	88	90	96	99	106
TRI SUD	D	BOB SANDLIN LAKE/RESERVOIR	526	573	625	689	762	841
COUNTY-OTHER	D	BOB SANDLIN LAKE/RESERVOIR	600	0	0	0	0	0
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	395	432	454	477	500	500
COUNTY-OTHER	D	NACATOCH AQUIFER | RED RIVER COUNTY	76	76	76	76	76	76
MINING	D	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	361	383	406	429	453	475
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | TITUS COUNTY	418	418	418	418	378	357

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	156	156	156	156	156	156
LIVESTOCK	D	SULPHUR RUN-OF-RIVER	1	1	1	1	1	1
IRRIGATION	D	SULPHUR RUN-OF-RIVER	1,311	1,311	1,311	1,311	1,311	1,311
		SULPHUR BASIN TOTAL	**3,925**	**3,438**	**3,537**	**3,653**	**3,736**	**3,823**
		TITUS COUNTY TOTAL	**65,416**	**61,350**	**60,658**	**60,003**	**58,955**	**57,905**
BI COUNTY WSC	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	479	479	479	479	479	479
DIANA SUD	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	598	598	598	598	598	598
DIANA SUD	D	O' THE PINES LAKE/RESERVOIR	524	524	524	524	524	524
EAST MOUNTAIN WATER SYSTEM	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	139	139	138	138	138	139
GILMER	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	1,226	1,226	1,226	1,226	1,226	1,226
GLENWOOD WSC	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	341	342	341	341	341	341
ORE CITY	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	214	214	214	214	214	214
ORE CITY	D	O' THE PINES LAKE/RESERVOIR	1,504	1,504	1,504	1,504	1,504	1,504
PRITCHETT WSC	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	441	441	441	441	441	441
SHARON WSC	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	363	363	363	363	363	363
UNION GROVE WSC	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	15	14	14	15	14	14
COUNTY-OTHER	D	BIG SANDY CREEK LAKE/RESERVOIR	27	27	27	27	27	27
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	447	447	448	447	447	447
COUNTY-OTHER	D	GLADEWATER LAKE/RESERVOIR	76	76	76	76	76	76
COUNTY-OTHER	D	QUEEN CITY AQUIFER | UPSHUR COUNTY	721	786	871	870	891	913
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	6	6	6	6	6	6
MINING	D	QUEEN CITY AQUIFER | UPSHUR COUNTY	299	573	608	480	355	263
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	183	183	183	183	183	183
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	975	975	975	975	975	975
IRRIGATION	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	240	240	240	240	240	240
IRRIGATION	D	CYPRESS RUN-OF-RIVER	22	22	22	22	22	22
IRRIGATION	D	LOMA LAKE/RESERVOIR	350	350	350	350	350	350
IRRIGATION	D	SABINE RUN-OF-RIVER	101	101	101	101	101	101
		CYPRESS BASIN TOTAL	**9,291**	**9,630**	**9,749**	**9,620**	**9,515**	**9,446**
BIG SANDY	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	296	296	296	296	296	296
EAST MOUNTAIN WATER SYSTEM	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	221	221	222	222	222	221
FOUKE WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	13	13	14	14	15	15
GLADEWATER	D	GLADEWATER LAKE/RESERVOIR	597	592	580	566	549	566
GLENWOOD WSC	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	10	10	10	10	10	10
PRITCHETT WSC	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	577	577	577	577	577	577
UNION GROVE WSC	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	361	362	362	361	362	362
COUNTY-OTHER	D	BIG SANDY CREEK LAKE/RESERVOIR	13	13	13	13	13	13
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	54	54	53	54	54	54
COUNTY-OTHER	D	GLADEWATER LAKE/RESERVOIR	36	36	36	36	36	36
COUNTY-OTHER	D	LOMA LAKE/RESERVOIR	400	400	400	400	400	400
COUNTY-OTHER	D	QUEEN CITY AQUIFER | UPSHUR COUNTY	134	145	160	161	165	169
MINING	D	QUEEN CITY AQUIFER | UPSHUR COUNTY	80	153	163	129	95	70
MINING	D	SABINE RUN-OF-RIVER	105	105	105	105	105	105
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	60	60	60	60	60	60
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	293	293	293	293	293	293
		SABINE BASIN TOTAL	**3,250**	**3,330**	**3,344**	**3,297**	**3,252**	**3,247**
		UPSHUR COUNTY TOTAL	**12,541**	**12,960**	**13,093**	**12,917**	**12,767**	**12,693**

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
BEN WHEELER WSC*	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	415	413	413	414	414	414
BETHEL ASH WSC*	I	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	147	165	175	177	182	182
EDOM WSC*	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	119	119	119	118	119	118
LITTLE HOPE MOORE WSC	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	51	50	51	50	51	50
R P M WSC*	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	123	125	125	125	125	124
R P M WSC*	D	QUEEN CITY AQUIFER | VAN ZANDT COUNTY	116	118	118	118	117	117
VAN	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	514	502	493	481	467	467
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	1,785	1,887	1,964	2,061	2,170	2,170
MINING	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	126	137	147	158	168	179
MINING	D	RHINES LAKE/RESERVOIR	1,170	1,170	1,170	1,170	1,170	1,170
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	59	59	59	59	59	59
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	1,108	1,108	1,108	1,108	1,108	1,108
IRRIGATION	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	33	33	33	33	33	33
IRRIGATION	D	NECHES RUN-OF-RIVER	166	166	166	166	166	166
IRRIGATION	D	SABINE RUN-OF-RIVER	74	74	74	74	74	74
IRRIGATION	D	TAWAKONI LAKE/RESERVOIR	184	166	164	163	161	159
		NECHES BASIN TOTAL	**6,190**	**6,292**	**6,379**	**6,475**	**6,584**	**6,590**
ABLES SPRINGS WSC*	D	FORK LAKE/RESERVOIR	0	0	0	0	0	0
ABLES SPRINGS WSC*	C	NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	1	1	1	1	1	1
ABLES SPRINGS WSC*	D	TAWAKONI LAKE/RESERVOIR	0	0	0	0	0	0
ABLES SPRINGS WSC*	C	TRINITY INDIRECT REUSE	0	0	1	1	0	0
CANTON	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	382	382	382	382	339	339
CANTON	D	MILL CREEK LAKE/RESERVOIR	1,187	1,187	1,187	1,187	1,187	1,187
CANTON	D	SABINE RUN-OF-RIVER	37	37	37	37	37	37
COMBINED CONSUMERS SUD	D	TAWAKONI LAKE/RESERVOIR	92	95	98	102	107	111
EDGEWOOD	D	EDGEWOOD CITY LAKE/RESERVOIR	160	160	160	160	160	160
EDGEWOOD	D	TAWAKONI LAKE/RESERVOIR	272	285	295	307	318	329
FRUITVALE WSC	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	485	485	485	485	485	485
GOLDEN WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	99	102	105	108	110	112
GRAND SALINE	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	645	645	645	645	611	611
LITTLE HOPE MOORE WSC	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	114	115	114	115	114	115
MACBEE SUD*	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	89	78	78	78	78	78
MACBEE SUD*	D	TAWAKONI LAKE/RESERVOIR	181	198	212	225	236	245
MYRTLE SPRINGS WSC	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	48	48	48	48	49	48
PINE RIDGE WSC	D	CARRIZO-WILCOX AQUIFER | SMITH COUNTY	11	12	11	12	12	12
PRUITT SANDFLAT WSC	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	328	328	328	328	328	328
SOUTH TAWAKONI WSC	D	TAWAKONI LAKE/RESERVOIR	438	472	498	530	562	590
VAN	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	134	146	155	167	181	181
VAN	D	SABINE RUN-OF-RIVER	350	350	350	350	350	350
WILLS POINT	D	SABINE RUN-OF-RIVER	120	120	120	120	120	120
WILLS POINT	D	TAWAKONI LAKE/RESERVOIR	300	642	637	505	417	414
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	551	557	471	441	517	454
COUNTY-OTHER	D	SABINE RUN-OF-RIVER	170	170	170	170	170	170
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	205	205	205	205	194	194
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	2	2	2	2	2	2
MANUFACTURING	D	SABINE RUN-OF-RIVER	54	54	54	54	54	54
MINING	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	1,100	1,100	1,100	1,100	1,041	1,041
MINING	D	LOCAL SURFACE WATER SUPPLY	842	1,003	1,162	1,325	1,483	1,642

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	89	89	89	89	84	84
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	1,035	1,035	1,035	1,035	1,035	1,035
		SABINE BASIN TOTAL	**9,521**	**10,103**	**10,235**	**10,314**	**10,382**	**10,529**
BETHEL ASH WSC*	I	CARRIZO-WILCOX AQUIFER | HENDERSON COUNTY	43	47	49	52	51	51
CANTON	D	MILL CREEK LAKE/RESERVOIR	5	5	5	5	5	5
MABANK*	C	TRWD LAKE/RESERVOIR SYSTEM	31	31	32	31	31	31
MACBEE SUD*	D	TAWAKONI LAKE/RESERVOIR	294	323	345	367	385	401
MYRTLE SPRINGS WSC	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	149	149	149	149	148	149
WILLS POINT	D	TAWAKONI LAKE/RESERVOIR	453	965	957	760	628	622
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	1,024	1,080	1,031	1,051	1,181	1,117
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	3	3	3	3	3	3
MINING	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	73	79	85	91	97	103
MINING	D	LOCAL SURFACE WATER SUPPLY	5	4	8	12	15	19
LIVESTOCK	D	CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	38	110	188	297	355	444
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	599	527	449	340	282	193
		TRINITY BASIN TOTAL	**2,717**	**3,323**	**3,301**	**3,158**	**3,181**	**3,138**
		VAN ZANDT COUNTY TOTAL	**18,428**	**19,718**	**19,915**	**19,947**	**20,147**	**20,257**
CYPRESS SPRINGS SUD	D	CYPRESS SPRINGS LAKE/RESERVOIR	216	203	195	186	175	169
SHARON WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	159	159	159	159	159	159
WINNSBORO	D	CYPRESS SPRINGS LAKE/RESERVOIR	587	560	534	514	490	469
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	795	799	808	801	810	806
MINING	D	QUEEN CITY AQUIFER | WOOD COUNTY	25	25	28	31	32	35
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	555	555	555	555	555	555
IRRIGATION	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	125	125	125	125	125	125
		CYPRESS BASIN TOTAL	**2,462**	**2,426**	**2,404**	**2,371**	**2,346**	**2,318**
ALGONQUIN WATER RESOURCES OF TEXAS*	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	373	374	373	373	373	373
BRIGHT STAR SALEM SUD	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	343	343	343	343	343	343
CORNERSVILLE WSC	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	50	48	48	49	49	49
FOUKE WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	945	945	944	944	943	943
GOLDEN WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	376	373	370	367	365	363
HAWKINS	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	1,075	1,075	1,075	1,075	1,075	1,075
JONES WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	818	813	809	804	801	795
LAKE FORK WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	664	664	666	667	667	665
MINEOLA	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	1,347	1,347	1,347	1,347	1,347	1,347
NEW HOPE SUD	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	366	366	366	366	366	366
PRITCHETT WSC	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	3	3	3	3	3	3
PRITCHETT WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	5	5	5	5	5	5
QUITMAN	D	FORK LAKE/RESERVOIR	316	1,010	1,000	989	978	967
RAMEY WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	640	640	640	640	640	640
SHARON WSC	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	471	471	471	471	471	471
SHIRLEY WSC	D	CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	18	17	18	18	18	18
SHIRLEY WSC	D	CARRIZO-WILCOX AQUIFER | RAINS COUNTY	8	8	8	8	8	8
WINNSBORO	D	CYPRESS SPRINGS LAKE/RESERVOIR	930	891	851	819	777	746
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	2	2	2	2	2	2
COUNTY-OTHER	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	3,616	3,658	3,652	3,658	3,649	3,653
MANUFACTURING	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	1,502	1,502	1,502	1,502	1,502	1,502
MINING	D	QUEEN CITY AQUIFER | WOOD COUNTY	284	288	289	290	292	293

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Region D Water User Group (WUG) Existing Water Supply

WUG NAME	SOURCE REGION	SOURCE DESCRIPTION	EXISTING SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
LIVESTOCK	D	LOCAL SURFACE WATER SUPPLY	1,613	1,613	1,613	1,613	1,613	1,613
LIVESTOCK	D	SABINE RUN-OF-RIVER	30	30	30	30	30	30
IRRIGATION	D	CARRIZO-WILCOX AQUIFER | WOOD COUNTY	22	22	22	22	22	22
IRRIGATION	D	QUEEN CITY AQUIFER | WOOD COUNTY	226	226	226	226	226	226
IRRIGATION	D	SABINE RUN-OF-RIVER	1,001	1,001	1,001	1,001	1,001	1,001
		SABINE BASIN TOTAL	**17,044**	**17,735**	**17,674**	**17,632**	**17,566**	**17,519**
		WOOD COUNTY TOTAL	**19,506**	**20,161**	**20,078**	**20,003**	**19,912**	**19,837**
		REGION D EXISTING WATER SUPPLY TOTAL	**677,524**	**687,729**	**683,254**	**685,147**	**694,555**	**692,647**

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Region D Water User Group (WUG) Needs/Surplus

WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Needs/Surplus report are calculated by first deducting the WUG split's projected demand from its total existing water supply volume. If the WUG split has a greater existing supply volume than projected demand in any given decade, this amount is considered a surplus volume. Surplus volumes are shown as positive values, and needs are shown as negative values in parentheses.

	(NEEDS)/SURPLUS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
BOWIE COUNTY - RED BASIN						
BURNS REDBANK WSC	(201)	(199)	(196)	(194)	(193)	(193)
CENTRAL BOWIE COUNTY WSC	(88)	(91)	(101)	(112)	(124)	(137)
DE KALB	(45)	(44)	(44)	(44)	(45)	(45)
HOOKS	(281)	(278)	(276)	(271)	(269)	(269)
NEW BOSTON	(409)	(411)	(407)	(406)	(405)	(405)
RIVERBEND WATER RESOURCES DISTRICT	(90)	(92)	(92)	(92)	(92)	(92)
TEXARKANA	(843)	(859)	(880)	(909)	(947)	(989)
COUNTY-OTHER	538	668	861	843	833	833
MANUFACTURING	3	2	2	2	2	2
LIVESTOCK	(252)	(252)	(229)	(196)	(168)	(156)
IRRIGATION	922	922	922	922	922	922
BOWIE COUNTY - SULPHUR BASIN						
CENTRAL BOWIE COUNTY WSC	(531)	(548)	(607)	(672)	(745)	(825)
DE KALB	(250)	(248)	(245)	(247)	(249)	(253)
MACEDONIA EYLAU MUD 1	(588)	(598)	(601)	(601)	(601)	(601)
MAUD	(211)	(226)	(241)	(238)	(237)	(237)
NASH	(392)	(458)	(523)	(589)	(589)	(589)
NEW BOSTON	(981)	(988)	(978)	(975)	(974)	(974)
REDWATER	(440)	(487)	(535)	(588)	(616)	(616)
RIVERBEND WATER RESOURCES DISTRICT	(433)	(444)	(447)	(445)	(445)	(445)
TEXARKANA	(6,302)	(6,423)	(6,579)	(6,797)	(7,081)	(7,391)
WAKE VILLAGE	(699)	(750)	(802)	(861)	(932)	(931)
COUNTY-OTHER	1,379	1,616	1,966	1,924	1,902	1,902
MANUFACTURING	(1,579)	(2,014)	(2,014)	(2,014)	(2,014)	(2,014)
LIVESTOCK	(417)	(417)	(378)	(325)	(278)	(260)
IRRIGATION	(4,134)	(4,134)	(4,134)	(4,134)	(4,134)	(4,134)
CAMP COUNTY - CYPRESS BASIN						
BI COUNTY WSC	489	386	307	204	102	1
PITTSBURG	845	826	813	786	755	722
COUNTY-OTHER	259	283	301	321	339	358
MANUFACTURING	67	50	50	50	50	50
MINING	11	12	13	14	15	16
LIVESTOCK	(3,962)	(3,962)	(3,962)	(3,962)	(3,962)	(3,962)
CASS COUNTY - CYPRESS BASIN						
ATLANTA	0	0	0	0	0	0
E M C WSC	10	10	10	10	10	10
EASTERN CASS WSC	429	434	439	442	443	443
HOLLY SPRINGS WSC	(47)	(43)	(39)	(38)	(38)	(38)
HUGHES SPRINGS	284	295	305	307	308	308
LINDEN	143	152	159	160	161	161
MIMS WSC	114	114	114	114	114	114
QUEEN CITY	8	12	17	17	17	17
WESTERN CASS WSC	723	730	736	738	739	739

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Region D Water User Group (WUG) Needs/Surplus

COUNTY-OTHER	(282)	(215)	(150)	(109)	(106)	(106)
MANUFACTURING	0	0	0	0	0	0
MINING	800	804	824	859	896	932
LIVESTOCK	(865)	(865)	(865)	(865)	(865)	(865)
CASS COUNTY - SULPHUR BASIN						
ATLANTA	0	0	0	0	0	0
EASTERN CASS WSC	26	27	27	27	27	27
QUEEN CITY	3	6	8	9	9	9
WESTERN CASS WSC	142	144	146	146	146	146
COUNTY-OTHER	(167)	(142)	(119)	(103)	(102)	(102)
MANUFACTURING	51	50	48	47	47	46
LIVESTOCK	(953)	(953)	(953)	(951)	(951)	(951)
DELTA COUNTY - SULPHUR BASIN						
COOPER	534	540	549	550	551	551
DELTA COUNTY MUD*	0	0	0	0	0	0
NORTH HUNT SUD*	(6)	(9)	(11)	(13)	(15)	(15)
COUNTY-OTHER	112	101	102	102	102	102
LIVESTOCK	(262)	(250)	(250)	(250)	(250)	(250)
IRRIGATION	6,767	6,780	6,790	6,795	6,795	6,807
FRANKLIN COUNTY - CYPRESS BASIN						
CYPRESS SPRINGS SUD	1,752	1,668	1,580	1,510	1,415	1,335
WINNSBORO	245	228	213	198	181	167
COUNTY-OTHER	4	7	11	9	8	7
MANUFACTURING	2	0	0	0	0	0
LIVESTOCK	(714)	(714)	(714)	(714)	(714)	(714)
IRRIGATION	69	69	69	69	69	69
FRANKLIN COUNTY - SABINE BASIN						
IRRIGATION	72	72	72	72	72	72
FRANKLIN COUNTY - SULPHUR BASIN						
CYPRESS SPRINGS SUD	1,093	1,040	982	933	872	822
MOUNT VERNON	2,448	2,314	2,188	2,083	1,953	1,847
COUNTY-OTHER	95	92	101	101	100	99
MINING	1,035	1,011	990	970	951	952
LIVESTOCK	(1,090)	(1,090)	(1,090)	(1,090)	(1,090)	(1,090)
IRRIGATION	70	70	70	70	70	70
GREGG COUNTY - CYPRESS BASIN						
GLENWOOD WSC	5	4	4	3	2	1
TRYON ROAD SUD	445	404	352	283	188	78
COUNTY-OTHER	205	228	241	259	283	300
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
GREGG COUNTY - SABINE BASIN						
CLARKSVILLE CITY	145	140	133	124	112	98
CROSS ROADS SUD*	51	51	50	50	51	52
ELDERVILLE WSC*	445	412	376	337	294	231
GLADEWATER	251	209	161	100	24	0
KILGORE*	223	2,986	2,589	2,107	1,595	1,533
LIBERTY CITY WSC	371	348	315	269	210	142
LONGVIEW	18,525	25,558	23,413	20,806	17,729	14,208
STARRVILLE-FRIENDSHIP WSC	26	21	15	8	(1)	(11)

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Region D Water User Group (WUG) Needs/Surplus

TRYON ROAD SUD	819	816	812	807	800	793
WEST GREGG SUD*	214	201	181	153	116	70
WHITE OAK	1,248	1,154	1,037	892	719	519
COUNTY-OTHER	520	1,059	1,137	1,241	1,393	1,303
MANUFACTURING	339	57	57	57	57	57
MINING	(11)	(19)	(19)	(14)	(10)	(6)
STEAM ELECTRIC POWER	1,302	1,302	1,302	1,302	1,302	1,302
LIVESTOCK	5	5	5	5	5	5
IRRIGATION	152	152	152	152	152	152
HARRISON COUNTY - CYPRESS BASIN						
BLOCKER CROSSROADS WSC	8	7	7	6	5	3
DIANA SUD	63	62	61	59	56	52
GUM SPRINGS WSC	884	877	870	855	834	811
HARLETON WSC	(47)	(56)	(69)	(96)	(131)	(174)
LEIGH WSC	20	2	(17)	(49)	(86)	(130)
MARSHALL	1,541	1,499	1,452	1,371	1,276	1,162
NORTH HARRISON WSC	20	16	11	0	(15)	(32)
PANOLA-BETHANY WSC*	1	(3)	(9)	(19)	(25)	(31)
SCOTTSVILLE	(10)	(14)	(19)	(27)	(36)	(46)
TALLEY WSC	58	58	56	51	44	37
TRYON ROAD SUD	27	21	15	5	2	0
WASKOM	(96)	(114)	(136)	(173)	(220)	(275)
WEST HARRISON WSC	56	56	55	51	48	45
COUNTY-OTHER	1,422	1,458	1,479	1,478	1,470	1,419
MANUFACTURING	2,519	2,517	2,517	2,517	2,517	2,517
MINING	(234)	(137)	(58)	20	95	154
LIVESTOCK	177	212	248	287	305	310
IRRIGATION	(384)	(384)	(384)	(384)	(384)	(384)
HARRISON COUNTY - SABINE BASIN						
BLOCKER CROSSROADS WSC	71	69	65	56	44	30
GILL WSC*	130	126	119	102	83	59
GUM SPRINGS WSC	1,713	1,703	1,684	1,641	1,586	1,515
HALLSVILLE	269	245	217	169	111	41
LEIGH WSC	4	0	(4)	(11)	(19)	(29)
LONGVIEW	617	571	518	459	390	313
MARSHALL	7,213	7,017	6,797	6,418	5,972	5,438
PANOLA-BETHANY WSC*	0	(46)	(103)	(189)	(248)	(301)
SCOTTSVILLE	(21)	(30)	(39)	(55)	(73)	(95)
TALLEY WSC	42	42	41	37	34	29
WEST HARRISON WSC	176	173	169	163	153	141
COUNTY-OTHER	890	953	999	1,036	1,086	1,098
MANUFACTURING	81,117	77,572	77,539	77,507	77,472	77,437
MINING	(1,472)	(1,130)	(854)	(586)	(322)	(129)
STEAM ELECTRIC POWER	5,396	5,396	5,396	5,396	5,396	5,396
LIVESTOCK	151	158	167	175	183	188
IRRIGATION	(148)	(148)	(148)	(148)	(148)	(148)
HOPKINS COUNTY - CYPRESS BASIN						
CORNERSVILLE WSC	48	46	44	40	38	34
CYPRESS SPRINGS SUD	141	130	120	110	101	94
COUNTY-OTHER	176	177	176	176	176	176

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Region D Water User Group (WUG) Needs/Surplus

MINING	(7)	(8)	(12)	(13)	(15)	(19)
LIVESTOCK	58	59	63	63	67	69
IRRIGATION	0	0	0	0	0	0
HOPKINS COUNTY - SABINE BASIN						
BRASHEAR WSC	0	0	0	0	0	0
CASH SUD*	3	1	(2)	(2)	(3)	(10)
CORNERSVILLE WSC	46	43	41	39	35	32
CUMBY	(13)	(27)	(41)	(54)	(71)	(81)
JONES WSC	15	18	20	23	24	27
LAKE FORK WSC	33	33	32	31	31	32
MARTIN SPRINGS WSC	204	158	113	75	22	(27)
MILLER GROVE WSC	(7)	(14)	(20)	(25)	(34)	(44)
SHADY GROVE NO 2 WSC	0	0	0	0	0	0
SHIRLEY WSC	110	103	96	92	81	75
SULPHUR SPRINGS	6	5	5	5	4	4
COUNTY-OTHER	520	547	559	515	507	503
MINING	(71)	(89)	(112)	(138)	(166)	(198)
LIVESTOCK	366	387	433	436	486	508
IRRIGATION	2	2	2	2	2	2
HOPKINS COUNTY - SULPHUR BASIN						
BRASHEAR WSC	0	0	0	0	0	0
BRINKER WSC	76	47	21	(12)	(47)	(83)
CUMBY	0	(2)	(3)	(4)	(6)	(7)
CYPRESS SPRINGS SUD	282	260	240	223	206	188
GAFFORD CHAPEL WSC	55	55	55	55	55	55
MARTIN SPRINGS WSC	40	31	24	15	5	(2)
NORTH HOPKINS WSC	447	427	407	367	323	276
SHADY GROVE NO 2 WSC	0	0	0	0	0	0
SULPHUR SPRINGS	1,878	1,798	1,719	1,594	1,451	1,301
COUNTY-OTHER	469	462	467	438	430	428
MANUFACTURING	797	862	947	1,019	1,158	1,307
MINING	(149)	(186)	(236)	(293)	(352)	(422)
LIVESTOCK	(1,068)	(1,090)	(1,140)	(1,143)	(1,196)	(1,219)
IRRIGATION	(4,627)	(4,627)	(4,627)	(4,627)	(4,627)	(4,627)
HUNT COUNTY - SABINE BASIN						
ABLES SPRINGS WSC*	0	(14)	(28)	(55)	(98)	(163)
B H P WSC*	0	(60)	(103)	(177)	(288)	(445)
BLACKLAND WSC*	0	(2)	(2)	(3)	(3)	(4)
CADDO BASIN SUD*	(5)	(172)	(314)	(560)	(945)	(1,503)
CADDO MILLS	26	(1)	(36)	(68)	(108)	(254)
CASH SUD*	41	(366)	(958)	(1,270)	(1,253)	(563)
CELESTE	(29)	(52)	(86)	(136)	(209)	(316)
COMBINED CONSUMERS SUD	0	0	0	0	0	0
GREENVILLE	(3,239)	(4,626)	(6,531)	(9,183)	(12,913)	(18,266)
HICKORY CREEK SUD*	(32)	(114)	(228)	(393)	(629)	(977)
JOSEPHINE*	0	(11)	(24)	(48)	(60)	(68)
MACBEE SUD*	0	0	0	0	0	0
POETRY WSC*	1	(48)	(83)	(143)	(237)	(364)
QUINLAN	0	0	0	0	0	0
ROYSE CITY*	(1)	(8)	(15)	(24)	(40)	(62)

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Region D Water User Group (WUG) Needs/Surplus

SHADY GROVE WSC	0	0	0	0	0	0
WEST TAWAKONI	0	495	437	302	235	63
COUNTY-OTHER	854	449	(142)	(551)	(1,571)	(3,426)
MANUFACTURING	547	610	791	964	1,083	1,269
MINING	(41)	(35)	(16)	(5)	0	3
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	41	41	41	41	41	41
IRRIGATION	(151)	(151)	(151)	(151)	(151)	(151)
HUNT COUNTY - SULPHUR BASIN						
CASH SUD*	4	1	(5)	(8)	(11)	(48)
COMMERCE	244	3,275	3,104	2,454	465	214
DELTA COUNTY MUD*	0	0	0	0	0	0
HICKORY CREEK SUD*	(36)	(91)	(172)	(285)	(451)	(692)
NORTH HUNT SUD*	(72)	(139)	(232)	(363)	(553)	(831)
TEXAS A&M UNIVERSITY COMMERCE	0	4	6	7	8	8
WOLFE CITY*	91	61	17	(52)	(149)	(293)
COUNTY-OTHER	0	0	(16)	(107)	(170)	(283)
MANUFACTURING	0	0	0	0	0	0
MINING	(30)	(27)	(18)	(13)	(7)	0
LIVESTOCK	12	12	12	12	12	12
IRRIGATION	(79)	(79)	(79)	(79)	(79)	(79)
HUNT COUNTY - TRINITY BASIN						
FROGNOT WSC*	3	3	2	1	1	0
HICKORY CREEK SUD*	(17)	(45)	(85)	(142)	(223)	(341)
WEST LEONARD WSC*	7	6	7	7	4	0
COUNTY-OTHER	8	0	(8)	(45)	(76)	(125)
MINING	(2)	(2)	(1)	(1)	0	0
LIVESTOCK	(2)	(2)	(2)	(2)	(1)	(1)
IRRIGATION	0	0	0	0	0	0
LAMAR COUNTY - RED BASIN						
LAMAR COUNTY WSD	3,778	3,706	3,647	3,592	3,533	3,458
PARIS	9,979	9,868	9,762	9,660	9,458	9,344
RENO (Lamar)	43	55	64	74	84	93
COUNTY-OTHER	(120)	(121)	(124)	(127)	(129)	(131)
MANUFACTURING	561	596	637	672	738	773
STEAM ELECTRIC POWER	263	263	263	263	263	263
LIVESTOCK	(617)	(617)	(617)	(617)	(617)	(617)
IRRIGATION	(1,140)	(1,140)	(1,140)	(1,140)	(1,140)	(1,140)
LAMAR COUNTY - SULPHUR BASIN						
BLOSSOM	80	96	114	114	112	110
LAMAR COUNTY WSD	2,897	2,852	2,816	2,783	2,748	2,705
PARIS	14,858	14,691	14,535	14,381	14,077	13,905
RENO (Lamar)	37	88	128	170	210	254
COUNTY-OTHER	(84)	(83)	(88)	(97)	(105)	(113)
MANUFACTURING	374	519	759	966	1,362	1,565
STEAM ELECTRIC POWER	3,187	3,187	3,187	3,187	3,187	3,187
LIVESTOCK	772	772	772	772	772	772
IRRIGATION	(328)	(328)	(328)	(328)	(328)	(328)
MARION COUNTY - CYPRESS BASIN						
DIANA SUD	18	19	20	21	21	21

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Region D Water User Group (WUG) Needs/Surplus

E M C WSC	81	81	81	81	81	81
HARLETON WSC	(15)	(18)	(22)	(31)	(42)	(56)
JEFFERSON	1,231	1,242	1,251	1,256	1,257	1,257
KELLYVILLE-BEREA WSC	41	47	52	54	54	54
MIMS WSC	654	654	654	654	654	654
COUNTY-OTHER	1,658	1,663	1,669	1,677	1,686	1,696
MINING	(373)	(645)	(590)	(471)	(352)	(265)
STEAM ELECTRIC POWER	0	188	570	1,035	1,603	1,990
LIVESTOCK	223	223	223	223	223	223
IRRIGATION	309	309	309	309	309	309
MORRIS COUNTY - CYPRESS BASIN						
BI COUNTY WSC	11	13	14	12	9	7
DAINGERFIELD	1,117	1,122	1,123	1,114	1,105	1,094
HOLLY SPRINGS WSC	(26)	(24)	(21)	(20)	(20)	(20)
HUGHES SPRINGS	1	1	1	1	1	1
LONE STAR	558	563	566	563	560	556
NAPLES	38	47	49	47	46	45
OMAHA	38	40	40	38	35	32
TRI SUD	0	0	0	0	0	0
COUNTY-OTHER	100	105	107	99	93	86
MANUFACTURING	96,168	90,737	85,421	86,677	95,551	89,325
STEAM ELECTRIC POWER	770	770	770	770	770	770
LIVESTOCK	(510)	(510)	(510)	(510)	(510)	(510)
IRRIGATION	59	59	59	59	59	59
MORRIS COUNTY - SULPHUR BASIN						
NAPLES	32	26	27	26	24	22
OMAHA	39	39	39	38	36	34
COUNTY-OTHER	88	90	91	88	85	83
LIVESTOCK	(469)	(469)	(469)	(469)	(469)	(469)
IRRIGATION	0	0	0	0	0	0
RAINS COUNTY - SABINE BASIN						
BRIGHT STAR SALEM SUD	495	900	899	891	883	873
CASH SUD*	16	0	(12)	(16)	(17)	(57)
EAST TAWAKONI	0	0	0	0	0	0
EMORY	0	0	0	0	0	0
GOLDEN WSC	5	5	5	5	5	5
MILLER GROVE WSC	(1)	(2)	(3)	(4)	(6)	(8)
POINT	0	0	0	0	0	0
SHIRLEY WSC	51	48	45	43	38	35
SOUTH RAINS SUD	90	90	90	90	90	90
COUNTY-OTHER	319	337	346	345	345	348
MANUFACTURING	0	0	0	0	0	0
LIVESTOCK	78	78	78	78	78	78
IRRIGATION	146	146	146	146	146	146
RED RIVER COUNTY - RED BASIN						
410 WSC	0	0	0	0	0	0
RED RIVER COUNTY WSC	96	98	97	95	94	89
COUNTY-OTHER	0	11	31	38	41	52
LIVESTOCK	(184)	(184)	(184)	(184)	(184)	(184)
IRRIGATION	810	810	810	810	810	810

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Region D Water User Group (WUG) Needs/Surplus

RED RIVER COUNTY - SULPHUR BASIN						
410 WSC	0	0	0	0	0	0
BOGATA	387	394	397	398	398	398
CLARKSVILLE	(237)	(231)	(222)	(221)	(219)	(219)
RED RIVER COUNTY WSC	77	89	87	81	77	65
COUNTY-OTHER	0	39	65	74	81	101
MANUFACTURING	8,524	8,524	8,517	8,517	8,517	8,517
MINING	0	0	0	0	0	0
LIVESTOCK	179	179	179	179	179	179
IRRIGATION	(2,154)	(2,154)	(2,154)	(2,154)	(2,154)	(2,154)
SMITH COUNTY - SABINE BASIN						
CARROLL WSC*	0	0	0	0	0	0
CRYSTAL SYSTEMS TEXAS*	389	240	81	(95)	(292)	(525)
JACKSON WSC*	0	0	0	0	0	0
LIBERTY CITY WSC	10	9	8	6	3	0
LINDALE RURAL WSC*	479	435	376	336	239	123
LINDALE*	(45)	(226)	(422)	(591)	(842)	(1,137)
OVERTON*	0	0	0	0	0	0
PINE RIDGE WSC	123	111	100	83	65	45
SAND FLAT WSC	303	291	265	236	205	172
SMITH COUNTY MUD 1	246	126	(13)	(178)	(375)	(609)
SOUTHERN UTILITIES*	0	0	0	0	0	0
STAR MOUNTAIN WSC	(20)	(39)	(61)	(87)	(116)	(148)
STARRVILLE-FRIENDSHIP WSC	63	52	37	19	(2)	(26)
TYLER*	7	7	7	9	10	12
WEST GREGG SUD*	56	49	41	29	15	0
WINONA	36	20	3	(20)	(48)	(81)
COUNTY-OTHER*	23	23	23	23	23	23
MANUFACTURING*	0	0	0	0	0	0
MINING*	161	156	153	167	184	200
LIVESTOCK*	0	0	0	0	0	0
IRRIGATION*	0	0	0	0	0	0
TITUS COUNTY - CYPRESS BASIN						
BI COUNTY WSC	42	39	35	31	26	21
CYPRESS SPRINGS SUD	44	42	48	49	49	49
MOUNT PLEASANT	13,910	13,126	12,317	11,474	10,400	9,392
TRI SUD	0	0	0	0	0	0
COUNTY-OTHER	323	241	237	230	168	117
MANUFACTURING	1,329	(1,418)	(1,295)	(1,305)	(1,564)	(1,694)
MINING	2,687	2,792	2,892	2,983	2,617	1,991
STEAM ELECTRIC POWER	(30,066)	(30,866)	(31,766)	(32,566)	(32,814)	(33,083)
LIVESTOCK	(923)	(923)	(923)	(923)	(928)	(928)
IRRIGATION	47	47	47	47	47	47
TITUS COUNTY - SULPHUR BASIN						
CYPRESS SPRINGS SUD	66	71	72	76	77	81
TRI SUD	0	0	0	0	0	0
COUNTY-OTHER	776	185	170	152	131	85
MINING	229	240	253	264	275	283
LIVESTOCK	(1,016)	(1,016)	(1,016)	(1,016)	(1,056)	(1,077)
IRRIGATION	368	368	368	368	368	368

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Region D Water User Group (WUG) Needs/Surplus

UPSHUR COUNTY - CYPRESS BASIN						
BI COUNTY WSC	112	97	82	62	42	21
DIANA SUD	700	687	675	656	634	611
EAST MOUNTAIN WATER SYSTEM	72	69	66	63	59	56
GILMER	103	42	(11)	(75)	(142)	(206)
GLENWOOD WSC	61	52	44	30	14	0
ORE CITY	1,563	1,558	1,552	1,545	1,536	1,528
PRITCHETT WSC	242	237	233	224	214	203
SHARON WSC	216	214	213	205	197	189
UNION GROVE WSC	9	8	8	8	7	7
COUNTY-OTHER	651	690	754	721	707	694
MANUFACTURING	(63)	(70)	(70)	(70)	(70)	(70)
MINING	0	0	0	0	0	0
LIVESTOCK	(64)	(64)	(64)	(64)	(64)	(64)
IRRIGATION	543	543	543	543	543	543
UPSHUR COUNTY - SABINE BASIN						
BIG SANDY	72	62	52	41	27	15
EAST MOUNTAIN WATER SYSTEM	48	41	35	26	16	6
FOUKE WSC	3	3	3	3	3	3
GLADEWATER	153	126	94	56	12	4
GLENWOOD WSC	3	3	2	2	2	1
PRITCHETT WSC	99	87	75	56	30	5
UNION GROVE WSC	210	207	197	186	178	169
COUNTY-OTHER	522	529	539	535	532	530
MINING	105	105	105	105	105	105
LIVESTOCK	(76)	(76)	(76)	(76)	(76)	(76)
VAN ZANDT COUNTY - NECHES BASIN						
BEN WHEELER WSC*	201	190	183	174	164	154
BETHEL ASH WSC*	75	75	70	58	50	39
EDOM WSC*	(11)	(18)	(23)	(32)	(42)	(55)
LITTLE HOPE MOORE WSC	6	3	2	(1)	(3)	(5)
R P M WSC*	14	(25)	(58)	(93)	(124)	(152)
VAN	277	247	224	195	166	152
COUNTY-OTHER	1,283	1,360	1,418	1,493	1,584	1,570
MINING	1,215	1,221	1,220	1,221	1,222	1,222
LIVESTOCK	152	152	152	152	152	152
IRRIGATION	(43)	(61)	(63)	(64)	(66)	(68)
VAN ZANDT COUNTY - SABINE BASIN						
ABLES SPRINGS WSC*	(1)	(1)	(1)	(1)	(2)	(2)
CANTON	645	574	522	463	367	321
COMBINED CONSUMERS SUD	0	0	0	0	0	0
EDGEWOOD	160	160	160	160	160	160
FRUITVALE WSC	180	167	156	142	126	112
GOLDEN WSC	44	46	48	50	49	49
GRAND SALINE	258	257	258	253	211	203
LITTLE HOPE MOORE WSC	12	7	3	(2)	(8)	(12)
MACBEE SUD*	89	78	78	78	78	78
MYRTLE SPRINGS WSC	19	18	17	15	14	12
PINE RIDGE WSC	5	5	4	4	3	2
PRUITT SANDFLAT WSC	172	164	157	149	141	133

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Region D Water User Group (WUG) Needs/Surplus

SOUTH TAWAKONI WSC	0	0	0	0	0	0
VAN	352	354	355	359	364	357
WILLS POINT	120	466	465	335	246	241
COUNTY-OTHER	264	247	143	94	153	78
MANUFACTURING	(242)	(492)	(492)	(492)	(503)	(503)
MINING	1,801	1,953	2,094	2,239	2,322	2,462
LIVESTOCK	463	463	463	463	458	458
VAN ZANDT COUNTY - TRINITY BASIN						
BETHEL ASH WSC*	23	21	20	18	14	11
CANTON	1	1	0	0	0	0
MABANK*	(17)	(22)	(26)	(44)	(73)	(114)
MACBEE SUD*	0	0	0	0	0	0
MYRTLE SPRINGS WSC	60	56	53	47	41	37
WILLS POINT	0	520	518	323	189	181
COUNTY-OTHER	562	594	528	528	641	565
MANUFACTURING	0	(1)	(1)	(1)	(1)	(1)
MINING	0	0	0	0	0	0
LIVESTOCK	424	424	424	424	424	424
WOOD COUNTY - CYPRESS BASIN						
CYPRESS SPRINGS SUD	176	164	156	147	136	129
SHARON WSC	58	61	65	63	62	61
WINNSBORO	375	345	320	297	270	248
COUNTY-OTHER	720	725	738	734	747	748
MINING	23	23	26	29	30	33
LIVESTOCK	72	72	72	72	72	72
IRRIGATION	89	89	89	89	89	89
WOOD COUNTY - SABINE BASIN						
ALGONQUIN WATER RESOURCES OF TEXAS*	266	255	242	229	214	199
BRIGHT STAR SALEM SUD	192	195	201	198	197	196
CORNERSVILLE WSC	25	22	21	20	19	17
FOUKE WSC	228	222	226	219	212	206
GOLDEN WSC	167	167	170	167	163	160
HAWKINS	713	705	705	698	694	691
JONES WSC	425	425	431	426	420	411
LAKE FORK WSC	446	446	452	451	448	443
MINEOLA	500	490	497	487	479	472
NEW HOPE SUD	37	34	37	33	30	27
PRITCHETT WSC	1	1	1	1	1	1
QUITMAN	0	691	683	668	654	641
RAMEY WSC	362	367	375	371	368	366
SHARON WSC	265	269	277	273	272	271
SHIRLEY WSC	9	8	8	8	7	6
WINNSBORO	594	549	510	473	428	394
COUNTY-OTHER	3,405	3,450	3,453	3,467	3,471	3,491
MANUFACTURING	(1,030)	(1,583)	(1,583)	(1,583)	(1,583)	(1,583)
MINING	261	265	268	271	274	276
LIVESTOCK	(1,098)	(1,098)	(1,098)	(1,098)	(1,098)	(1,098)
IRRIGATION	796	796	796	796	796	796

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Region D Water User Group (WUG) Second-Tier Identified Water Needs

Second-tier needs are WUG split needs adjusted to include the implementation of recommended demand reduction and direct reuse water management strategies.

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
BOWIE COUNTY - RED BASIN						
BURNS REDBANK WSC	201	199	196	194	193	193
CENTRAL BOWIE COUNTY WSC	88	91	101	112	124	137
DE KALB	45	44	44	44	45	45
HOOKS	281	278	276	271	269	269
NEW BOSTON	409	411	407	406	405	405
RIVERBEND WATER RESOURCES DISTRICT	90	92	92	92	92	92
TEXARKANA	843	859	880	909	947	989
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
LIVESTOCK	252	252	229	196	168	156
IRRIGATION	0	0	0	0	0	0
BOWIE COUNTY - SULPHUR BASIN						
CENTRAL BOWIE COUNTY WSC	531	548	607	672	745	825
DE KALB	250	248	245	247	249	253
MACEDONIA EYLAU MUD 1	588	598	601	601	601	601
MAUD	211	226	241	238	237	237
NASH	392	458	523	589	589	589
NEW BOSTON	981	988	978	975	974	974
REDWATER	440	487	535	588	616	616
RIVERBEND WATER RESOURCES DISTRICT	433	444	447	445	445	445
TEXARKANA	6,302	6,423	6,579	6,797	7,081	7,391
WAKE VILLAGE	699	750	802	861	932	931
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	1,418	1,810	1,810	1,810	1,810	1,810
LIVESTOCK	417	417	378	325	278	260
IRRIGATION	4,134	4,134	4,134	4,134	4,134	4,134
CAMP COUNTY - CYPRESS BASIN						
BI COUNTY WSC	0	0	0	0	0	0
PITTSBURG	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	3,962	3,962	3,962	3,962	3,962	3,962
CASS COUNTY - CYPRESS BASIN						
ATLANTA	0	0	0	0	0	0
E M C WSC	0	0	0	0	0	0
EASTERN CASS WSC	0	0	0	0	0	0
HOLLY SPRINGS WSC	47	43	39	38	38	38
HUGHES SPRINGS	0	0	0	0	0	0
LINDEN	0	0	0	0	0	0
MIMS WSC	0	0	0	0	0	0
QUEEN CITY	0	0	0	0	0	0
WESTERN CASS WSC	0	0	0	0	0	0
COUNTY-OTHER	282	215	150	109	106	106

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Region D Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
CASS COUNTY - CYPRESS BASIN						
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	865	865	865	865	865	865
CASS COUNTY - SULPHUR BASIN						
ATLANTA	0	0	0	0	0	0
EASTERN CASS WSC	0	0	0	0	0	0
QUEEN CITY	0	0	0	0	0	0
WESTERN CASS WSC	0	0	0	0	0	0
COUNTY-OTHER	167	142	119	103	102	102
MANUFACTURING	0	0	0	0	0	0
LIVESTOCK	953	953	953	951	951	951
DELTA COUNTY - SULPHUR BASIN						
COOPER	0	0	0	0	0	0
DELTA COUNTY MUD*	0	0	0	0	0	0
NORTH HUNT SUD*	6	9	11	13	15	15
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	262	250	250	250	250	250
IRRIGATION	0	0	0	0	0	0
FRANKLIN COUNTY - CYPRESS BASIN						
CYPRESS SPRINGS SUD	0	0	0	0	0	0
WINNSBORO	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
LIVESTOCK	714	714	714	714	714	714
IRRIGATION	0	0	0	0	0	0
FRANKLIN COUNTY - SABINE BASIN						
IRRIGATION	0	0	0	0	0	0
FRANKLIN COUNTY - SULPHUR BASIN						
CYPRESS SPRINGS SUD	0	0	0	0	0	0
MOUNT VERNON	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	1,090	1,090	1,090	1,090	1,090	1,090
IRRIGATION	0	0	0	0	0	0
GREGG COUNTY - CYPRESS BASIN						
GLENWOOD WSC	0	0	0	0	0	0
TRYON ROAD SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
GREGG COUNTY - SABINE BASIN						
CLARKSVILLE CITY	0	0	0	0	0	0
CROSS ROADS SUD*	0	0	0	0	0	0
ELDERVILLE WSC*	0	0	0	0	0	0
GLADEWATER	0	0	0	0	0	0
KILGORE*	0	0	0	0	0	0
LIBERTY CITY WSC	0	0	0	0	0	0

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Region D Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
GREGG COUNTY - SABINE BASIN						
LONGVIEW	0	0	0	0	0	0
STARRVILLE-FRIENDSHIP WSC	0	0	0	0	1	11
TRYON ROAD SUD	0	0	0	0	0	0
WEST GREGG SUD*	0	0	0	0	0	0
WHITE OAK	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	11	19	19	14	10	6
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
HARRISON COUNTY - CYPRESS BASIN						
BLOCKER CROSSROADS WSC	0	0	0	0	0	0
DIANA SUD	0	0	0	0	0	0
GUM SPRINGS WSC	0	0	0	0	0	0
HARLETON WSC	47	56	69	96	131	174
LEIGH WSC	0	0	17	49	86	130
MARSHALL	0	0	0	0	0	0
NORTH HARRISON WSC	0	0	0	0	15	32
PANOLA-BETHANY WSC*	0	3	9	19	25	31
SCOTTSVILLE	10	14	19	27	36	46
TALLEY WSC	0	0	0	0	0	0
TRYON ROAD SUD	0	0	0	0	0	0
WASKOM	96	114	136	173	220	275
WEST HARRISON WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	234	137	58	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	384	384	384	384	384	384
HARRISON COUNTY - SABINE BASIN						
BLOCKER CROSSROADS WSC	0	0	0	0	0	0
GILL WSC*	0	0	0	0	0	0
GUM SPRINGS WSC	0	0	0	0	0	0
HALLSVILLE	0	0	0	0	0	0
LEIGH WSC	0	0	4	11	19	29
LONGVIEW	0	0	0	0	0	0
MARSHALL	0	0	0	0	0	0
PANOLA-BETHANY WSC*	0	46	103	189	248	301
SCOTTSVILLE	21	30	39	55	73	95
TALLEY WSC	0	0	0	0	0	0
WEST HARRISON WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	1,472	1,130	854	586	322	129
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0

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Region D Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
HARRISON COUNTY - SABINE BASIN						
IRRIGATION	148	148	148	148	148	148
HOPKINS COUNTY - CYPRESS BASIN						
CORNERSVILLE WSC	0	0	0	0	0	0
CYPRESS SPRINGS SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	7	8	12	13	15	19
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
HOPKINS COUNTY - SABINE BASIN						
BRASHEAR WSC	0	0	0	0	0	0
CASH SUD*	0	0	2	2	3	10
CORNERSVILLE WSC	0	0	0	0	0	0
CUMBY	13	27	41	54	71	81
JONES WSC	0	0	0	0	0	0
LAKE FORK WSC	0	0	0	0	0	0
MARTIN SPRINGS WSC	0	0	0	0	0	27
MILLER GROVE WSC	7	14	20	25	34	44
SHADY GROVE NO 2 WSC	0	0	0	0	0	0
SHIRLEY WSC	0	0	0	0	0	0
SULPHUR SPRINGS	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	71	89	112	138	166	198
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
HOPKINS COUNTY - SULPHUR BASIN						
BRASHEAR WSC	0	0	0	0	0	0
BRINKER WSC	0	0	0	12	47	83
CUMBY	0	2	3	4	6	7
CYPRESS SPRINGS SUD	0	0	0	0	0	0
GAFFORD CHAPEL WSC	0	0	0	0	0	0
MARTIN SPRINGS WSC	0	0	0	0	0	2
NORTH HOPKINS WSC	0	0	0	0	0	0
SHADY GROVE NO 2 WSC	0	0	0	0	0	0
SULPHUR SPRINGS	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	149	186	236	293	352	422
LIVESTOCK	1,068	1,090	1,140	1,143	1,196	1,219
IRRIGATION	4,627	4,627	4,627	4,627	4,627	4,627
HUNT COUNTY - SABINE BASIN						
ABLES SPRINGS WSC*	0	13	28	53	93	155
B H P WSC*	0	60	103	177	288	445
BLACKLAND WSC*	0	1	1	2	3	3
CADDO BASIN SUD*	4	170	311	555	936	1,488
CADDO MILLS	0	1	36	68	108	254
CASH SUD*	0	365	957	1,270	1,253	563
CELESTE	29	52	86	136	209	316

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Region D Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	**2030**	**2040**	**2050**	**2060**	**2070**
HUNT COUNTY - SABINE BASIN						
COMBINED CONSUMERS SUD	0	0	0	0	0	0
GREENVILLE	0	140	1,391	3,059	5,320	8,525
HICKORY CREEK SUD*	32	114	228	393	629	977
JOSEPHINE*	0	8	19	41	53	61
MACBEE SUD*	0	0	0	0	0	0
POETRY WSC*	0	46	82	140	233	357
QUINLAN	0	0	0	0	0	0
ROYSE CITY*	0	7	14	24	37	60
SHADY GROVE WSC	0	0	0	0	0	0
WEST TAWAKONI	0	0	0	0	0	0
COUNTY-OTHER	0	0	142	551	1,571	3,426
MANUFACTURING	0	0	0	0	0	0
MINING	41	35	16	5	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	151	151	151	151	151	151
HUNT COUNTY - SULPHUR BASIN						
CASH SUD*	0	0	5	8	11	48
COMMERCE	0	0	0	0	0	0
DELTA COUNTY MUD*	0	0	0	0	0	0
HICKORY CREEK SUD*	36	91	172	285	451	692
NORTH HUNT SUD*	72	139	232	363	553	831
TEXAS A&M UNIVERSITY COMMERCE	0	0	0	0	0	0
WOLFE CITY*	0	0	0	52	149	293
COUNTY-OTHER	0	0	16	107	170	283
MANUFACTURING	0	0	0	0	0	0
MINING	30	27	18	13	7	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	79	79	79	79	79	79
HUNT COUNTY - TRINITY BASIN						
FROGNOT WSC*	0	0	0	0	0	0
HICKORY CREEK SUD*	17	45	85	142	223	341
WEST LEONARD WSC*	0	0	0	0	0	0
COUNTY-OTHER	0	0	8	45	76	125
MINING	2	2	1	1	0	0
LIVESTOCK	2	2	2	2	1	1
IRRIGATION	0	0	0	0	0	0
LAMAR COUNTY - RED BASIN						
LAMAR COUNTY WSD	0	0	0	0	0	0
PARIS	0	0	0	0	0	0
RENO (Lamar)	0	0	0	0	0	0
COUNTY-OTHER	120	121	124	127	129	131
MANUFACTURING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	617	617	617	617	617	617
IRRIGATION	1,140	1,140	1,140	1,140	1,140	1,140

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Region D Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
LAMAR COUNTY - SULPHUR BASIN						
BLOSSOM	0	0	0	0	0	0
LAMAR COUNTY WSD	0	0	0	0	0	0
PARIS	0	0	0	0	0	0
RENO (Lamar)	0	0	0	0	0	0
COUNTY-OTHER	84	83	88	97	105	113
MANUFACTURING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	328	328	328	328	328	328
MARION COUNTY - CYPRESS BASIN						
DIANA SUD	0	0	0	0	0	0
E M C WSC	0	0	0	0	0	0
HARLETON WSC	15	18	22	31	42	56
JEFFERSON	0	0	0	0	0	0
KELLYVILLE-BEREA WSC	0	0	0	0	0	0
MIMS WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	373	645	590	471	352	265
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
MORRIS COUNTY - CYPRESS BASIN						
BI COUNTY WSC	0	0	0	0	0	0
DAINGERFIELD	0	0	0	0	0	0
HOLLY SPRINGS WSC	26	24	21	20	20	20
HUGHES SPRINGS	0	0	0	0	0	0
LONE STAR	0	0	0	0	0	0
NAPLES	0	0	0	0	0	0
OMAHA	0	0	0	0	0	0
TRI SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	510	510	510	510	510	510
IRRIGATION	0	0	0	0	0	0
MORRIS COUNTY - SULPHUR BASIN						
NAPLES	0	0	0	0	0	0
OMAHA	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	469	469	469	469	469	469
IRRIGATION	0	0	0	0	0	0
RAINS COUNTY - SABINE BASIN						
BRIGHT STAR SALEM SUD	0	0	0	0	0	0
CASH SUD*	0	0	12	16	17	57
EAST TAWAKONI	0	0	0	0	0	0
EMORY	0	0	0	0	0	0
GOLDEN WSC	0	0	0	0	0	0

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Region D Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
RAINS COUNTY - SABINE BASIN						
MILLER GROVE WSC	1	2	3	4	6	8
POINT	0	0	0	0	0	0
SHIRLEY WSC	0	0	0	0	0	0
SOUTH RAINS SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0
RED RIVER COUNTY - RED BASIN						
410 WSC	0	0	0	0	0	0
RED RIVER COUNTY WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
LIVESTOCK	184	184	184	184	184	184
IRRIGATION	0	0	0	0	0	0
RED RIVER COUNTY - SULPHUR BASIN						
410 WSC	0	0	0	0	0	0
BOGATA	0	0	0	0	0	0
CLARKSVILLE	237	231	222	221	219	219
RED RIVER COUNTY WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	2,154	2,154	2,154	2,154	2,154	2,154
SMITH COUNTY - SABINE BASIN						
CARROLL WSC*	0	0	0	0	0	0
CRYSTAL SYSTEMS TEXAS*	0	0	0	95	292	525
JACKSON WSC*	0	0	0	0	0	0
LIBERTY CITY WSC	0	0	0	0	0	0
LINDALE RURAL WSC*	0	0	0	0	0	0
LINDALE*	45	226	422	591	842	1,137
OVERTON*	0	0	0	0	0	0
PINE RIDGE WSC	0	0	0	0	0	0
SAND FLAT WSC	0	0	0	0	0	0
SMITH COUNTY MUD 1	0	0	13	178	375	609
SOUTHERN UTILITIES*	0	0	0	0	0	0
STAR MOUNTAIN WSC	20	39	61	87	116	148
STARRVILLE-FRIENDSHIP WSC	0	0	0	0	2	26
TYLER*	0	0	0	0	0	0
WEST GREGG SUD*	0	0	0	0	0	0
WINONA	0	0	0	20	48	81
COUNTY-OTHER*	0	0	0	0	0	0
MANUFACTURING*	0	0	0	0	0	0
MINING*	0	0	0	0	0	0
LIVESTOCK*	0	0	0	0	0	0
IRRIGATION*	0	0	0	0	0	0

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Region D Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
TITUS COUNTY - CYPRESS BASIN						
BI COUNTY WSC	0	0	0	0	0	0
CYPRESS SPRINGS SUD	0	0	0	0	0	0
MOUNT PLEASANT	0	0	0	0	0	0
TRI SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	1,003	880	890	1,149	1,279
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	30,066	30,866	31,766	32,566	32,814	33,083
LIVESTOCK	923	923	923	923	928	928
IRRIGATION	0	0	0	0	0	0
TITUS COUNTY - SULPHUR BASIN						
CYPRESS SPRINGS SUD	0	0	0	0	0	0
TRI SUD	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	1,016	1,016	1,016	1,016	1,056	1,077
IRRIGATION	0	0	0	0	0	0
UPSHUR COUNTY - CYPRESS BASIN						
BI COUNTY WSC	0	0	0	0	0	0
DIANA SUD	0	0	0	0	0	0
EAST MOUNTAIN WATER SYSTEM	0	0	0	0	0	0
GILMER	0	0	11	75	142	206
GLENWOOD WSC	0	0	0	0	0	0
ORE CITY	0	0	0	0	0	0
PRITCHETT WSC	0	0	0	0	0	0
SHARON WSC	0	0	0	0	0	0
UNION GROVE WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	63	70	70	70	70	70
MINING	0	0	0	0	0	0
LIVESTOCK	64	64	64	64	64	64
IRRIGATION	0	0	0	0	0	0
UPSHUR COUNTY - SABINE BASIN						
BIG SANDY	0	0	0	0	0	0
EAST MOUNTAIN WATER SYSTEM	0	0	0	0	0	0
FOUKE WSC	0	0	0	0	0	0
GLADEWATER	0	0	0	0	0	0
GLENWOOD WSC	0	0	0	0	0	0
PRITCHETT WSC	0	0	0	0	0	0
UNION GROVE WSC	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	76	76	76	76	76	76
VAN ZANDT COUNTY - NECHES BASIN						
BEN WHEELER WSC*	0	0	0	0	0	0
BETHEL ASH WSC*	0	0	0	0	0	0
EDOM WSC*	11	18	23	32	42	55

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Region D Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
VAN ZANDT COUNTY - NECHES BASIN						
LITTLE HOPE MOORE WSC	0	0	0	1	3	5
R P M WSC*	0	25	58	93	124	152
VAN	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	43	61	63	64	66	68
VAN ZANDT COUNTY - SABINE BASIN						
ABLES SPRINGS WSC*	0	0	0	0	0	0
CANTON	0	0	0	0	0	0
COMBINED CONSUMERS SUD	0	0	0	0	0	0
EDGEWOOD	0	0	0	0	0	0
FRUITVALE WSC	0	0	0	0	0	0
GOLDEN WSC	0	0	0	0	0	0
GRAND SALINE	0	0	0	0	0	0
LITTLE HOPE MOORE WSC	0	0	0	2	8	12
MACBEE SUD*	0	0	0	0	0	0
MYRTLE SPRINGS WSC	0	0	0	0	0	0
PINE RIDGE WSC	0	0	0	0	0	0
PRUITT SANDFLAT WSC	0	0	0	0	0	0
SOUTH TAWAKONI WSC	0	0	0	0	0	0
VAN	0	0	0	0	0	0
WILLS POINT	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	192	417	417	417	428	428
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
VAN ZANDT COUNTY - TRINITY BASIN						
BETHEL ASH WSC*	0	0	0	0	0	0
CANTON	0	0	0	0	0	0
MABANK*	14	18	21	37	65	104
MACBEE SUD*	0	0	0	0	0	0
MYRTLE SPRINGS WSC	0	0	0	0	0	0
WILLS POINT	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	0	1	1	1	1	1
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
WOOD COUNTY - CYPRESS BASIN						
CYPRESS SPRINGS SUD	0	0	0	0	0	0
SHARON WSC	0	0	0	0	0	0
WINNSBORO	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MINING	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	0	0	0	0	0	0

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Region D Water User Group (WUG) Second-Tier Identified Water Needs

	WUG SECOND-TIER NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
WOOD COUNTY - SABINE BASIN						
ALGONQUIN WATER RESOURCES OF TEXAS*	0	0	0	0	0	0
BRIGHT STAR SALEM SUD	0	0	0	0	0	0
CORNERSVILLE WSC	0	0	0	0	0	0
FOUKE WSC	0	0	0	0	0	0
GOLDEN WSC	0	0	0	0	0	0
HAWKINS	0	0	0	0	0	0
JONES WSC	0	0	0	0	0	0
LAKE FORK WSC	0	0	0	0	0	0
MINEOLA	0	0	0	0	0	0
NEW HOPE SUD	0	0	0	0	0	0
PRITCHETT WSC	0	0	0	0	0	0
QUITMAN	0	0	0	0	0	0
RAMEY WSC	0	0	0	0	0	0
SHARON WSC	0	0	0	0	0	0
SHIRLEY WSC	0	0	0	0	0	0
WINNSBORO	0	0	0	0	0	0
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	1,030	1,583	1,583	1,583	1,583	1,583
MINING	0	0	0	0	0	0
LIVESTOCK	1,098	1,098	1,098	1,098	1,098	1,098
IRRIGATION	0	0	0	0	0	0

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Region D Water User Group (WUG) Second-Tier Identified Water Needs Summary

Second-tier needs are WUG split needs adjusted to include the implementation of recommended demand reduction and direct reuse water management strategies.

WUG CATEGORY	NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MUNICIPAL	13,590	15,355	18,705	23,079	28,524	35,252
COUNTY-OTHER	653	561	647	1,139	2,259	4,286
MANUFACTURING	2,703	4,884	4,761	4,771	5,041	5,171
MINING	2,390	2,278	1,916	1,534	1,224	1,039
STEAM ELECTRIC POWER	30,066	30,866	31,766	32,566	32,814	33,083
LIVESTOCK	14,542	14,552	14,540	14,455	14,477	14,491
IRRIGATION	13,188	13,206	13,208	13,209	13,211	13,213

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Region D Source Water Balance (Availability - WUG Supply)

GROUNDWATER SOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
BLOSSOM AQUIFER	BOWIE	RED	FRESH	21	21	21	21	21	21
BLOSSOM AQUIFER	BOWIE	SULPHUR	FRESH	180	180	180	180	180	180
BLOSSOM AQUIFER	LAMAR	RED	FRESH	323	323	323	323	323	323
BLOSSOM AQUIFER	LAMAR	SULPHUR	FRESH	71	71	71	71	71	71
BLOSSOM AQUIFER	RED RIVER	RED	FRESH	567	567	568	568	568	568
BLOSSOM AQUIFER	RED RIVER	SULPHUR	FRESH	388	388	388	388	388	388
CARRIZO-WILCOX AQUIFER	BOWIE	SULPHUR	FRESH	6,710	6,350	6,090	6,242	6,093	6,135
CARRIZO-WILCOX AQUIFER	CAMP	CYPRESS	FRESH	1,888	1,876	1,867	1,859	1,851	1,842
CARRIZO-WILCOX AQUIFER	CASS	CYPRESS	FRESH	12,771	12,744	12,744	12,743	12,730	12,718
CARRIZO-WILCOX AQUIFER	CASS	SULPHUR	FRESH	2,379	2,310	2,249	2,187	2,116	2,053
CARRIZO-WILCOX AQUIFER	FRANKLIN	CYPRESS	FRESH	6,875	6,884	6,893	6,904	6,916	6,916
CARRIZO-WILCOX AQUIFER	FRANKLIN	SULPHUR	FRESH	1,253	1,251	1,249	1,258	1,266	1,266
CARRIZO-WILCOX AQUIFER	GREGG	CYPRESS	FRESH	475	464	451	434	410	393
CARRIZO-WILCOX AQUIFER	GREGG	SABINE	FRESH	1,685	1,467	1,393	1,375	1,310	1,362
CARRIZO-WILCOX AQUIFER	HARRISON	CYPRESS	FRESH	853	644	499	346	169	14
CARRIZO-WILCOX AQUIFER	HARRISON	SABINE	FRESH	2,532	2,462	2,400	2,319	2,236	2,165
CARRIZO-WILCOX AQUIFER	HOPKINS	CYPRESS	FRESH	271	271	272	272	272	272
CARRIZO-WILCOX AQUIFER	HOPKINS	SABINE	FRESH	978	977	976	978	981	981
CARRIZO-WILCOX AQUIFER	HOPKINS	SULPHUR	FRESH	5,930	6,016	6,039	5,856	5,821	5,606
CARRIZO-WILCOX AQUIFER	MARION	CYPRESS	FRESH	402	399	396	394	392	390
CARRIZO-WILCOX AQUIFER	MORRIS	CYPRESS	FRESH	1,143	1,135	1,135	1,135	1,135	1,135
CARRIZO-WILCOX AQUIFER	MORRIS	SULPHUR	FRESH	5	18	18	18	18	18
CARRIZO-WILCOX AQUIFER	RAINS	SABINE	FRESH	937	924	921	886	889	832
CARRIZO-WILCOX AQUIFER	RED RIVER	SULPHUR	FRESH	0	0	0	0	0	0
CARRIZO-WILCOX AQUIFER	SMITH	SABINE	FRESH	5,116	4,770	4,370	3,715	3,034	2,210
CARRIZO-WILCOX AQUIFER	TITUS	CYPRESS	FRESH	1,587	878	379	425	517	560
CARRIZO-WILCOX AQUIFER	TITUS	SULPHUR	FRESH	1,664	1,605	1,560	1,514	1,467	1,445
CARRIZO-WILCOX AQUIFER	UPSHUR	CYPRESS	FRESH	364	345	344	362	387	413
CARRIZO-WILCOX AQUIFER	UPSHUR	SABINE	FRESH	0	0	0	0	0	0
CARRIZO-WILCOX AQUIFER	VAN ZANDT	NECHES	FRESH	801	688	601	493	374	363
CARRIZO-WILCOX AQUIFER	VAN ZANDT	SABINE	FRESH	138	100	100	100	100	100
CARRIZO-WILCOX AQUIFER	VAN ZANDT	TRINITY	FRESH	771	642	520	356	238	143
CARRIZO-WILCOX AQUIFER	WOOD	CYPRESS	FRESH	1,740	1,738	1,738	1,738	1,738	1,738
CARRIZO-WILCOX AQUIFER	WOOD	SABINE	FRESH	5,583	5,495	5,397	5,340	5,266	5,164
NACATOCH AQUIFER	BOWIE	RED	FRESH	1,548	1,525	1,541	1,625	1,698	1,724
NACATOCH AQUIFER	BOWIE	SULPHUR	FRESH	1,942	1,942	1,942	1,942	1,942	1,942
NACATOCH AQUIFER	DELTA	SULPHUR	FRESH	311	297	286	281	281	269
NACATOCH AQUIFER	FRANKLIN	SULPHUR	FRESH	30	30	30	30	30	30
NACATOCH AQUIFER	HOPKINS	SABINE	FRESH	171	171	171	171	171	171
NACATOCH AQUIFER	HOPKINS	SULPHUR	FRESH	0	0	0	0	0	0
NACATOCH AQUIFER	HUNT	SABINE	FRESH	2,713	2,715	2,719	2,721	2,727	2,729
NACATOCH AQUIFER	HUNT	SULPHUR	FRESH	0	0	22	377	856	1,561
NACATOCH AQUIFER	LAMAR	SULPHUR	FRESH	110	110	110	110	110	110
NACATOCH AQUIFER	RAINS	SABINE	FRESH	1	1	1	1	1	1
NACATOCH AQUIFER	RED RIVER	RED	FRESH	50	50	50	50	50	50

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.
** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region D Source Water Balance (Availability - WUG Supply)

GROUNDWATER SOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY*	2020	2030	2040	2050	2060	2070
NACATOCH AQUIFER	RED RIVER	SULPHUR	FRESH	2,057	2,057	2,057	2,057	2,057	2,057
QUEEN CITY AQUIFER	CAMP	CYPRESS	FRESH	4,170	4,170	4,014	4,014	4,014	4,014
QUEEN CITY AQUIFER	CASS	CYPRESS	FRESH	35,154	35,144	35,135	35,113	35,104	35,091
QUEEN CITY AQUIFER	CASS	SULPHUR	FRESH	2,319	2,306	2,293	2,282	2,269	2,256
QUEEN CITY AQUIFER	GREGG	CYPRESS	FRESH	1,359	1,359	1,359	1,359	1,359	1,359
QUEEN CITY AQUIFER	GREGG	SABINE	FRESH	5,625	5,625	5,625	5,625	5,625	5,625
QUEEN CITY AQUIFER	HARRISON	CYPRESS	FRESH	7,729	7,736	7,736	7,736	7,736	7,736
QUEEN CITY AQUIFER	HARRISON	SABINE	FRESH	2,310	2,310	2,310	2,310	2,310	2,310
QUEEN CITY AQUIFER	MARION	CYPRESS	FRESH	13,574	13,574	13,574	13,574	13,505	13,438
QUEEN CITY AQUIFER	MORRIS	CYPRESS	FRESH	4,971	4,971	4,971	4,971	4,971	4,864
QUEEN CITY AQUIFER	SMITH	SABINE	FRESH	27,288	27,288	27,288	27,158	26,963	26,832
QUEEN CITY AQUIFER	TITUS	CYPRESS	FRESH	144	144	144	144	144	144
QUEEN CITY AQUIFER	UPSHUR	CYPRESS	FRESH	18,710	18,380	18,067	18,205	18,312	18,332
QUEEN CITY AQUIFER	UPSHUR	SABINE	FRESH	7,447	7,354	7,328	7,352	7,379	7,398
QUEEN CITY AQUIFER	VAN ZANDT	NECHES	FRESH	4,624	4,624	4,624	4,624	4,624	4,624
QUEEN CITY AQUIFER	WOOD	CYPRESS	FRESH	986	986	986	986	986	986
QUEEN CITY AQUIFER	WOOD	SABINE	FRESH	8,525	8,521	8,517	8,513	8,510	8,506
TRINITY AQUIFER	DELTA	SULPHUR	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	HUNT	SABINE	FRESH	213	213	213	213	213	213
TRINITY AQUIFER	HUNT	SULPHUR	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	HUNT	TRINITY	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	LAMAR	RED	FRESH	0	0	0	0	0	0
TRINITY AQUIFER	LAMAR	SULPHUR	FRESH	6	6	6	6	6	6
TRINITY AQUIFER	RED RIVER	RED	FRESH	29	29	29	29	29	29
TRINITY AQUIFER	RED RIVER	SULPHUR	FRESH	174	173	174	173	174	173
WOODBINE AQUIFER	HUNT	SABINE	FRESH	0	0	0	0	0	0
WOODBINE AQUIFER	HUNT	SULPHUR	FRESH	0	0	0	0	0	0
WOODBINE AQUIFER	HUNT	TRINITY	FRESH	206	210	216	225	230	229
WOODBINE AQUIFER	LAMAR	RED	FRESH	22	22	22	22	22	22
WOODBINE AQUIFER	LAMAR	SULPHUR	FRESH	0	0	0	0	0	0
WOODBINE AQUIFER	RED RIVER	RED	FRESH	0	0	0	0	0	0
			GROUNDWATER SOURCE WATER BALANCE TOTAL	**220,919**	**218,046**	**215,712**	**214,799**	**213,685**	**212,616**

REUSE SOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY*	2020	2030	2040	2050	2060	2070
DIRECT REUSE	GREGG	SABINE	FRESH	0	0	0	0	0	0
DIRECT REUSE	LAMAR	RED	FRESH	0	0	0	0	0	0
DIRECT REUSE	MORRIS	CYPRESS	FRESH	0	0	0	0	0	0
DIRECT REUSE	TITUS	CYPRESS	FRESH	0	0	0	0	0	0
			REUSE SOURCE WATER BALANCE TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

SURFACE WATER SOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY*	2020	2030	2040	2050	2060	2070
BIG CREEK LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	644	644	644	644	644	644
BIG SANDY CREEK LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	0	0	0	0	0	0

* Salinity field indicates whether the source availability is considered 'fresh' (less than 1,000 mg/L), 'brackish' (1,000 to 10,000 mg/L), 'saline' (10,001 mg/L to 34,999 mg/L), or 'seawater' (35,000 mg/L or greater). Sources can also be labeled as 'fresh/brackish' or 'brackish/saline', if a combination of the salinity types is appropriate.

** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region D Source Water Balance (Availability - WUG Supply)

SURFACE WATER SOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
BOB SANDLIN LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	45	47	49	51	54	56
BRANDY BRANCH LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	17,542	17,542	17,542	17,542	17,542	17,542
CADDO LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	10,000	10,000	10,000	10,000	10,000	10,000
CANEY CREEK LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	964	964	964	964	964	964
CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	RESERVOIR**	SULPHUR	FRESH	5,138	4,432	3,307	2,259	1,509	441
CROOK LAKE/RESERVOIR	RESERVOIR**	RED	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	CAMP	CYPRESS	FRESH	53	53	90	155	217	243
CYPRESS LIVESTOCK LOCAL SUPPLY	CASS	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	FRANKLIN	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	HARRISON	CYPRESS	FRESH	0	0	0	0	21	55
CYPRESS LIVESTOCK LOCAL SUPPLY	HOPKINS	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	MORRIS	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	UPSHUR	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS LIVESTOCK LOCAL SUPPLY	WOOD	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS RUN-OF-RIVER	CAMP	CYPRESS	FRESH	1	1	1	1	1	1
CYPRESS RUN-OF-RIVER	CASS	CYPRESS	FRESH	168	168	168	168	168	168
CYPRESS RUN-OF-RIVER	GREGG	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS RUN-OF-RIVER	HARRISON	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS RUN-OF-RIVER	MARION	CYPRESS	FRESH	615	615	615	615	615	615
CYPRESS RUN-OF-RIVER	MORRIS	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS RUN-OF-RIVER	TITUS	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS RUN-OF-RIVER	UPSHUR	CYPRESS	FRESH	0	0	0	0	0	0
CYPRESS SPRINGS LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	0	0	0	0	0	0
EDGEWOOD CITY LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	0	0	0	0	0	0
ELLIOT CREEK LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	1,892	1,892	1,892	1,892	1,892	1,892
ELLISON CREEK LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	10,643	10,643	10,643	10,643	10,643	10,643
FORK LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	0	0	0	0	0	0
GILMER LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	0	0	0	0	0	0
GLADEWATER LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	2,972	2,868	1,997	1,570	1,178	822
GRAYS CREEK RUN-OF-RIVER	HARRISON	CYPRESS	FRESH	0	0	0	0	0	0
GREENVILLE CITY LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	0	0	0	0	0	0
JOHNSON CREEK LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	0	0	0	0	0	0
LANGFORD LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	433	293	0	0	0	0
LOMA LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	1,027	1,027	1,027	1,027	1,027	1,027
MILL CREEK LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	0	0	0	0	0	0
MONTICELLO LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	0	0	0	0	0	0
NECHES LIVESTOCK LOCAL SUPPLY	VAN ZANDT	NECHES	FRESH	28	28	28	28	28	28
NECHES RUN-OF-RIVER	VAN ZANDT	NECHES	FRESH	0	0	0	0	0	0
O' THE PINES LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	0	0	0	0	0	0
PAT MAYSE LAKE/RESERVOIR	RESERVOIR**	RED	FRESH	8,182	8,180	8,181	8,181	8,180	8,209
RED LIVESTOCK LOCAL SUPPLY	BOWIE	RED	FRESH	0	0	0	0	0	0
RED LIVESTOCK LOCAL SUPPLY	LAMAR	RED	FRESH	0	0	0	0	0	0
RED LIVESTOCK LOCAL SUPPLY	RED RIVER	RED	FRESH	0	0	0	0	0	0
RED RUN-OF-RIVER	BOWIE	RED	FRESH	2,220	2,220	2,220	2,220	2,220	2,220

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** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region D Source Water Balance (Availability - WUG Supply)

SURFACE WATER SOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	COUNTY	BASIN	SALINITY*	2020	2030	2040	2050	2060	2070
RED RUN-OF-RIVER	LAMAR	RED	FRESH	0	0	0	0	0	0
RED RUN-OF-RIVER	RED RIVER	RED	FRESH	0	0	0	0	0	0
RHINES LAKE/RESERVOIR	RESERVOIR**	NECHES	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	FRANKLIN	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	HOPKINS	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	HUNT	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	RAINS	SABINE	FRESH	169	169	169	169	169	169
SABINE LIVESTOCK LOCAL SUPPLY	UPSHUR	SABINE	FRESH	59	59	59	59	59	59
SABINE LIVESTOCK LOCAL SUPPLY	VAN ZANDT	SABINE	FRESH	0	0	0	0	0	0
SABINE LIVESTOCK LOCAL SUPPLY	WOOD	SABINE	FRESH	0	0	0	0	0	0
SABINE OTHER LOCAL SUPPLY	GREGG	SABINE	FRESH	2,050	2,050	2,050	2,050	2,050	2,050
SABINE OTHER LOCAL SUPPLY	VAN ZANDT	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	GREGG	SABINE	FRESH	1	1	1	1	1	1
SABINE RUN-OF-RIVER	HARRISON	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	HOPKINS	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	HUNT	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	RAINS	SABINE	FRESH	0	0	0	0	0	0
SABINE RUN-OF-RIVER	SMITH	SABINE	FRESH	644	644	644	644	644	644
SABINE RUN-OF-RIVER	UPSHUR	SABINE	FRESH	1	1	1	1	1	1
SABINE RUN-OF-RIVER	VAN ZANDT	SABINE	FRESH	91	91	91	91	91	91
SABINE RUN-OF-RIVER	WOOD	SABINE	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	BOWIE	SULPHUR	FRESH	576	576	514	406	300	258
SULPHUR LIVESTOCK LOCAL SUPPLY	CASS	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	DELTA	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	FRANKLIN	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	HOPKINS	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	HUNT	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	LAMAR	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	MORRIS	SULPHUR	FRESH	66	61	61	61	66	66
SULPHUR LIVESTOCK LOCAL SUPPLY	RED RIVER	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR LIVESTOCK LOCAL SUPPLY	TITUS	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR OTHER LOCAL SUPPLY	DELTA	SULPHUR	FRESH	25	26	26	26	26	26
SULPHUR RUN-OF-RIVER	BOWIE	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER	DELTA	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER	FRANKLIN	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER	HOPKINS	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER	HUNT	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER	LAMAR	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER	RED RIVER	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR RUN-OF-RIVER	TITUS	SULPHUR	FRESH	0	0	0	0	0	0
SULPHUR SPRINGS LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	1,664	1,664	1,664	1,664	1,664	1,664
TANKERSLEY LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	0	0	0	0	0	0
TAWAKONI LAKE/RESERVOIR	RESERVOIR**	SABINE	FRESH	0	0	0	0	0	0
TRINITY LIVESTOCK LOCAL SUPPLY	HUNT	TRINITY	FRESH	0	0	0	0	0	0
TRINITY LIVESTOCK LOCAL SUPPLY	VAN ZANDT	TRINITY	FRESH	0	0	0	0	0	0

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** Since reservoir sources can exist across multiple counties, the county field value, 'reservoir' is applied to all reservoir sources.

Region D Source Water Balance (Availability - WUG Supply)

SURFACE WATER SOURCE TYPE				SOURCE WATER BALANCE (ACRE-FEET PER YEAR)					
SOURCE NAME	**COUNTY**	**BASIN**	**SALINITY***	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
TURKEY CREEK LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	0	0	0	0	0	0
WELSH LAKE/RESERVOIR	RESERVOIR**	CYPRESS	FRESH	0	0	0	0	0	0
WRIGHT PATMAN LAKE/RESERVOIR	RESERVOIR**	SULPHUR	FRESH	224,936	213,042	201,141	189,173	177,111	164,915
SURFACE WATER SOURCE WATER BALANCE TOTAL				**292,849**	**280,001**	**265,789**	**252,305**	**239,085**	**225,514**

REGION D SOURCE WATER BALANCE TOTAL	**513,768**	**498,047**	**481,501**	**467,104**	**452,770**	**438,130**

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** Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

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Region D Water User Group (WUG) Data Comparison to 2016 Regional Water Plan (RWP)

	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
BOWIE COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	3,501	3,501	0.0%	3,535	3,535	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,379	1,584	-33.4%	2,304	800	-65.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
BOWIE COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	981	7,161	630.0%	981	7,161	630.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	6,221	10,373	66.7%	5,121	10,373	102.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	5,240	4,134	-21.1%	4,140	4,134	-0.1%
BOWIE COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,156	1,156	0.0%	720	720	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,156	1,825	57.9%	720	1,136	57.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	669	100.0%	0	416	100.0%
BOWIE COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	35	35	0.0%	35	35	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,579	1,611	2.0%	2,286	2,047	-10.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	1,544	1,579	2.3%	2,251	2,014	-10.5%
BOWIE COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	187	66	-64.7%	187	66	-64.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	17,374	12,850	-26.0%	17,399	15,058	-13.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	17,187	12,784	-25.6%	17,216	14,992	-12.9%
CAMP COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	432	432	0.0%	478	478	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	136	173	27.2%	48	120	150.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
CAMP COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	952	952	0.0%	952	952	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	952	4,914	416.2%	952	4,914	416.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	3,962	100.0%	0	3,962	100.0%
CAMP COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	47	102	117.0%	58	102	75.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	46	35	-23.9%	58	52	-10.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
CAMP COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	23	23	0.0%	23	23	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	12	12	0.0%	7	7	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
CAMP COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,762	2,814	1.9%	2,792	2,814	0.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,539	1,480	-3.8%	2,194	2,091	-4.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	226	0	-100.0%
CASS COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,766	638	-76.9%	3,073	638	-79.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,589	1,087	-31.6%	1,410	846	-40.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	449	100.0%	0	208	100.0%

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Region D Water User Group (WUG) Data Comparison to 2016 Regional Water Plan (RWP)

	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	**2021 RWP**	**DIFFERENCE (%)**	**2016 RWP**	**2021 RWP**	**DIFFERENCE (%)**
CASS COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	839	839	0.0%	841	841	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	715	2,657	271.6%	715	2,657	271.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	1,818	100.0%	0	1,816	100.0%
CASS COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	120,051	32,774	-72.7%	88,056	32,845	-62.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	115,199	32,723	-71.6%	150,883	32,799	-78.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	115	0	-100.0%	62,827	0	-100.0%
CASS COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	839	839	0.0%	952	952	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	39	39	0.0%	20	20	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
CASS COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,974	4,250	42.9%	2,920	4,438	52.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,882	2,415	28.3%	1,766	2,502	41.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	47	100.0%	0	38	100.0%
DELTA COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,148	194	-83.1%	1,022	175	-82.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	207	82	-60.4%	210	73	-65.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
DELTA COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	4,601	9,163	99.2%	4,530	9,203	103.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,775	2,396	-13.7%	2,626	2,396	-8.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
DELTA COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	373	279	-25.2%	373	291	-22.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	373	541	45.0%	373	541	45.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	262	100.0%	0	250	100.0%
DELTA COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,807	1,119	-38.1%	1,668	1,116	-33.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	457	591	29.3%	442	580	31.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	6	100.0%	0	15	100.0%
FRANKLIN COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	197	197	0.0%	232	215	-7.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	153	98	-35.9%	170	109	-35.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
FRANKLIN COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	300	314	4.7%	300	314	4.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	26	103	296.2%	26	103	296.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
FRANKLIN COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,046	1,046	0.0%	1,046	1,046	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,036	2,850	175.1%	1,036	2,850	175.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	1,804	100.0%	0	1,804	100.0%

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	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
FRANKLIN COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	0	7	100.0%	0	7	100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	0	5	100.0%	0	7	100.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
FRANKLIN COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,040	1,040	0.0%	954	954	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	5	5	0.0%	2	2	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
FRANKLIN COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	4,981	6,871	37.9%	4,605	5,575	21.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,298	1,333	2.7%	1,367	1,404	2.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
GREGG COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,288	1,320	2.5%	1,682	2,503	48.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	718	595	-17.1%	1,075	900	-16.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
GREGG COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	182	192	5.5%	182	192	5.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	24	40	66.7%	24	40	66.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
GREGG COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	215	215	0.0%	215	215	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	215	210	-2.3%	215	210	-2.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
GREGG COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	6,846	1,572	-77.0%	6,848	1,574	-77.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	4,251	1,233	-71.0%	6,542	1,517	-76.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
GREGG COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	70	263	275.7%	116	174	50.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	274	274	0.0%	180	180	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	204	11	-94.6%	64	6	-90.6%
GREGG COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	42,961	52,959	23.3%	49,154	64,679	31.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	30,079	30,191	0.4%	46,786	46,965	0.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	11	100.0%
GREGG COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,242	2,242	0.0%	2,242	2,242	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	978	940	-3.9%	2,094	940	-55.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HARRISON COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	4,200	3,750	-10.7%	4,845	4,395	-9.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	3,176	1,438	-54.7%	4,397	1,878	-57.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%

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	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
HARRISON COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	212	169	-20.3%	212	169	-20.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	445	701	57.5%	445	701	57.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	233	532	128.3%	233	532	128.3%
HARRISON COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	964	964	0.0%	1,313	1,313	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	856	636	-25.7%	1,097	815	-25.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HARRISON COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	40,956	108,372	164.6%	40,956	107,894	163.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	95,100	24,736	-74.0%	140,534	27,940	-80.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	55,006	0	-100.0%	100,394	0	-100.0%
HARRISON COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	865	792	-8.4%	953	880	-7.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,498	2,498	0.0%	855	855	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	1,633	1,706	4.5%	18	129	616.7%
HARRISON COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	15,424	22,164	43.7%	10,450	22,127	111.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	7,493	9,425	25.8%	10,658	13,564	27.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	6	174	2800.0%	849	1,113	31.1%
HARRISON COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	24,161	26,508	9.7%	24,161	26,508	9.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	19,838	21,112	6.4%	46,625	21,112	-54.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	22,464	0	-100.0%
HOPKINS COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,705	1,342	-21.3%	1,585	1,230	-22.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	824	177	-78.5%	844	123	-85.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HOPKINS COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	143	144	0.7%	143	144	0.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,269	4,769	110.2%	2,269	4,769	110.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	2,126	4,627	117.6%	2,126	4,627	117.6%
HOPKINS COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	4,854	4,854	0.0%	4,856	4,856	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	4,236	5,498	29.8%	4,236	5,498	29.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	1,068	100.0%	0	1,219	100.0%
HOPKINS COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,741	1,741	0.0%	2,275	2,275	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,741	944	-45.8%	2,275	968	-57.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HOPKINS COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	804	804	0.0%	938	938	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,031	1,031	0.0%	1,577	1,577	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	227	227	0.0%	639	639	0.0%

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	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
HOPKINS COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	21,309	8,753	-58.9%	19,611	8,719	-55.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	4,670	5,389	15.4%	6,022	6,855	13.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	20	100.0%	255	254	-0.4%
HUNT COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,517	1,652	-34.4%	5,340	3,012	-43.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,282	790	-65.4%	12,893	6,846	-46.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	7,554	3,834	-49.2%
HUNT COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	108	125	15.7%	108	125	15.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	254	355	39.8%	254	355	39.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	146	230	57.5%	146	230	57.5%
HUNT COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,150	1,146	-0.3%	1,150	1,147	-0.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,141	1,095	-4.0%	1,141	1,095	-4.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	2	100.0%	0	1	100.0%
HUNT COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,386	1,102	-20.5%	2,525	1,941	-23.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	705	555	-21.3%	1,312	672	-48.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
HUNT COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	55	55	0.0%	50	50	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	128	128	0.0%	47	47	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	73	73	0.0%	0	0	0.0%
HUNT COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	14,704	13,754	-6.5%	24,455	20,894	-14.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	15,288	16,768	9.7%	41,507	45,799	10.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	3,362	3,431	2.1%	18,892	25,190	33.3%
HUNT COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	351	373	6.3%	351	373	6.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	12,436	373	-97.0%	28,564	373	-98.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	12,085	0	-100.0%	28,213	0	-100.0%
LAMAR COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	351	275	-21.7%	342	280	-18.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	418	479	14.6%	458	524	14.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	67	204	204.5%	116	244	110.3%
LAMAR COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,633	8,658	228.8%	2,320	8,658	273.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	20,945	10,126	-51.7%	20,622	10,126	-50.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	18,312	1,468	-92.0%	18,302	1,468	-92.0%
LAMAR COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	3,258	1,624	-50.2%	3,253	1,624	-50.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,800	1,469	-47.5%	2,800	1,469	-47.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	617	100.0%	0	617	100.0%

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LAMAR COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	5,961	5,961	0.0%	7,475	7,475	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	6,427	5,026	-21.8%	8,338	5,137	-38.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	565	0	-100.0%	951	0	-100.0%
LAMAR COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	37,835	37,631	-0.5%	36,295	36,064	-0.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	5,976	5,959	-0.3%	6,208	6,195	-0.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
LAMAR COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	8,961	8,961	0.0%	8,961	8,961	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	8,503	5,511	-35.2%	19,529	5,511	-71.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	10,568	0	-100.0%
MARION COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,766	1,757	-0.5%	1,766	1,757	-0.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	545	99	-81.8%	545	61	-88.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
MARION COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	0	321	100.0%	0	321	100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	0	12	100.0%	0	12	100.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
MARION COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	411	411	0.0%	411	411	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	411	188	-54.3%	411	188	-54.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
MARION COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	72	0	-100.0%	95	0	-100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	72	0	-100.0%	95	0	-100.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
MARION COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	116	116	0.0%	128	128	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	489	489	0.0%	393	393	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	373	373	0.0%	265	265	0.0%
MARION COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,708	2,960	73.3%	1,708	2,960	73.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	423	950	124.6%	395	949	140.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	15	100.0%	0	56	100.0%
MARION COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,852	4,257	129.9%	3,967	6,247	57.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,852	4,257	129.9%	3,967	4,257	7.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
MORRIS COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	540	540	0.0%	540	540	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	445	352	-20.9%	458	371	-19.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%

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	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
MORRIS COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	0	70	100.0%	0	70	100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	0	11	100.0%	0	11	100.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
MORRIS COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	626	626	0.0%	626	626	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	618	1,605	159.7%	618	1,605	159.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	979	100.0%	0	979	100.0%
MORRIS COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	134,943	121,906	-9.7%	128,105	115,068	-10.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	95,931	25,738	-73.2%	130,868	25,743	-80.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	2,763	0	-100.0%
MORRIS COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	3,025	3,191	5.5%	2,995	3,197	6.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,307	1,383	5.8%	1,356	1,426	5.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	164	26	-84.1%	170	20	-88.2%
MORRIS COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	820	820	0.0%	820	820	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	43	50	16.3%	91	50	-45.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
RAINS COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	711	393	-44.7%	727	409	-43.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	587	74	-87.4%	608	61	-90.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
RAINS COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	55	211	283.6%	55	211	283.6%
PROJECTED DEMAND TOTAL (acre-feet per year)	38	65	71.1%	38	65	71.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
RAINS COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	506	506	0.0%	506	506	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	506	428	-15.4%	506	428	-15.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
RAINS COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	5	12	140.0%	5	12	140.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	3	12	300.0%	3	12	300.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
RAINS COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,022	2,656	31.4%	3,178	3,041	-4.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,170	2,000	70.9%	1,221	2,103	72.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	1	100.0%	0	65	100.0%
RED RIVER COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	332	159	-52.1%	324	161	-50.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	238	159	-33.2%	6	8	33.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%

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	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
RED RIVER COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	780	2,523	223.5%	770	2,523	227.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	5,156	3,867	-25.0%	4,895	3,867	-21.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	4,376	2,154	-50.8%	4,125	2,154	-47.8%
RED RIVER COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,687	1,527	-9.5%	1,687	1,527	-9.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,484	1,532	3.2%	1,484	1,532	3.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	184	100.0%	0	184	100.0%
RED RIVER COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	9	8,527	94644.4%	2	8,520	425900.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	9	3	-66.7%	11	3	-72.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	9	0	-100.0%
RED RIVER COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	4	4	0.0%	3	3	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	4	4	0.0%	3	3	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
RED RIVER COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,905	1,730	-9.2%	1,001	1,717	71.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,237	1,407	13.7%	1,271	1,384	8.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	237	100.0%	591	219	-62.9%
RED RIVER COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	8,510	0	-100.0%	9,290	0	-100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	489	0	-100.0%	1,048	0	-100.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SMITH COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,912	567	-80.5%	4,500	1,239	-72.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,371	544	-60.3%	2,300	1,216	-47.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SMITH COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	370	324	-12.4%	475	324	-31.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	370	324	-12.4%	475	324	-31.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SMITH COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	468	514	9.8%	468	514	9.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	468	514	9.8%	468	514	9.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
SMITH COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	0	4	100.0%	0	5	100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	300	4	-98.7%	442	5	-98.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	300	0	-100.0%	442	0	-100.0%
SMITH COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	320	448	40.0%	452	697	54.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	287	287	0.0%	497	497	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	45	0	-100.0%

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	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
SMITH COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	7,376	8,304	12.6%	9,508	10,274	8.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	6,106	6,657	9.0%	11,947	12,448	4.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	146	65	-55.5%	2,802	2,526	-9.9%
SMITH COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	12	0	-100.0%	27	0	-100.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	12	0	-100.0%	27	0	-100.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TITUS COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,573	1,573	0.0%	1,882	992	-47.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	497	474	-4.6%	829	790	-4.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TITUS COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,077	1,468	36.3%	1,077	1,468	36.3%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,000	1,053	5.3%	1,000	1,053	5.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TITUS COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,008	1,008	0.0%	942	942	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	930	2,947	216.9%	930	2,947	216.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	1,939	100.0%	0	2,005	100.0%
TITUS COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	5,392	5,392	0.0%	5,816	2,461	-57.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	8,995	4,063	-54.8%	11,256	4,155	-63.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	3,603	0	-100.0%	5,440	1,694	-68.9%
TITUS COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	4,553	4,560	0.2%	4,659	4,666	0.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,644	1,644	0.0%	2,392	2,392	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
TITUS COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	6,966	19,550	180.6%	7,185	18,528	157.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	5,508	5,488	-0.4%	9,017	8,985	-0.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	1,396	0	-100.0%	2,229	0	-100.0%
TITUS COUNTY | STEAM ELECTRIC POWER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	31,865	31,865	0.0%	29,148	28,848	-1.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	52,423	61,931	18.1%	120,703	61,931	-48.7%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	20,558	30,066	46.2%	91,555	33,083	-63.9%
UPSHUR COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,919	1,908	-0.6%	2,050	2,135	4.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,498	735	-50.9%	1,855	911	-50.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
UPSHUR COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	272	713	162.1%	272	713	162.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	185	170	-8.1%	185	170	-8.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%

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	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
UPSHUR COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,511	1,511	0.0%	1,511	1,511	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,358	1,651	21.6%	1,358	1,651	21.6%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	140	100.0%	0	140	100.0%
UPSHUR COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	6	6	0.0%	6	6	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	272	69	-74.6%	382	76	-80.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	266	63	-76.3%	376	70	-81.4%
UPSHUR COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1	484	48300.0%	1	438	43700.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	379	379	0.0%	333	333	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	378	0	-100.0%	332	0	-100.0%
UPSHUR COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	7,002	7,919	13.1%	7,003	7,890	12.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	3,598	4,253	18.2%	4,467	5,278	18.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	291	206	-29.2%
VAN ZANDT COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	4,458	3,530	-20.8%	5,144	3,911	-24.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,780	1,421	-48.9%	3,422	1,698	-50.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
VAN ZANDT COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	107	457	327.1%	107	432	303.7%
PROJECTED DEMAND TOTAL (acre-feet per year)	437	500	14.4%	437	500	14.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	330	43	-87.0%	330	68	-79.4%
VAN ZANDT COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,928	2,928	0.0%	2,923	2,923	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	2,172	1,889	-13.0%	2,172	1,889	-13.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
VAN ZANDT COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	523	264	-49.5%	641	253	-60.5%
PROJECTED DEMAND TOTAL (acre-feet per year)	681	506	-25.7%	928	757	-18.4%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	158	242	53.2%	287	504	75.6%
VAN ZANDT COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,146	3,316	54.5%	2,984	4,154	39.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	300	300	0.0%	470	470	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
VAN ZANDT COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	7,241	7,933	9.6%	9,853	8,584	-12.9%
PROJECTED DEMAND TOTAL (acre-feet per year)	3,958	5,249	32.6%	5,033	6,682	32.8%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	13	29	123.1%	199	340	70.9%
WOOD COUNTY | COUNTY-OTHER WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	4,413	4,413	0.0%	4,461	4,461	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	477	288	-39.6%	515	222	-56.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%

*WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The needs shown in the WUG Data Comparison to 2016 RWP report are calculated by first deducting the WUG split's projected demand from its total existing water supply volume. If the WUG split has a greater existing supply volume than projected demand in any given decade, this amount is considered a surplus volume. Before aggregating the difference between supplies and demands to the WUG county and category level, calculated surpluses are updated to zero so that only the WUGs with needs in the decade are included with the Needs totals.

Region D Water User Group (WUG) Data Comparison to 2016 Regional Water Plan (RWP)

	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
WOOD COUNTY | IRRIGATION WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	940	1,374	46.2%	940	1,374	46.2%
PROJECTED DEMAND TOTAL (acre-feet per year)	721	489	-32.2%	721	489	-32.2%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
WOOD COUNTY | LIVESTOCK WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	2,092	2,198	5.1%	2,092	2,198	5.1%
PROJECTED DEMAND TOTAL (acre-feet per year)	1,810	3,224	78.1%	1,810	3,224	78.1%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	1,098	100.0%	0	1,098	100.0%
WOOD COUNTY | MANUFACTURING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	1,502	1,502	0.0%	1,502	1,502	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	759	2,532	233.6%	1,004	3,085	207.3%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	1,030	100.0%	0	1,583	100.0%
WOOD COUNTY | MINING WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	309	309	0.0%	328	328	0.0%
PROJECTED DEMAND TOTAL (acre-feet per year)	25	25	0.0%	19	19	0.0%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
WOOD COUNTY | MUNICIPAL WUG TYPE						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	7,850	9,710	23.7%	8,493	9,974	17.4%
PROJECTED DEMAND TOTAL (acre-feet per year)	4,627	4,871	5.3%	4,729	5,035	6.5%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	0	0	0.0%	0	0	0.0%
REGION D						
EXISTING WUG SUPPLY TOTAL (acre-feet per year)	674,967	677,524	0.4%	660,854	692,647	4.8%
PROJECTED DEMAND TOTAL (acre-feet per year)	634,172	401,419	-36.7%	956,972	479,321	-49.9%
WATER SUPPLY NEEDS TOTAL (acre-feet per year)*	150,192	80,588	-46.3%	410,695	117,022	-71.5%

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Region D Source Data Comparison to 2016 Regional Water Plan (RWP)

	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
BOWIE COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	13,430	15,086	12.3%	12,297	14,213	15.6%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	3,591	10,066	180.3%	3,345	9,820	193.6%
CAMP COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	7,583	8,356	10.2%	7,583	8,200	8.1%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	535	535	0.0%	725	725	0.0%
CASS COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	42,726	56,532	32.3%	42,726	56,135	31.4%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	846	854	0.9%	847	855	0.9%
DELTA COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	937	631	-32.7%	937	631	-32.7%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	4,801	9,444	96.7%	4,762	9,445	98.3%
FRANKLIN COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	9,514	9,816	3.2%	9,514	9,816	3.2%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	1,155	1,159	0.3%	1,145	1,159	1.2%
GREGG COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	15,222	15,025	-1.3%	15,222	15,025	-1.3%
REUSE AVAILABILITY TOTAL (acre-feet per year)	6,161	6,161	0.0%	6,161	6,161	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	3,774	15,333	306.3%	3,776	15,333	306.1%
HARRISON COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	19,210	21,106	9.9%	19,012	20,899	9.9%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	28,478	105,031	268.8%	28,623	105,176	267.5%
HOPKINS COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	4,598	11,481	149.7%	4,598	11,157	142.6%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	3,110	3,089	-0.7%	2,589	2,568	-0.8%
HUNT COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	7,185	4,774	-33.6%	7,185	6,333	-11.9%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	1,148	1,165	1.5%	1,149	1,166	1.5%
LAMAR COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	5,470	583	-89.3%	5,470	583	-89.3%
REUSE AVAILABILITY TOTAL (acre-feet per year)	12	12	0.0%	12	12	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	1,633	10,232	526.6%	1,633	10,232	526.6%
MARION COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	17,626	18,133	2.9%	17,626	17,997	2.1%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	148	1,072	624.3%	148	1,072	624.3%
MORRIS COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	12,268	12,037	-1.9%	12,095	11,930	-1.4%
REUSE AVAILABILITY TOTAL (acre-feet per year)	72,086	72,086	0.0%	65,248	65,248	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	492	481	-2.2%	497	486	-2.2%
RAINS COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	1,704	1,840	8.0%	1,584	1,746	10.2%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	730	886	21.4%	730	886	21.4%
RED RIVER COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	3,479	4,949	42.3%	3,479	4,946	42.2%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	10,675	12,427	16.4%	11,445	12,427	8.6%
RESERVOIR* COUNTY						
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	1,211,304	1,220,004	0.7%	1,006,609	1,117,950	11.1%

* Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

Region D Source Data Comparison to 2016 Regional Water Plan (RWP)

	2020 PLANNING DECADE			2070 PLANNING DECADE		
	2016 RWP	2021 RWP	DIFFERENCE (%)	2016 RWP	2021 RWP	DIFFERENCE (%)
SMITH COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	38,239	41,589	8.8%	38,215	41,083	7.5%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	994	994	0.0%	994	994	0.0%
TITUS COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	10,459	10,197	-2.5%	9,776	10,176	4.1%
REUSE AVAILABILITY TOTAL (acre-feet per year)	160	160	0.0%	160	160	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	1,644	2,029	23.4%	1,644	2,029	23.4%
UPSHUR COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	32,685	34,522	5.6%	32,504	34,276	5.5%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	1,359	1,556	14.5%	1,359	1,556	14.5%
VAN ZANDT COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	14,097	15,259	8.2%	13,865	14,862	7.2%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	4,183	4,498	7.5%	4,591	4,906	6.9%
WOOD COUNTY						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	31,651	31,503	-0.5%	31,423	31,283	-0.4%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	2,765	3,199	15.7%	2,765	3,199	15.7%
REGION D						
GROUNDWATER AVAILABILITY TOTAL (acre-feet per year)	288,083	313,419	8.8%	285,111	311,291	9.2%
REUSE AVAILABILITY TOTAL (acre-feet per year)	78,419	78,419	0.0%	71,581	71,581	0.0%
SURFACE WATER AVAILABILITY TOTAL (acre-feet per year)	1,283,365	1,404,054	9.4%	1,079,376	1,301,984	20.6%

* Since reservoir sources can exist across multiple counties, the county field value, ‘reservoir’ is applied to all reservoir sources.

Region D Water User Group (WUG) Unmet Needs

WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The unmet needs shown in the WUG Unmet Needs report are calculated by first deducting the WUG split's projected demand from the sum of its total existing water supply volume and all associated recommended water management strategy water volumes. If the WUG split has a greater future supply volume than projected demand in any given decade, this amount is considered a surplus volume. In order to display only unmet needs associated with the WUG split, these surplus volumes are updated to a zero and the unmet needs water volumes are shown as absolute values.

	WUG UNMET NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
BOWIE COUNTY - SULPHUR BASIN						
MANUFACTURING	629	0	0	0	0	0
HUNT COUNTY - SABINE BASIN						
HICKORY CREEK SUD*	32	114	228	393	629	977
HUNT COUNTY - SULPHUR BASIN						
HICKORY CREEK SUD*	36	91	172	285	451	692
HUNT COUNTY - TRINITY BASIN						
HICKORY CREEK SUD*	17	45	85	142	223	341
RED RIVER COUNTY - SULPHUR BASIN						
IRRIGATION	97	97	97	97	97	97

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

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Region D Water User Group (WUG) Unmet Needs Summary

WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. The unmet needs shown in the WUG Unmet Needs Summary report are calculated by first deducting the WUG split's projected demand from the sum of its total existing water supply volume and all associated recommended water management strategy water volumes. If the WUG split has a greater future supply volume than projected demand in any given decade, this amount is considered a surplus volume. Before aggregating the difference between supplies and demands to the WUG category level, calculated surpluses are updated to zero so that only the WUGs with unmet needs in the decade are included with the Needs totals. Unmet needs water volumes are shown as absolute values.

WUG CATEGORY	NEEDS (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MUNICIPAL	85	250	485	820	1,303	2,010
COUNTY-OTHER	0	0	0	0	0	0
MANUFACTURING	629	0	0	0	0	0
MINING	0	0	0	0	0	0
STEAM ELECTRIC POWER	0	0	0	0	0	0
LIVESTOCK	0	0	0	0	0	0
IRRIGATION	97	97	97	97	97	97

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Region D Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
ABLES SPRINGS WSC*	C	CONSERVATION - ABLES SPRINGS WSC	DEMAND REDUCTION	$0	$34	1	2	1	3	7	10
ABLES SPRINGS WSC*	C	MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	D | MARVIN NICHOLS LAKE/RESERVOIR	N/A	$707	0	0	0	21	35	44
ABLES SPRINGS WSC*	C	NTMWD - ADDITIONAL LAVON WATERSHED REUSE	C | TRINITY INDIRECT REUSE	N/A	$835	0	0	0	1	6	10
ABLES SPRINGS WSC*	C	NTMWD - ADDITIONAL MEASURES TO ACCESS FULL LAVON YIELD	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$75	0	1	2	1	2	3
ABLES SPRINGS WSC*	C	NTMWD - BOIS D'ARC LAKE	C | BOIS D ARC LAKE/RESERVOIR	N/A	$81	0	11	17	15	24	31
ABLES SPRINGS WSC*	C	NTMWD - EXPANDED WETLAND REUSE	C | TRINITY INDIRECT REUSE	N/A	$749	0	1	3	3	6	9
ABLES SPRINGS WSC*	C	NTMWD - OKLAHOMA	OK | OKLAHOMA RUN-OF-RIVER	N/A	$423	0	0	0	0	0	13
ABLES SPRINGS WSC*	C	NTMWD - TEXOMA BLENDING	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$430	0	0	6	12	20	30
ABLES SPRINGS WSC*	C	WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	$834	0	0	0	0	0	15
ATLANTA	D	RIVERBEND STRATEGY CASS COUNTY	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	$242	0	1,075	1,135	1,209	1,206	1,206
B H P WSC*	C	MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	D | MARVIN NICHOLS LAKE/RESERVOIR	N/A	$707	0	0	0	68	107	125
B H P WSC*	C	NTMWD - ADDITIONAL LAVON WATERSHED REUSE	C | TRINITY INDIRECT REUSE	N/A	$834	0	0	0	5	17	29
B H P WSC*	C	NTMWD - ADDITIONAL MEASURES TO ACCESS FULL LAVON YIELD	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$75	0	56	71	54	84	99
B H P WSC*	C	NTMWD - EXPANDED WETLAND REUSE	C | TRINITY INDIRECT REUSE	N/A	$749	0	4	10	11	19	28
B H P WSC*	C	NTMWD - OKLAHOMA	OK | OKLAHOMA RUN-OF-RIVER	N/A	$423	0	0	0	0	0	37
B H P WSC*	C	NTMWD - TEXOMA BLENDING	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$430	0	0	22	39	61	85
B H P WSC*	C	WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	$834	0	0	0	0	0	42
BLACKLAND WSC*	C	CONSERVATION - BLACKLAND WSC	DEMAND REDUCTION	N/A	$357	0	1	1	1	0	1
BLACKLAND WSC*	C	MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	D | MARVIN NICHOLS LAKE/RESERVOIR	N/A	$707	0	0	0	1	1	1
BLACKLAND WSC*	C	NTMWD - ADDITIONAL LAVON WATERSHED REUSE	C | TRINITY INDIRECT REUSE	N/A	N/A	0	0	0	0	0	0
BLACKLAND WSC*	C	NTMWD - ADDITIONAL MEASURES TO ACCESS FULL LAVON YIELD	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	N/A	0	0	0	0	0	0
BLACKLAND WSC*	C	NTMWD - BOIS D'ARC LAKE	C | BOIS D ARC LAKE/RESERVOIR	N/A	$81	0	1	1	1	1	1
BLACKLAND WSC*	C	NTMWD - EXPANDED WETLAND REUSE	C | TRINITY INDIRECT REUSE	N/A	N/A	0	0	0	0	0	0
BLACKLAND WSC*	C	NTMWD - OKLAHOMA	OK | OKLAHOMA RUN-OF-RIVER	N/A	N/A	0	0	0	0	0	0

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Region D Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
BLACKLAND WSC*	C	NTMWD - TEXOMA BLENDING	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$430	0	0	0	0	1	1
BLACKLAND WSC*	C	WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	N/A	0	0	0	0	0	0
BRINKER WSC	D	INCREASE EXISTING CONTRACT (BRINKER WSC, SULPHUR)	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	N/A	$1176	0	0	0	12	47	83
BURNS REDBANK WSC	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$482	$537	201	199	196	194	193	193
CADDO BASIN SUD*	C	MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	D | MARVIN NICHOLS LAKE/RESERVOIR	N/A	$707	0	0	0	217	349	421
CADDO BASIN SUD*	C	NTMWD - ADDITIONAL LAVON WATERSHED REUSE	C | TRINITY INDIRECT REUSE	N/A	$835	0	0	0	15	54	98
CADDO BASIN SUD*	C	NTMWD - ADDITIONAL MEASURES TO ACCESS FULL LAVON YIELD	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$75	0	15	21	14	22	24
CADDO BASIN SUD*	C	NTMWD - BOIS D'ARC LAKE	C | BOIS D ARC LAKE/RESERVOIR	$486	$81	4	144	195	153	246	298
CADDO BASIN SUD*	C	NTMWD - EXPANDED WETLAND REUSE	C | TRINITY INDIRECT REUSE	N/A	$749	0	11	30	32	66	93
CADDO BASIN SUD*	C	NTMWD - OKLAHOMA	OK | OKLAHOMA RUN-OF-RIVER	N/A	$423	0	0	0	0	0	127
CADDO BASIN SUD*	C	NTMWD - TEXOMA BLENDING	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$430	0	0	65	124	199	285
CADDO BASIN SUD*	C	WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	$834	0	0	0	0	0	142
CADDO BASIN SUD*	D	ADVANCED WATER CONSERVATION (CADDO BASIN SUD)	DEMAND REDUCTION	$770	$770	1	2	3	5	9	15
CADDO MILLS	D	GREENVILLE CONSERVATION AND WTP	D | TAWAKONI LAKE/RESERVOIR	N/A	$237	0	1	36	68	108	254
CANTON	D	CANTON REUSE	D | SABINE INDIRECT REUSE	$3291	$1464	323	323	323	323	323	323
CANTON	D	DRILL NEW WELLS (CANTON, CARRIZO-WILCOX, SABINE)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	$1420	$920	100	100	100	100	100	100
CASH SUD*	C	MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	D | MARVIN NICHOLS LAKE/RESERVOIR	N/A	$707	0	0	0	258	307	266
CASH SUD*	C	NTMWD - ADDITIONAL LAVON WATERSHED REUSE	C | TRINITY INDIRECT REUSE	N/A	$835	0	0	0	19	48	62
CASH SUD*	C	NTMWD - ADDITIONAL MEASURES TO ACCESS FULL LAVON YIELD	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$75	0	238	297	204	239	202
CASH SUD*	C	NTMWD - EXPANDED WETLAND REUSE	C | TRINITY INDIRECT REUSE	N/A	$749	0	16	41	37	57	60
CASH SUD*	C	NTMWD - OKLAHOMA	OK | OKLAHOMA RUN-OF-RIVER	N/A	$423	0	0	0	0	0	79
CASH SUD*	C	NTMWD - TEXOMA BLENDING	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$430	0	0	95	154	182	181
CASH SUD*	C	WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	$834	0	0	0	0	0	90

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Region D Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
CASH SUD*	D	ADVANCED WATER CONSERVATION (CASH SUD)	DEMAND REDUCTION	N/A	N/A	0	1	1	0	0	0
CASH SUD*	D	INCREASE EXISTING CONTRACT (CASH SUD)	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	$2198	$1762	332	416	568	642	471	337
CELESTE	D	DRILL NEW WELLS (CELESTE, WOODBINE, TRINITY)	D | WOODBINE AQUIFER | HUNT COUNTY	$2288	$1276	29	52	86	136	209	229
CELESTE	D	NEW CONTRACT WITH GREENVILLE AND PIPELINE TO CELESTE	D | TAWAKONI LAKE/RESERVOIR	N/A	$3920	0	0	0	0	0	87
CENTRAL BOWIE COUNTY WSC	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$482	$537	619	639	708	784	869	962
CLARKSVILLE	D	DRILL NEW WELLS WITH RO TREATMENT (CLARKSVILLE, BLOSSOM)	D | BLOSSOM AQUIFER | RED RIVER COUNTY	$4312	$2402	388	388	388	388	388	388
COUNTY-OTHER, CASS	D	DRILL NEW WELLS (COUNTY OTHER, CASS, CARRIZO, CYPRESS)	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	$514	$84	323	323	323	323	323	323
COUNTY-OTHER, CASS	D	DRILL NEW WELLS (COUNTY OTHER, CASS, CARRIZO, SULPHUR)	D | CARRIZO-WILCOX AQUIFER | CASS COUNTY	$528	$97	216	216	216	216	216	216
COUNTY-OTHER, CASS	D	RIVERBEND STRATEGY CASS COUNTY	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	$483	0	44	44	44	44	44
COUNTY-OTHER, HUNT	D	GREENVILLE CONSERVATION AND WTP	D | TAWAKONI LAKE/RESERVOIR	N/A	$237	0	0	166	703	1,817	3,834
COUNTY-OTHER, LAMAR	D	INCREASE EXISTING CONTRACT (COUNTY-OTHER LAMAR)	D | PAT MAYSE LAKE/RESERVOIR	$1629	$1629	204	204	212	224	234	244
CRYSTAL SYSTEMS TEXAS*	D	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, CARRIZO, SABINE)	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	N/A	$99	0	0	135	135	269	538
CRYSTAL SYSTEMS TEXAS*	I	TYLER-LAKE PALESTINE	I | PALESTINE LAKE/RESERVOIR	N/A	$896	0	71	145	232	331	418
CUMBY	D	DRILL NEW WELLS (CUMBY, NACATOCH, HOPKINS, SABINE)	D | NACATOCH AQUIFER | HOPKINS COUNTY	$6001	$1387	13	29	44	58	77	88
DE KALB	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$243	$537	295	292	289	291	294	298
EDOM WSC*	D	DRILL NEW WELLS (EDOM WSC, VAN ZANDT, CARRIZO, NECHES)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	$3308	$2250	11	18	23	32	42	55
GILMER	D	DRILL NEW WELLS (GILMER, CARRIZO, CYPRESS)	D | CARRIZO-WILCOX AQUIFER | UPSHUR COUNTY	N/A	$60	0	0	216	216	216	216
GREENVILLE	D	GREENVILLE CONSERVATION AND WTP	D | TAWAKONI LAKE/RESERVOIR	N/A	$237	0	140	1,391	3,059	5,320	3,212
GREENVILLE	D	GREENVILLE CONSERVATION AND WTP	DEMAND REDUCTION	$681	$681	4,051	4,486	5,140	6,124	7,593	9,741
GREENVILLE	D	NEW WTP GREENVILLE	D | TAWAKONI LAKE/RESERVOIR	N/A	$1059	0	0	0	0	0	5,313
HARLETON WSC	D	INCREASE EXISTING CONTRACT (HARLETON, CYPRESS)	D | O' THE PINES LAKE/RESERVOIR	$652	$652	62	74	91	127	173	230
HOLLY SPRINGS WSC	D	INCREASE EXISTING CONTRACT (HOLLY SPRINGS, CYPRESS)	D | O' THE PINES LAKE/RESERVOIR	$0	$0	80	80	80	80	80	80
HOOKS	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$243	$537	281	278	276	271	269	269

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Region D Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
IRRIGATION, BOWIE	D	DRILL NEW WELLS (IRRIGATION BOWIE, CARRIZO-WILCOX, SULPHUR)	D | CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	$1052	$624	4,134	4,134	4,134	4,134	4,134	4,134
IRRIGATION, HARRISON	D	DRILL NEW WELLS (IRRIGATION HARRISON, QUEEN CITY , SABINE)	D | QUEEN CITY AQUIFER | HARRISON COUNTY	$118	$31	161	161	161	161	161	161
IRRIGATION, HARRISON	D	DRILL NEW WELLS (IRRIGATION HARRISON, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | HARRISON COUNTY	$120	$35	484	484	484	484	484	484
IRRIGATION, HOPKINS	D	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	N/A	$728	0	0	111	387	575	931
IRRIGATION, HOPKINS	D	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SULPHUR)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	$759	$593	4,627	4,627	4,516	4,240	4,052	3,696
IRRIGATION, HUNT	D	DRILL NEW WELLS (IRRIGATION HUNT, NACATOCH, SABINE)	D | NACATOCH AQUIFER | HUNT COUNTY	$1396	$639	230	230	230	230	230	230
IRRIGATION, LAMAR	D	PAT MAYSE RAW WATER PIPELINE (IRRIGATION LAMAR)	D | PAT MAYSE LAKE/RESERVOIR	$897	$321	1,468	1,468	1,468	1,468	1,468	1,468
IRRIGATION, RED RIVER	D	DRILL NEW WELLS (IRRIGATION, RED RIVER)	D | NACATOCH AQUIFER | RED RIVER COUNTY	$831	$607	2,057	2,057	2,057	2,057	2,057	2,057
IRRIGATION, VAN ZANDT	D	DRILL NEW WELLS (IRRIGATION VAN ZANDT, QUEEN CITY, NECHES)	D | QUEEN CITY AQUIFER | VAN ZANDT COUNTY	$1137	$617	227	227	227	227	227	227
JOSEPHINE*	C	CONSERVATION - JOSEPHINE	DEMAND REDUCTION	N/A	$132	0	1	2	3	3	3
JOSEPHINE*	C	CONSERVATION, IRRIGATION RESTRICTIONS – JOSEPHINE	DEMAND REDUCTION	$184	$69	1	2	3	4	4	4
JOSEPHINE*	C	MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	D | MARVIN NICHOLS LAKE/RESERVOIR	N/A	$707	0	0	0	16	20	17
JOSEPHINE*	C	NTMWD - ADDITIONAL LAVON WATERSHED REUSE	C | TRINITY INDIRECT REUSE	N/A	$835	0	0	0	1	3	4
JOSEPHINE*	C	NTMWD - ADDITIONAL MEASURES TO ACCESS FULL LAVON YIELD	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$75	0	8	13	13	15	13
JOSEPHINE*	C	NTMWD - EXPANDED WETLAND REUSE	C | TRINITY INDIRECT REUSE	N/A	$749	0	0	2	2	4	4
JOSEPHINE*	C	NTMWD - OKLAHOMA	OK | OKLAHOMA RUN-OF-RIVER	N/A	$423	0	0	0	0	0	5
JOSEPHINE*	C	NTMWD - TEXOMA BLENDING	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$430	0	0	4	9	11	12
JOSEPHINE*	C	WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	$834	0	0	0	0	0	6
LEIGH WSC	D	DRILL NEW WELLS (LEIGH, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | HARRISON COUNTY	N/A	$123	0	0	54	108	108	162
LINDALE*	D	DRILL NEW WELLS (LINDALE, CARRIZO, NECHES)	I | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	$370	$93	206	402	599	781	984	1,198
LINDALE*	I	TYLER-LAKE PALESTINE	I | PALESTINE LAKE/RESERVOIR	N/A	$896	0	116	206	313	426	538
LITTLE HOPE MOORE WSC	D	DRILL NEW WELL (LITTLE HOPE MOORE WSC, VAN ZANDT, CARRIZO, NECHES)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	N/A	$1059	0	0	0	3	11	17

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Region D Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
LIVESTOCK, BOWIE	D	BOWIE COUNTY LIVESTOCK DRILL NEW WELLS	D | CARRIZO-WILCOX AQUIFER | BOWIE COUNTY	$1518	$650	417	417	378	325	278	260
LIVESTOCK, BOWIE	D	BOWIE COUNTY LIVESTOCK DRILL NEW WELLS	D | NACATOCH AQUIFER | BOWIE COUNTY	$1401	$639	252	252	229	196	168	156
LIVESTOCK, CAMP	D	DRILL NEW WELLS (LIVESTOCK, CAMP, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | CAMP COUNTY	$123	$46	4,000	4,000	4,000	4,000	4,000	4,000
LIVESTOCK, CASS	D	DRILL NEW WELLS (LIVESTOCK, CASS, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | CASS COUNTY	$111	$35	968	968	968	968	968	968
LIVESTOCK, CASS	D	DRILL NEW WELLS (LIVESTOCK, CASS, QUEEN CITY, SULPHUR)	D | QUEEN CITY AQUIFER | CASS COUNTY	$111	$35	966	966	966	966	966	966
LIVESTOCK, DELTA	D	DRILL NEW WELLS (LIVESTOCK, DELTA, NACATOCH, SULPHUR)	D | NACATOCH AQUIFER | DELTA COUNTY	$1134	$615	262	250	250	250	250	250
LIVESTOCK, FRANKLIN	D	DRILL NEW WELLS (LIVESTOCK, FRANKLIN, CARRIZO, CYPRESS)	D | CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	$111	$35	805	805	805	805	805	805
LIVESTOCK, FRANKLIN	D	DRILL NEW WELLS (LIVESTOCK, FRANKLIN, CARRIZO, SULPHUR)	D | CARRIZO-WILCOX AQUIFER | FRANKLIN COUNTY	$111	$35	1,129	1,129	1,129	1,129	1,129	1,129
LIVESTOCK, HOPKINS	D	DRILL NEW WELLS (LIVESTOCK, HOPKINS, CARRIZO, SULPHUR)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	$1016	$704	1,068	1,090	1,140	1,143	1,196	1,219
LIVESTOCK, HUNT	D	DRILL NEW WELL (LIVESTOCK, HUNT, TRINITY, SABINE)	D | TRINITY AQUIFER | HUNT COUNTY	$16500	$2000	2	2	2	2	2	2
LIVESTOCK, LAMAR	D	LAMAR LIVESTOCK PIPELINE AND CONTRACT WITH LAMAR CO WSD	D | PAT MAYSE LAKE/RESERVOIR	$3626	$1964	617	617	617	617	617	617
LIVESTOCK, MORRIS	D	DRILL NEW WELLS (LIVESTOCK, MORRIS, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | MORRIS COUNTY	$121	$37	644	644	644	644	644	644
LIVESTOCK, MORRIS	D	DRILL NEW WELLS (LIVESTOCK, MORRIS, QUEEN CITY, SULPHUR)	D | QUEEN CITY AQUIFER | MORRIS COUNTY	$97	$19	483	483	483	483	483	483
LIVESTOCK, RED RIVER	D	DRILL NEW WELLS (LIVESTOCK, RED RIVER)	D | BLOSSOM AQUIFER | RED RIVER COUNTY	$3636	$909	10	11	10	11	10	11
LIVESTOCK, RED RIVER	D	DRILL NEW WELLS (LIVESTOCK, RED RIVER)	D | TRINITY AQUIFER | RED RIVER COUNTY	$1207	$626	174	173	174	173	174	173
LIVESTOCK, TITUS	D	DRILL NEW WELLS (LIVESTOCK, TITUS)	D | CARRIZO-WILCOX AQUIFER | TITUS COUNTY	$808	$531	1,939	1,939	1,939	1,939	1,984	2,005
LIVESTOCK, UPSHUR	D	DRILL NEW WELLS (LIVESTOCK, UPSHUR, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | UPSHUR COUNTY	$106	$31	161	161	161	161	161	161
LIVESTOCK, UPSHUR	D	DRILL NEW WELLS (LIVESTOCK, UPSHUR, QUEEN CITY, SABINE)	D | QUEEN CITY AQUIFER | UPSHUR COUNTY	$106	$31	161	161	161	161	161	161
LIVESTOCK, WOOD	D	DRILL NEW WELLS (LIVESTOCK, WOOD, QUEEN CITY, SABINE)	D | QUEEN CITY AQUIFER | WOOD COUNTY	$111	$111	1,129	1,129	1,129	1,129	1,129	1,129
MABANK*	C	CONSERVATION - MABANK	DEMAND REDUCTION	$767	$305	2	2	3	5	4	4
MABANK*	C	CONSERVATION – WASTE PROHIBITION, MABANK	DEMAND REDUCTION	N/A	$347	0	0	0	0	1	1
MABANK*	C	CONSERVATION, IRRIGATION RESTRICTIONS – MABANK	DEMAND REDUCTION	$107	$70	1	2	2	2	3	5

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Region D Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
MABANK*	C	CONSERVATION, WATER LOSS CONTROL - MABANK	DEMAND REDUCTION	N/A	N/A	0	0	0	0	0	0
MABANK*	C	INTEGRATED PIPELINE	C | TRINITY INDIRECT REUSE	N/A	$163	0	15	12	12	20	28
MABANK*	C	MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	D | MARVIN NICHOLS LAKE/RESERVOIR	N/A	$1003	0	0	0	16	27	36
MABANK*	C	TRWD - AQUIFER STORAGE AND RECOVERY PILOT	C | TRINITY AQUIFER ASR | TARRANT COUNTY	N/A	$99	0	0	1	0	1	1
MABANK*	C	TRWD - CARRIZO-WILCOX GROUNDWATER	C | CARRIZO-WILCOX AQUIFER | FREESTONE COUNTY	N/A	$375	0	0	0	0	0	1
MABANK*	C	TRWD - CARRIZO-WILCOX GROUNDWATER	I | CARRIZO-WILCOX AQUIFER | ANDERSON COUNTY	N/A	$375	0	0	2	2	3	4
MABANK*	C	TRWD - CARRIZO-WILCOX GROUNDWATER	I | QUEEN CITY AQUIFER | ANDERSON COUNTY	N/A	$375	0	0	1	1	2	2
MABANK*	C	TRWD - REUSE FROM TRA CENTRAL WWTP	C | TRINITY INDIRECT REUSE	N/A	$510	0	3	3	4	8	13
MABANK*	C	TRWD - TEHUACANA	C | TEHUACANA LAKE/RESERVOIR	N/A	$1069	0	0	2	2	3	5
MABANK*	C	TRWD - UNALLOCATED SUPPLY UTILIZATION	C | TRWD LAKE/RESERVOIR SYSTEM	$0	$0	14	0	0	0	1	2
MABANK*	C	WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	$907	0	0	0	0	0	12
MACEDONIA EYLAU MUD 1	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$482	$537	588	598	601	601	601	601
MANUFACTURING, BOWIE	D	ADVANCED WATER CONSERVATION (MANUFACTURING BOWIE)	DEMAND REDUCTION	$0	$0	161	204	204	204	204	204
MANUFACTURING, BOWIE	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$105	$85	789	59,724	66,305	74,531	82,757	100,609
MANUFACTURING, TITUS	D	ADVANCED WATER CONSERVATION (MANUFACTURING TITUS, CYPRESS)	DEMAND REDUCTION	N/A	$0	0	415	415	415	415	415
MANUFACTURING, TITUS	D	INCREASE EXISTING CONTRACT (MANUFACTURING TITUS FROM MT PLEASANT SURPLUS)	D | BOB SANDLIN LAKE/RESERVOIR	N/A	$782	0	1,003	880	890	1,149	1,279
MANUFACTURING, UPSHUR	D	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | UPSHUR COUNTY	$106	$31	161	161	161	161	161	161
MANUFACTURING, VAN ZANDT	D	ADVANCED WATER CONSERVATION (MANUFACTURING VAN ZANDT)	DEMAND REDUCTION	$0	$0	50	75	75	75	75	75
MANUFACTURING, VAN ZANDT	D	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, TRINITY)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	$893	$613	242	504	504	356	238	143
MANUFACTURING, VAN ZANDT	D	INCREASE EXISTING CONTRACT (MANUFACTURING VAN ZANDT FROM GOLDEN WSC SURPLUS)	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	N/A	$1303	0	0	0	62	191	214

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Region D Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
MANUFACTURING, VAN ZANDT	D	INCREASE EXISTING CONTRACT (MANUFACTURING VAN ZANDT FROM GRAND SALINE SURPLUS)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	N/A	$2803	0	0	0	0	0	72
MANUFACTURING, WOOD	D	DRILL NEW WELLS (MANUFACTURING, WOOD, QUEEN CITY, SABINE)	D | QUEEN CITY AQUIFER | WOOD COUNTY	$78	$25	1,129	1,610	1,610	1,610	1,610	1,610
MARTIN SPRINGS WSC	D	INCREASE EXISTING CONTRACT (MARTIN SPRINGS)	D | CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	N/A	$1176	0	0	0	0	0	29
MAUD	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$243	$537	211	226	241	238	237	237
MILLER GROVE WSC	D	DRILL NEW WELLS (MILLER GROVE WSC, HOPKINS, CARRIZO-WILCOX, SULPHUR)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	$9000	$2154	8	16	23	29	40	52
MINING, GREGG	D	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE)	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	$370	$74	27	27	27	27	27	27
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | HARRISON COUNTY	$117	$36	332	332	332	332	332	332
MINING, HARRISON	D	DRILL NEW WELLS (MINING HARRISON, QUEEN CITY, SABINE)	D | QUEEN CITY AQUIFER | HARRISON COUNTY	$126	$51	1,452	1,452	1,452	1,452	1,452	1,452
MINING, HOPKINS	D	DRILL NEW WELLS (MINING HOPKINS, HOPKINS, CARRIZO, SULPHUR)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	$1123	$718	227	283	360	444	533	639
MINING, HUNT	D	DRILL NEW WELLS (MINING HUNT, TRINITY, SABINE)	D | TRINITY AQUIFER | HUNT COUNTY	$1384	N/A	73	64	35	19	7	0
MINING, MARION	D	DRILL NEW WELLS (MINING MARION, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | MARION COUNTY	$121	$37	432	645	645	645	645	645
NASH	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$243	$537	392	458	523	589	589	589
NEW BOSTON	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$243	$537	1,390	1,399	1,385	1,381	1,379	1,379
NORTH HARRISON WSC	D	DRILL NEW WELLS (NORTH HARRISON, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | HARRISON COUNTY	N/A	$130	0	0	0	0	54	54
NORTH HUNT SUD*	D	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE)	D | NACATOCH AQUIFER | HUNT COUNTY	$2337	$1331	78	148	243	376	568	846
PANOLA-BETHANY WSC*	D	DRILL NEW WELLS (PANOLA BETHANY, QUEEN CITY, SABINE)	D | QUEEN CITY AQUIFER | HARRISON COUNTY	N/A	$77	0	52	112	210	276	335
POETRY WSC*	C	MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	D | MARVIN NICHOLS LAKE/RESERVOIR	N/A	$707	0	0	0	55	87	102
POETRY WSC*	C	NTMWD - ADDITIONAL LAVON WATERSHED REUSE	C | TRINITY INDIRECT REUSE	N/A	$835	0	0	0	4	14	24
POETRY WSC*	C	NTMWD - ADDITIONAL MEASURES TO ACCESS FULL LAVON YIELD	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$75	0	4	5	4	6	6
POETRY WSC*	C	NTMWD - BOIS D'ARC LAKE	C | BOIS D ARC LAKE/RESERVOIR	N/A	$81	0	39	52	39	61	72
POETRY WSC*	C	NTMWD - EXPANDED WETLAND REUSE	C | TRINITY INDIRECT REUSE	N/A	$749	0	3	8	8	16	23
POETRY WSC*	C	NTMWD - OKLAHOMA	OK | OKLAHOMA RUN-OF-RIVER	N/A	$423	0	0	0	0	0	31

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Region D Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
POETRY WSC*	C	NTMWD - TEXOMA BLENDING	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$430	0	0	18	32	50	68
POETRY WSC*	C	WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	$834	0	0	0	0	0	34
POETRY WSC*	D	ADVANCED WATER CONSERVATION (POETRY WSC)	DEMAND REDUCTION	$770	$770	1	2	1	3	4	7
R P M WSC*	D	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES)	D | CARRIZO-WILCOX AQUIFER | VAN ZANDT COUNTY	N/A	$1355	0	25	58	93	124	152
REDWATER	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$243	$537	440	487	535	588	616	616
RIVERBEND WATER RESOURCES DISTRICT	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$105	$537	523	536	539	537	537	537
ROYSE CITY*	C	CONSERVATION - ROYSE CITY	DEMAND REDUCTION	$0	$0	1	1	1	0	3	2
ROYSE CITY*	C	MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	D | MARVIN NICHOLS LAKE/RESERVOIR	N/A	$707	0	0	0	9	14	17
ROYSE CITY*	C	NTMWD - ADDITIONAL LAVON WATERSHED REUSE	C | TRINITY INDIRECT REUSE	N/A	$835	0	0	0	1	2	4
ROYSE CITY*	C	NTMWD - ADDITIONAL MEASURES TO ACCESS FULL LAVON YIELD	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$75	0	7	9	7	11	13
ROYSE CITY*	C	NTMWD - EXPANDED WETLAND REUSE	C | TRINITY INDIRECT REUSE	N/A	$749	0	0	2	2	2	4
ROYSE CITY*	C	NTMWD - OKLAHOMA	OK | OKLAHOMA RUN-OF-RIVER	N/A	$423	0	0	0	0	0	5
ROYSE CITY*	C	NTMWD - TEXOMA BLENDING	C | NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	N/A	$430	0	0	3	5	8	11
ROYSE CITY*	C	WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	$834	0	0	0	0	0	6
SCOTTSVILLE	D	DRILL NEW WELLS (SCOTTSVILLE, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | HARRISON COUNTY	$716	$93	54	54	108	108	162	162
SMITH COUNTY MUD 1	D	DRILL NEW WELLS (SMITH COUNTY MUD 1, QUEEN CITY, SABINE)	D | QUEEN CITY AQUIFER | SMITH COUNTY	N/A	$108	0	0	108	216	432	648
STAR MOUNTAIN WSC	D	DRILL NEW WELLS (STAR MOUNTAIN, QUEEN CITY, SABINE)	D | QUEEN CITY AQUIFER | SMITH COUNTY	$611	$116	108	108	108	108	216	216
STARRVILLE-FRIENDSHIP WSC	D	DRILL NEW WELLS (STARRVILLE FRIENDSHIP, CARRIZO, SABINE)	D | CARRIZO-WILCOX AQUIFER | GREGG COUNTY	N/A	$574	0	0	0	0	108	108
STEAM ELECTRIC POWER, TITUS	D	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS)	D | BOB SANDLIN LAKE/RESERVOIR	$100	$100	5,351	6,019	5,760	5,716	4,868	4,172
STEAM ELECTRIC POWER, TITUS	D	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS)	D | O' THE PINES LAKE/RESERVOIR	$100	$100	24,715	24,847	26,006	26,850	27,946	28,911
TEXARKANA	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$243	$537	7,145	7,282	7,459	7,706	8,028	8,380
WAKE VILLAGE	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$243	$537	699	750	802	861	932	931

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Region D Recommended Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
WASKOM	D	DRILL NEW WELLS (WASKOM, QUEEN CITY, CYPRESS)	D | QUEEN CITY AQUIFER | HARRISON COUNTY	$602	$80	108	162	162	216	270	324
WINONA	D	DRILL NEW WELLS (WINONA, CARRIZO-WILCOX, SABINE)	D | CARRIZO-WILCOX AQUIFER | SMITH COUNTY	N/A	$111	0	0	0	108	108	108
WOLFE CITY*	D	NEW CONTRACT WITH GREENVILLE AND PIPELINE TO WOLFE CITY	D | TAWAKONI LAKE/RESERVOIR	N/A	$1120	0	0	0	52	149	293

REGION D RECOMMENDED WMS SUPPLY TOTAl	83,220	148,810	160,572	175,221	191,870	220,948

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

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Region D Recommended Projects Associated with Water Management Strategies

SPONSOR NAME	SPONSOR IS WWP?	ONLINE DECADE	PROJECT NAME	PROJECT DESCRIPTION	CAPITAL COST
CANTON	NO	2020	CANTON INDIRECT REUSE	CONVEYANCE/TRANSMISSION PIPELINE; DIVERSION AND CONTROL STRUCTURE; NEW WATER RIGHT/PERMIT NO IBT; PUMP STATION; STORAGE TANK	$8,381,000
CANTON	NO	2020	DRILL NEW WELLS (CANTON, CARRIZO-WILCOX, SABINE)	SINGLE WELL; WATER TREATMENT PLANT EXPANSION	$716,000
CELESTE	NO	2020	DRILL NEW WELLS (CELESTE, WOODBINE, TRINITY, 2020)	SINGLE WELL; CONVEYANCE/TRANSMISSION PIPELINE; NEW WATER TREATMENT PLANT	$694,000
CELESTE	NO	2040	DRILL NEW WELLS (CELESTE, WOODBINE, TRINITY, 2040)	SINGLE WELL; WATER TREATMENT PLANT EXPANSION	$509,000
CELESTE	NO	2060	DRILL NEW WELLS (CELESTE, WOODBINE, TRINITY, 2060)	SINGLE WELL; WATER TREATMENT PLANT EXPANSION	$509,000
CELESTE	NO	2070	NEW CONTRACT WITH GREENVILLE AND PIPELINE TO CELESTE	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT; PUMP STATION	$3,342,000
CLARKSVILLE	NO	2020	DRILL NEW WELLS (CLARKSVILLE, NACATOCH, SULPHUR)	MULTIPLE WELLS/WELL FIELD; WATER TREATMENT PLANT EXPANSION	$10,537,000
COUNTY-OTHER, CASS	NO	2020	DRILL NEW WELLS (COUNTY OTHER, CASS, CARRIZO, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$1,973,000
COUNTY-OTHER, CASS	NO	2020	DRILL NEW WELLS (COUNTY OTHER, CASS, CARRIZO, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$1,324,000
CRYSTAL SYSTEMS TEXAS	NO	2040	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, CARRIZO, NECHES)	MULTIPLE WELLS/WELL FIELD	$2,531,000
CRYSTAL SYSTEMS TEXAS	NO	2040	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, CARRIZO, SABINE)	MULTIPLE WELLS/WELL FIELD	$2,531,000
CUMBY	NO	2020	DRILL NEW WELLS (CUMBY, HOPKINS, NACATOCH, SABINE, 2020)	SINGLE WELL; WATER TREATMENT PLANT EXPANSION	$480,000
CUMBY	NO	2070	DRILL NEW WELLS (CUMBY, HOPKINS, NACATOCH, SABINE, 2070)	SINGLE WELL; WATER TREATMENT PLANT EXPANSION	$480,000
EDOM WSC	NO	2020	DRILL NEW WELL (EDOM WSC, VAN ZANDT, CARRIZO, NECHES, 2020)	SINGLE WELL; WATER TREATMENT PLANT EXPANSION	$403,000
EDOM WSC	NO	2050	DRILL NEW WELL (EDOM WSC, VAN ZANDT, CARRIZO, NECHES, 2050)	SINGLE WELL; WATER TREATMENT PLANT EXPANSION	$358,000
EDOM WSC	NO	2070	DRILL NEW WELL (EDOM WSC, VAN ZANDT, CARRIZO, NECHES, 2070)	SINGLE WELL; WATER TREATMENT PLANT EXPANSION	$344,000
GILMER	NO	2040	DRILL NEW WELLS (GILMER, CARRIZO, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$801,000
GREENVILLE	YES	2070	NEW WTP GREENVILLE	NEW WATER TREATMENT PLANT	$81,786,000
GREENVILLE	YES	2030	WTP EXPANSION 2030 (GREENVILLE, SABINE)	WATER TREATMENT PLANT EXPANSION	$43,955,000
HARLETON WSC	NO	2020	INCREASE EXISTING CONTRACT (HARLETON, CYPRESS)	CONTRACT AMENDMENT	$4,928
HOLLY SPRINGS WSC	NO	2020	INCREASE EXISTING CONTRACT (HOLLY SPRINGS, CYPRESS)	CONTRACT AMENDMENT	$130,000
IRRIGATION, BOWIE	NO	2020	DRILL NEW WELLS (BOWIE IRRIGATION, CARRIZO-WILCOX, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$10,597,000
IRRIGATION, HARRISON	NO	2020	DRILL NEW WELLS (IRRIGATION HARRISON, QUEEN CITY, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$577,000
IRRIGATION, HARRISON	NO	2020	DRILL NEW WELLS (IRRIGATION HARRISON, QUEEN CITY, SABINE)	SINGLE WELL	$193,000
IRRIGATION, HOPKINS	NO	2040	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE, 2040)	SINGLE WELL	$1,030,000
IRRIGATION, HOPKINS	NO	2060	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE, 2060)	MULTIPLE WELLS/WELL FIELD	$1,802,000
IRRIGATION, HOPKINS	NO	2020	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$10,927,000
IRRIGATION, HUNT	NO	2020	DRILL NEW WELLS (IRRIGATION HUNT, NACATOCH, SABINE)	MULTIPLE WELLS/WELL FIELD	$1,249,000
IRRIGATION, LAMAR	NO	2020	PAT MAYSE RAW WATER PIPELINE (IRRIGATION LAMAR, RED)	CONVEYANCE/TRANSMISSION PIPELINE	$12,021,000
IRRIGATION, RED RIVER	NO	2020	DRILL NEW WELLS (IRRIGATION, RED RIVER, NACATOCH, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$6,551,000
IRRIGATION, VAN ZANDT	NO	2020	DRILL NEW WELLS (IRRIGATION VAN ZANDT, QUEEN, NECHES)	MULTIPLE WELLS/WELL FIELD	$1,683,000
LEIGH WSC	NO	2040	DRILL NEW WELLS (LEIGH, QUEEN CITY, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$1,973,000
LINDALE	NO	2020	DRILL NEW WELLS (LINDALE, CARRIZO, NECHES)	MULTIPLE WELLS/WELL FIELD	$7,592,000

Region D Recommended Projects Associated with Water Management Strategies

SPONSOR NAME	SPONSOR IS WWP?	ONLINE DECADE	PROJECT NAME	PROJECT DESCRIPTION	CAPITAL COST
LITTLE HOPE MOORE WSC	NO	2050	DRILL NEW WELL (LITTLE HOPE MOORE WSC, VAN ZANDT, CARRIZO, NECHES	SINGLE WELL; WATER TREATMENT PLANT EXPANSION	$371,000
LIVESTOCK, BOWIE	NO	2020	DRILL NEW WELLS (LIVESTOCK BOWIE , NACATOCH, RED)	MULTIPLE WELLS/WELL FIELD	$1,630,000
LIVESTOCK, BOWIE	NO	2020	DRILL NEW WELLS (LIVESTOCK, BOWIE, CARRIZO-WILCOX, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$2,423,000
LIVESTOCK, CAMP	NO	2020	DRILL NEW WELLS (LIVESTOCK, CAMP, QUEEN, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$4,401,500
LIVESTOCK, CASS	NO	2020	DRILL NEW WELLS (LIVESTOCK, CASS, QUEEN CITY, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$1,037,000
LIVESTOCK, CASS	NO	2020	DRILL NEW WELLS (LIVESTOCK, CASS, QUEEN CITY, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$1,037,000
LIVESTOCK, DELTA	NO	2020	DRILL NEW WELLS (LIVESTOCK, DELTA, NACATOCH, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$1,929,000
LIVESTOCK, FRANKLIN	NO	2020	DRILL NEW WELLS (LIVESTOCK, FRANKLIN, CARRIZO, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$865,000
LIVESTOCK, FRANKLIN	NO	2020	DRILL NEW WELLS (LIVESTOCK, FRANKLIN, CARRIZO, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$1,211,000
LIVESTOCK, HOPKINS	NO	2020	DRILL NEW WELLS (LIVESTOCK HOPKINS, HOPKINS, CARRIZO, SULPHUR, 2020)	MULTIPLE WELLS/WELL FIELD	$4,961,000
LIVESTOCK, HOPKINS	NO	2060	DRILL NEW WELLS (LIVESTOCK HOPKINS, HOPKINS, CARRIZO, SULPHUR, 2060)	MULTIPLE WELLS/WELL FIELD	$924,000
LIVESTOCK, HUNT	NO	2020	DRILL NEW WELL (LIVESTOCK HUNT, TRINITY, SABINE)	SINGLE WELL	$407,000
LIVESTOCK, LAMAR	NO	2020	NEW CONTRACT AND PIPELINE TO LAMAR CO WSD FOR LAMAR LIVESTOCK	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT	$14,574,000
LIVESTOCK, MORRIS	NO	2020	DRILL NEW WELLS (LIVESTOCK, MORRIS, QUEEN CITY, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$767,000
LIVESTOCK, MORRIS	NO	2020	DRILL NEW WELLS (LIVESTOCK, MORRIS, QUEEN CITY, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$539,000
LIVESTOCK, RED RIVER	NO	2020	DRILL NEW WELLS (LIVESTOCK RED RIVER, BLOSSOM, RED)	SINGLE WELL	$425,000
LIVESTOCK, RED RIVER	NO	2020	DRILL NEW WELLS (LIVESTOCK RED RIVER, TRINITY AQUIFER, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$1,436,000
LIVESTOCK, TITUS	NO	2020	DRILL NEW WELLS (LIVESTOCK TITUS, CARRIZO, CYPRESS, 2020)	SINGLE WELL	$767,000
LIVESTOCK, TITUS	NO	2030	DRILL NEW WELLS (LIVESTOCK TITUS, CARRIZO, CYPRESS, 2030)	SINGLE WELL	$684,000
LIVESTOCK, TITUS	NO	2020	DRILL NEW WELLS (LIVESTOCK TITUS, CARRIZO, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$5,215,000
LIVESTOCK, UPSHUR	NO	2020	DRILL NEW WELLS (LIVESTOCK, UPSHUR, QUEEN CITY, CYPRESS)	SINGLE WELL	$172,000
LIVESTOCK, UPSHUR	NO	2020	DRILL NEW WELLS (LIVESTOCK, UPSHUR, QUEEN CITY, SABINE)	SINGLE WELL	$172,000
LIVESTOCK, WOOD	NO	2020	DRILL NEW WELL (LIVESTOCK, WOOD, QUEEN CITY, SABINE)	MULTIPLE WELLS/WELL FIELD	$1,210,000
MANUFACTURING, UPSHUR	NO	2020	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN CITY, CYPRESS)	SINGLE WELL	$172,000
MANUFACTURING, VAN ZANDT	NO	2020	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, TRINITY, 2020)	MULTIPLE WELLS/WELL FIELD	$1,043,000
MANUFACTURING, VAN ZANDT	NO	2030	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, TRINITY, 2030)	MULTIPLE WELLS/WELL FIELD	$1,355,000
MANUFACTURING, WOOD	NO	2020	DRILL NEW WELLS (MANUFACTURING, WOOD, QUEEN CITY, SABINE)	MULTIPLE WELLS/WELL FIELD	$1,210,000
MILLER GROVE WSC	NO	2020	DRILL NEW WELLS (MILLER GROVE WSC, HOPKINS, CARRIZO-WILCOX, SULPHUR, 2020)	SINGLE WELL	$459,000
MILLER GROVE WSC	NO	2070	DRILL NEW WELLS (MILLER GROVE WSC, HOPKINS, CARRIZO-WILCOX, SULPHUR, 2070)	SINGLE WELL	$459,000
MINING, GREGG	NO	2020	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE)	SINGLE WELL	$117,000
MINING, HARRISON	NO	2020	DRILL NEW WELLS (MINING HARRISON, QUEEN CITY, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$384,000
MINING, HARRISON	NO	2020	DRILL NEW WELLS (MINING HARRISON, QUEEN CITY, SABINE)	SINGLE WELL	$1,555,000
MINING, HOPKINS	NO	2020	DRILL NEW WELLS (MINING HOPKINS, HOPKINS, CARRIZO, SULPHUR, 2020)	MULTIPLE WELLS/WELL FIELD	$1,528,000

Region D Recommended Projects Associated with Water Management Strategies

SPONSOR NAME	SPONSOR IS WWP?	ONLINE DECADE	PROJECT NAME	PROJECT DESCRIPTION	CAPITAL COST
MINING, HOPKINS	NO	2050	DRILL NEW WELLS (MINING HOPKINS, HOPKINS, CARRIZO, SULPHUR, 2050)	MULTIPLE WELLS/WELL FIELD	$428,000
MINING, HOPKINS	NO	2060	DRILL NEW WELLS (MINING HOPKINS, HOPKINS, CARRIZO, SULPHUR, 2060)	MULTIPLE WELLS/WELL FIELD	$924,000
MINING, HUNT	NO	2020	DRILL NEW WELLS (MINING HUNT, TRINITY, SABINE)	MULTIPLE WELLS/WELL FIELD	$766,000
MINING, MARION	NO	2020	DRILL NEW WELLS (MINING MARION, QUEEN CITY, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$767,000
NORTH HARRISON WSC	NO	2060	DRILL NEW WELLS (NORTH HARRISON, QUEEN CITY, CYPRESS)	SINGLE WELL	$612,000
NORTH HUNT SUD	NO	2020	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2020)	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; WATER TREATMENT PLANT EXPANSION	$1,493,000
NORTH HUNT SUD	NO	2030	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2030)	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; WATER TREATMENT PLANT EXPANSION	$1,054,000
NORTH HUNT SUD	NO	2040	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2040)	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; WATER TREATMENT PLANT EXPANSION	$1,054,000
NORTH HUNT SUD	NO	2050	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2050)	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; WATER TREATMENT PLANT EXPANSION	$1,998,000
NORTH HUNT SUD	NO	2060	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2060)	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; WATER TREATMENT PLANT EXPANSION	$2,932,000
NORTH HUNT SUD	NO	2070	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2070)	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; WATER TREATMENT PLANT EXPANSION	$2,902,000
PANOLA-BETHANY WSC	NO	2030	DRILL NEW WELLS (PANOLA BETHANY, QUEEN CITY, SABINE)	MULTIPLE WELLS/WELL FIELD	$2,399,000
R P M WSC	NO	2030	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2030)	MULTIPLE WELLS/WELL FIELD	$895,000
R P M WSC	NO	2040	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2040)	SINGLE WELL	$370,000
R P M WSC	NO	2050	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2050)	MULTIPLE WELLS/WELL FIELD	$753,000
R P M WSC	NO	2060	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2060)	MULTIPLE WELLS/WELL FIELD	$784,000
R P M WSC	NO	2070	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2070)	MULTIPLE WELLS/WELL FIELD	$774,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2030	RIVERBEND STRATEGY CASS NEW WTP AND TRANSMISSION LINE	CONVEYANCE/TRANSMISSION PIPELINE; NEW WATER TREATMENT PLANT	$22,807,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2020	RIVERBEND WMS INTERIM TO ULTIMATE STORAGE CONVERSION	CONTRACT AMENDMENT; RAISE CONSERVATION POOL	$20,550,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2030	RIVERBEND WMS NEW RAW WATER INTAKE 120 MGD 2030	NEW SURFACE WATER INTAKE	$13,282,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2050	RIVERBEND WMS NEW RAW WATER PIPELINE 32 MGD 2050	CONVEYANCE/TRANSMISSION PIPELINE	$61,647,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2030	RIVERBEND WMS NEW WTP 25 MGD 2030	NEW WATER TREATMENT PLANT	$127,811,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2050	RIVERBEND WMS PUMP STATION EXPANSION 18 MGD 2050	PUMP STATION	$11,603,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2060	RIVERBEND WMS PUMP STATION EXPANSION 30 MGD 2060	PUMP STATION	$22,130,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2040	RIVERBEND WMS PUMP STATION EXPANSION 6 MGD 2040	PUMP STATION	$4,326,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2030	RIVERBEND WMS RAW WATER PIPELINE 72 MGD 2030	CONVEYANCE/TRANSMISSION PIPELINE	$36,061,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2030	RIVERBEND WMS RAW WATER PUMP STATION 66 MGD 2030	PUMP STATION	$45,041,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2020	RIVERBEND WMS WATER RIGHT AMENDMENT	NEW WATER RIGHT/PERMIT NO IBT	$103,000
RIVERBEND WATER RESOURCES DISTRICT	YES	2050	RIVERBEND WMS WTP EXPANSION 10 MGD 2050	WATER TREATMENT PLANT EXPANSION	$33,348,000

Region D Recommended Projects Associated with Water Management Strategies

SPONSOR NAME	SPONSOR IS WWP?	ONLINE DECADE	PROJECT NAME	PROJECT DESCRIPTION	CAPITAL COST
RIVERBEND WATER RESOURCES DISTRICT	YES	2040	RIVERBEND WMS WTP EXPANSION 5 MGD 2040	WATER TREATMENT PLANT EXPANSION	$19,745,000
SCOTTSVILLE	NO	2020	DRILL NEW WELLS (SCOTTSVILLE, QUEEN CITY, CYPRESS)	MULTIPLE WELLS/WELL FIELD	$1,429,000
SMITH COUNTY MUD 1	NO	2040	DRILL NEW WELLS (SMITH COUNTY MUD 1, QUEEN CITY, SABINE)	MULTIPLE WELLS/WELL FIELD	$3,948,000
STAR MOUNTAIN WSC	NO	2020	DRILL NEW WELLS (STAR MOUNTAIN, QUEEN CITY, SABINE)	MULTIPLE WELLS/WELL FIELD	$1,521,000
STARRVILLE-FRIENDSHIP WSC	NO	2060	DRILL NEW WELLS (STARRVILLE FRIENDSHIP, CARRIZO, SABINE)	SINGLE WELL	$761,000
WASKOM	NO	2020	DRILL NEW WELLS (WASKOM, QUEEN CITY, CYPRESS)	SINGLE WELL	$2,399,000
WINONA	NO	2050	DRILL NEW WELLS (WINONA, CARRIZO-WILCOX, SABINE)	SINGLE WELL	$761,000
WOLFE CITY	NO	2050	NEW CONTRACT WITH GREENVILLE AND PIPELINE TO WOLFE CITY	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT; PUMP STATION	$7,124,000

REGION D RECOMMENDED CAPITAL COST TOTAL	**$730,725,428**

Region D Alternative Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
B H P WSC*	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$2345	$1550	2	60	103	177	288	446
BRINKER WSC	D	ALT DRILL NEW WELLS (BRINKER WSC)	D | CARRIZO-WILCOX AQUIFER | HOPKINS COUNTY	N/A	$916	0	0	0	12	47	83
BRINKER WSC	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	N/A	$1904	0	0	0	12	47	83
CADDO BASIN SUD*	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$1711	$1486	5	172	315	561	946	1,502
CADDO MILLS	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	N/A	$1441	0	1	36	68	108	254
CANTON	D	ALT CANTON GRAND SALINE RESERVOIR	D | GRAND SALINE LAKE/RESERVOIR	$3087	$1264	1,810	1,810	1,810	1,810	1,810	1,810
CASH SUD*	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$1571	$1470	330	394	978	1,297	1,285	1,321
CELESTE	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$2744	$1614	29	52	86	136	209	316
CLARKSVILLE	D	ALT CLARKSVILLE TREATED PIPELINE PAT MAYSE WATER	D | PAT MAYSE LAKE/RESERVOIR	$5010	$2165	303	303	303	303	303	303
CLARKSVILLE	D	DIMPLE RESERVOIR	D | DIMPLE LAKE/RESERVOIR	$8399	$5789	303	303	303	303	303	303
CLARKSVILLE	D	RIVERBEND STRATEGY	D | WRIGHT PATMAN LAKE/RESERVOIR	$3865	$1149	303	303	303	303	303	303
COUNTY-OTHER, HUNT	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	N/A	$1442	0	0	166	703	1,817	3,834
CUMBY	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$5807	$1966	13	29	44	58	77	88
HICKORY CREEK SUD*	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$1924	$1525	88	254	489	822	1,306	2,012
IRRIGATION, HOPKINS	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$1552	$1346	4,627	4,627	4,627	4,627	4,627	4,627
IRRIGATION, RED RIVER	D	ALT DRILL NEW WELLS (IRRIGATION RED RIVER, TRINITY AQUIFER, SULPHUR)	D | TRINITY AQUIFER | RED RIVER COUNTY	$845	$536	97	97	97	97	97	97
LIVESTOCK, HOPKINS	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$2021	$1544	1,068	1,090	1,140	1,143	1,196	1,219
LIVESTOCK, WOOD	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$695	$542	1,132	1,132	1,132	1,132	1,132	1,132
MANUFACTURING, VAN ZANDT	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$1443	$1443	242	418	418	418	429	429

*A single asterisk next to a WUG's name denotes that the WUG is split by two or more planning regions.

Region D Alternative Water User Group (WUG) Water Management Strategies (WMS)

						WATER MANAGEMENT STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
WUG ENTITY NAME	WMS SPONSOR REGION	WMS NAME	SOURCE NAME	UNIT COST 2020	UNIT COST 2070	2020	2030	2040	2050	2060	2070
MANUFACTURING, WOOD	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$656	$535	1,030	1,583	1,583	1,583	1,583	1,583
MARTIN SPRINGS WSC	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	N/A	$5724	0	0	0	0	0	29
MILLER GROVE WSC	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$3846	$1692	8	16	23	29	40	52
MINING, HOPKINS	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$2136	$1545	227	283	360	444	533	639
MINING, HUNT	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$2082	N/A	73	64	35	19	7	0
NORTH HUNT SUD*	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	$2078	$1541	78	148	243	376	567	846
POETRY WSC*	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	N/A	$1549	0	47	83	143	236	365
QUEEN CITY	D	ALT RIVERBEND STRATEGY CASS	D | WRIGHT PATMAN LAKE/RESERVOIR	N/A	$483	0	251	244	243	243	243
WOLFE CITY*	D	ALT WOOD COUNTY PIPELINE	D | CARRIZO-WILCOX AQUIFER | WOOD COUNTY	N/A	$1679	0	0	0	51	149	293
					REGION D ALTERNATIVE WMS SUPPLY TOTAL	11,768	13,437	14,921	16,870	19,688	24,212

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Region D Alternative Projects Associated with Water Management Strategies

SPONSOR NAME	SPONSOR IS WWP?	ONLINE DECADE	PROJECT NAME	PROJECT DESCRIPTION	CAPITAL COST
B H P WSC	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (B H P, CADDO BASIN SUD, POETRY WSC)	CONVEYANCE/TRANSMISSION PIPELINE	$1,038,000
BRINKER WSC	NO	2050	ALT WOOD COUNTY PIPELINE TIE-IN (BRINKER WSC)	CONVEYANCE/TRANSMISSION PIPELINE	$3,567,000
BRINKER WSC	NO	2050	DRILL NEW WELLS (BRINKER WSC, CARRIZO-WILCOX, SULPHUR)	MULTIPLE WELLS/WELL FIELD; WATER TREATMENT PLANT EXPANSION	$1,405,000
CADDO BASIN SUD	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (B H P, CADDO BASIN SUD, POETRY WSC)	CONVEYANCE/TRANSMISSION PIPELINE	$3,860,000
CANTON	NO	2020	ALT CANTON GRAND SALINE RESERVOIR	CONVEYANCE/TRANSMISSION PIPELINE; NEW SURFACE WATER INTAKE; NEW WATER RIGHT/PERMIT NO IBT; PUMP STATION; WATER TREATMENT PLANT EXPANSION; RESERVOIR CONSTRUCTION	$45,373,000
CASH SUD	YES	2020	ALT WOOD COUNTY PIPELINE TIE-IN (CASH SUD)	CONVEYANCE/TRANSMISSION PIPELINE	$1,926,000
CELESTE	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (CELESTE)	CONVEYANCE/TRANSMISSION PIPELINE	$5,076,000
CLARKSVILLE	NO	2020	ALT CLARKSVILLE TREATED PIPELINE PAT MAYSE WATER	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT; PUMP STATION	$12,255,000
CLARKSVILLE	NO	2020	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB (CLARKSVILLE, SULPHUR)	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT; PUMP STATION; STORAGE TANK	$11,702,000
CLARKSVILLE	NO	2020	DIMPLE RESERVOIR	CONVEYANCE/TRANSMISSION PIPELINE; DIVERSION AND CONTROL STRUCTURE; NEW WATER RIGHT/PERMIT NO IBT; RESERVOIR CONSTRUCTION	$38,489,000
COUNTY-OTHER, WOOD	NO	2020	ALT WOOD COUNTY PIPELINE AND REGIONAL WELL FIELD	CONVEYANCE/TRANSMISSION PIPELINE; MULTIPLE WELLS/WELL FIELD; STORAGE TANK	$232,728,000
CUMBY	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (CUMBY)	CONVEYANCE/TRANSMISSION PIPELINE	$4,809,000
HICKORY CREEK SUD	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (HICKORY CREEK	CONVEYANCE/TRANSMISSION PIPELINE	$11,862,000
IRRIGATION, HOPKINS	NO	2020	ALT WOOD COUNTY PIPELINE (IRRIGATION HOPKINS)	CONVEYANCE/TRANSMISSION PIPELINE	$13,522,000
IRRIGATION, RED RIVER	NO	2020	ALT DRILL NEW WELLS (IRRIGATION RED RIVER, TRINITY AQUIFER, SULPHUR)	MULTIPLE WELLS/WELL FIELD	$425,000
LIVESTOCK, HOPKINS	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (HOPKINS	CONVEYANCE/TRANSMISSION PIPELINE	$8,273,000
LIVESTOCK, WOOD	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (WOOD CO LIVESTOCK)	CONVEYANCE/TRANSMISSION PIPELINE	$2,479,000
MANUFACTURING, WOOD	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (WOOD CO MANUFACTURING)	CONVEYANCE/TRANSMISSION PIPELINE	$2,722,000
MARTIN SPRINGS WSC	NO	2070	WOOD COUNTY PIPELINE TIE-IN (MARTIN SPRINGS)	CONVEYANCE/TRANSMISSION PIPELINE	$1,574,000
MILLER GROVE WSC	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (MILLER GROVE WSC)	CONVEYANCE/TRANSMISSION PIPELINE	$1,587,000
MINING, HOPKINS	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (HOPKINS MINING)	CONVEYANCE/TRANSMISSION PIPELINE	$5,367,000
MINING, HUNT	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (HUNT CO MINING)	CONVEYANCE/TRANSMISSION PIPELINE	$560,000
NORTH HUNT SUD	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (NORTH HUNT SUD)	CONVEYANCE/TRANSMISSION PIPELINE	$6,777,000
POETRY WSC	NO	2020	ALT WOOD COUNTY PIPELINE TIE-IN (B H P, CADDO BASIN SUD, POETRY WSC)	CONVEYANCE/TRANSMISSION PIPELINE	$1,055,000
WOLFE CITY	NO	2040	ALT WOOD COUNTY PIPELINE TIE-IN (WOLFE CITY)	CONVEYANCE/TRANSMISSION PIPELINE; NEW CONTRACT	$7,124,000

REGION D ALTERNATIVE CAPITAL COST TOTAL	**$425,555,000**

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Region D Water User Group (WUG) Management Supply Factor

WUG supplies and projected demands are entered for each of a WUG's region-county-basin divisions. To calculate the Management Supply Factor for each WUG as a whole, not split by region-county-basin, the combined total of existing and future supply is divided by the total projected demand. If a WUG is split by more than one planning region, the whole WUG's management supply factor will show up in each of its planning region's management supply factor reports.

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
410 WSC	1.0	1.0	1.0	1.0	1.0	1.0
ABLES SPRINGS WSC*	1.0	1.0	1.0	1.0	1.0	1.0
ALGONQUIN WATER RESOURCES OF TEXAS*	3.5	3.1	2.8	2.6	2.3	2.1
ATLANTA	1.0	1.0	1.0	1.0	1.0	1.0
B H P WSC*	1.0	1.0	1.0	1.0	1.0	1.0
BEN WHEELER WSC*	1.9	1.9	1.8	1.7	1.7	1.6
BETHEL ASH WSC*	1.9	1.7	1.5	1.4	1.3	1.2
BI COUNTY WSC	1.6	1.4	1.3	1.2	1.1	1.0
BIG SANDY	1.3	1.3	1.2	1.2	1.1	1.1
BLACKLAND WSC*	1.0	1.0	1.0	1.0	1.0	1.0
BLOCKER CROSSROADS WSC	1.6	1.6	1.5	1.4	1.3	1.2
BLOSSOM	1.6	1.7	1.9	1.9	1.8	1.8
BOGATA	4.1	4.4	4.5	4.6	4.6	4.6
BRASHEAR WSC	1.0	1.0	1.0	1.0	1.0	1.0
BRIGHT STAR SALEM SUD	2.9	4.1	4.3	4.2	4.2	4.1
BRINKER WSC	1.3	1.2	1.1	1.0	1.0	1.0
BURNS REDBANK WSC	1.0	1.0	1.0	1.0	1.0	1.0
CADDO BASIN SUD*	1.0	1.0	1.0	1.0	1.0	1.0
CADDO MILLS	1.2	1.0	1.0	1.0	1.0	1.0
CANTON	2.1	2.0	1.9	1.8	1.7	1.6
CARROLL WSC*	1.0	1.0	1.0	1.0	1.0	1.0
CASH SUD*	1.2	1.1	1.0	1.0	1.0	1.1
CELESTE	1.0	1.0	1.0	1.0	1.0	1.0
CENTRAL BOWIE COUNTY WSC	1.0	1.0	1.0	1.0	1.0	1.0
CLARKSVILLE	1.2	1.3	1.3	1.3	1.3	1.3
CLARKSVILLE CITY	2.5	2.3	2.2	2.0	1.8	1.7
COMBINED CONSUMERS SUD	1.0	1.0	1.0	1.0	1.0	1.0
COMMERCE	1.2	3.1	2.8	2.2	1.2	1.1
COOPER	2.2	2.2	2.3	2.3	2.3	2.3
CORNERSVILLE WSC	2.0	1.9	1.8	1.7	1.6	1.5
COUNTY-OTHER, BOWIE	2.2	2.8	4.5	4.4	4.4	4.4
COUNTY-OTHER, CAMP	2.5	2.8	3.0	3.3	3.6	4.0
COUNTY-OTHER, CASS	1.1	1.2	1.3	1.4	1.4	1.4
COUNTY-OTHER, DELTA	2.4	2.2	2.2	2.3	2.3	2.4
COUNTY-OTHER, FRANKLIN	2.0	2.0	2.1	2.0	2.0	2.0
COUNTY-OTHER, GREGG	2.2	3.1	3.1	3.1	3.1	2.8
COUNTY-OTHER, HARRISON	2.6	2.6	2.6	2.6	2.5	2.3
COUNTY-OTHER, HOPKINS	7.6	9.3	10.9	9.5	10.5	10.0
COUNTY-OTHER, HUNT	2.1	1.3	1.0	1.0	1.0	1.0
COUNTY-OTHER, LAMAR	1.0	1.0	1.0	1.0	1.0	1.0
COUNTY-OTHER, MARION	17.7	18.7	20.0	22.0	24.7	28.8
COUNTY-OTHER, MORRIS	1.5	1.6	1.6	1.5	1.5	1.5
COUNTY-OTHER, RAINS	5.3	5.5	5.9	6.0	6.4	6.7
COUNTY-OTHER, RED RIVER	1.0	1.5	2.5	3.3	4.1	20.1

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Region D Water User Group (WUG) Management Supply Factor

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, SMITH*	1.4	1.3	1.3	1.3	1.3	1.3
COUNTY-OTHER, TITUS	3.3	1.8	1.7	1.6	1.4	1.3
COUNTY-OTHER, UPSHUR	2.6	2.6	2.6	2.5	2.4	2.3
COUNTY-OTHER, VAN ZANDT	2.5	2.5	2.4	2.3	2.4	2.3
COUNTY-OTHER, WOOD	15.3	15.7	16.5	17.2	18.4	20.1
CROSS ROADS SUD*	2.5	2.5	2.4	2.3	2.2	2.1
CRYSTAL SYSTEMS TEXAS*	1.4	1.3	1.4	1.3	1.3	1.4
CUMBY	1.0	1.0	1.0	1.0	1.0	1.0
CYPRESS SPRINGS SUD	5.5	5.3	5.1	4.9	4.6	4.3
DAINGERFIELD	3.4	3.4	3.4	3.4	3.3	3.2
DE KALB	1.0	1.0	1.0	1.0	1.0	1.0
DELTA COUNTY MUD*	1.0	1.0	1.0	1.0	1.0	1.0
DIANA SUD	2.6	2.5	2.5	2.4	2.3	2.2
E M C WSC	1.4	1.4	1.4	1.4	1.4	1.4
EAST MOUNTAIN WATER SYSTEM	1.5	1.4	1.4	1.3	1.3	1.2
EAST TAWAKONI	1.0	1.0	1.0	1.0	1.0	1.0
EASTERN CASS WSC	3.8	3.9	4.0	4.1	4.2	4.2
EDGEWOOD	1.6	1.6	1.5	1.5	1.5	1.5
EDOM WSC*	1.0	1.0	1.0	1.0	1.0	1.0
ELDERVILLE WSC*	2.1	1.9	1.8	1.6	1.4	1.3
EMORY	1.0	1.0	1.0	1.0	1.0	1.0
FOUKE WSC	1.3	1.3	1.3	1.3	1.3	1.3
FROGNOT WSC*	2.1	1.9	1.6	1.3	1.1	1.0
FRUITVALE WSC	1.6	1.5	1.5	1.4	1.4	1.3
GAFFORD CHAPEL WSC	1.5	1.5	1.5	1.5	1.4	1.4
GILL WSC*	1.7	1.7	1.6	1.6	1.5	1.4
GILMER	1.1	1.0	1.2	1.1	1.1	1.0
GLADEWATER	1.3	1.3	1.2	1.1	1.0	1.0
GLENWOOD WSC	1.2	1.2	1.2	1.1	1.1	1.0
GOLDEN WSC	1.8	1.8	1.9	1.6	1.1	1.0
GRAND SALINE	1.7	1.7	1.7	1.6	1.5	1.3
GREENVILLE	1.1	1.0	1.0	1.0	1.0	1.0
GUM SPRINGS WSC	4.4	4.3	4.1	3.9	3.6	3.2
HALLSVILLE	1.5	1.4	1.4	1.3	1.2	1.1
HARLETON WSC	1.0	1.0	1.0	1.0	1.0	1.0
HAWKINS	3.0	2.9	2.9	2.9	2.8	2.8
HICKORY CREEK SUD*	0.8	0.6	0.4	0.3	0.2	0.1
HOLLY SPRINGS WSC	1.0	1.1	1.1	1.1	1.1	1.1
HOOKS	1.0	1.0	1.0	1.0	1.0	1.0
HUGHES SPRINGS	2.0	2.1	2.2	2.2	2.2	2.2
IRRIGATION, BOWIE	1.1	1.1	1.1	1.1	1.1	1.1
IRRIGATION, DELTA	3.8	3.8	3.8	3.8	3.8	3.8
IRRIGATION, FRANKLIN	3.0	3.0	3.0	3.0	3.0	3.0
IRRIGATION, GREGG	4.8	4.8	4.8	4.8	4.8	4.8
IRRIGATION, HARRISON	1.2	1.2	1.2	1.2	1.2	1.2
IRRIGATION, HOPKINS	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, HUNT	1.0	1.0	1.0	1.0	1.0	1.0
IRRIGATION, LAMAR	1.0	1.0	1.0	1.0	1.0	1.0

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Region D Water User Group (WUG) Management Supply Factor

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	2020	2030	2040	2050	2060	2070
IRRIGATION, MARION	26.8	26.8	26.8	26.8	26.8	26.8
IRRIGATION, MORRIS	6.4	6.4	6.4	6.4	6.4	6.4
IRRIGATION, RAINS	3.2	3.2	3.2	3.2	3.2	3.2
IRRIGATION, RED RIVER	1.2	1.2	1.2	1.2	1.2	1.2
IRRIGATION, SMITH*	1.6	1.6	1.6	1.6	1.6	1.6
IRRIGATION, TITUS	1.4	1.4	1.4	1.4	1.4	1.4
IRRIGATION, UPSHUR	4.2	4.2	4.2	4.2	4.2	4.2
IRRIGATION, VAN ZANDT	1.4	1.3	1.3	1.3	1.3	1.3
IRRIGATION, WOOD	2.8	2.8	2.8	2.8	2.8	2.8
JACKSON WSC*	1.0	2.9	2.8	2.6	2.5	1.3
JEFFERSON	3.9	4.0	4.1	4.1	4.1	4.1
JONES WSC	2.1	2.1	2.1	2.1	2.1	2.1
JOSEPHINE*	1.0	1.0	1.0	1.0	1.0	1.0
KELLYVILLE-BEREA WSC	1.4	1.5	1.5	1.6	1.6	1.6
KILGORE*	1.1	2.0	1.8	1.6	1.5	1.4
LAKE FORK WSC	3.0	3.0	3.1	3.1	3.0	3.0
LAMAR COUNTY WSD	3.6	3.6	3.5	3.4	3.3	3.3
LEIGH WSC	1.1	1.0	1.1	1.1	1.0	1.0
LIBERTY CITY WSC	1.8	1.7	1.6	1.5	1.3	1.2
LINDALE RURAL WSC*	2.2	2.1	1.9	1.8	1.6	1.4
LINDALE*	1.2	1.3	1.3	1.4	1.4	1.3
LINDEN	1.5	1.5	1.6	1.6	1.6	1.6
LITTLE HOPE MOORE WSC	1.1	1.1	1.0	1.0	1.0	1.0
LIVESTOCK, BOWIE	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, CAMP	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, CASS	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, DELTA	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, FRANKLIN	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, GREGG	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, HARRISON	1.5	1.6	1.6	1.6	1.6	1.6
LIVESTOCK, HOPKINS	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, HUNT	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, LAMAR	1.5	1.5	1.5	1.5	1.5	1.5
LIVESTOCK, MARION	2.2	2.2	2.2	2.2	2.2	2.2
LIVESTOCK, MORRIS	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, RAINS	1.2	1.2	1.2	1.2	1.2	1.2
LIVESTOCK, RED RIVER	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, SMITH*	1.5	1.5	1.5	1.5	1.5	1.5
LIVESTOCK, TITUS	1.0	1.0	1.0	1.0	1.0	1.0
LIVESTOCK, UPSHUR	1.1	1.1	1.1	1.1	1.1	1.1
LIVESTOCK, VAN ZANDT	1.6	1.6	1.6	1.6	1.5	1.5
LIVESTOCK, WOOD	1.0	1.0	1.0	1.0	1.0	1.0
LONE STAR	4.0	4.1	4.1	4.1	4.0	3.9
LONGVIEW	1.8	2.0	1.8	1.7	1.5	1.4
MABANK*	1.0	1.0	1.0	1.0	1.0	1.0
MACBEE SUD*	1.2	1.1	1.1	1.1	1.1	1.1
MACEDONIA EYLAU MUD 1	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, BOWIE	0.6	29.3	32.5	36.5	40.5	49.3

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Region D Water User Group (WUG) Management Supply Factor

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	2020	2030	2040	2050	2060	2070
MANUFACTURING, CAMP	2.9	2.0	2.0	2.0	2.0	2.0
MANUFACTURING, CASS	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, FRANKLIN	1.4	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, GREGG	1.3	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, HARRISON	4.4	3.9	3.9	3.9	3.9	3.9
MANUFACTURING, HOPKINS	1.8	1.9	2.0	2.1	2.2	2.4
MANUFACTURING, HUNT	2.0	1.9	2.2	2.4	2.6	2.2
MANUFACTURING, LAMAR	1.2	1.2	1.3	1.3	1.4	1.5
MANUFACTURING, MORRIS	4.7	4.5	4.3	4.4	4.7	4.5
MANUFACTURING, RAINS	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, RED RIVER	2,842.3	2,842.3	2,840.0	2,840.0	2,840.0	2,840.0
MANUFACTURING, SMITH*	1.0	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, TITUS	1.3	1.0	1.0	1.0	1.0	1.0
MANUFACTURING, UPSHUR	2.4	2.2	2.2	2.2	2.2	2.2
MANUFACTURING, VAN ZANDT	1.1	1.1	1.1	1.0	1.0	1.0
MANUFACTURING, WOOD	1.0	1.0	1.0	1.0	1.0	1.0
MARSHALL	2.8	2.6	2.5	2.3	2.1	1.9
MARTIN SPRINGS WSC	1.6	1.4	1.3	1.2	1.0	1.0
MAUD	1.0	1.0	1.0	1.0	1.0	1.0
MILLER GROVE WSC	1.0	1.0	1.0	1.0	1.0	1.0
MIMS WSC	7.0	7.0	7.0	7.0	7.0	7.0
MINEOLA	1.6	1.6	1.6	1.6	1.6	1.5
MINING, CAMP	1.9	2.1	2.3	2.6	2.9	3.3
MINING, CASS	21.5	14.9	14.7	20.1	30.9	47.6
MINING, FRANKLIN	208.0	203.2	248.5	243.5	318.0	477.0
MINING, GREGG	1.1	1.0	1.0	1.0	1.1	1.1
MINING, HARRISON	1.0	1.2	1.5	1.9	2.4	3.1
MINING, HOPKINS	1.0	1.0	1.0	1.0	1.0	1.0
MINING, HUNT	1.0	1.0	1.0	1.0	1.0	1.1
MINING, MARION	1.1	1.0	1.1	1.3	1.6	2.0
MINING, RED RIVER	1.0	1.0	1.0	1.0	1.0	1.0
MINING, SMITH*	1.4	1.6	1.6	1.5	1.5	1.5
MINING, TITUS	2.8	2.7	2.6	2.6	2.3	2.0
MINING, UPSHUR	1.3	1.1	1.1	1.2	1.2	1.3
MINING, VAN ZANDT	11.1	10.9	10.3	9.7	9.2	8.8
MINING, WOOD	12.4	12.5	13.8	15.3	16.2	17.3
MOUNT PLEASANT	4.6	3.8	3.4	3.0	2.6	2.3
MOUNT VERNON	5.3	5.0	4.8	4.5	4.3	4.0
MYRTLE SPRINGS WSC	1.7	1.6	1.6	1.5	1.4	1.3
NAPLES	1.5	1.5	1.5	1.5	1.5	1.4
NASH	1.0	1.0	1.0	1.0	1.0	1.0
NEW BOSTON	1.0	1.0	1.0	1.0	1.0	1.0
NEW HOPE SUD	1.1	1.1	1.1	1.1	1.1	1.1
NORTH HARRISON WSC	1.1	1.1	1.1	1.0	1.2	1.1
NORTH HOPKINS WSC	1.9	1.9	1.8	1.7	1.5	1.4
NORTH HUNT SUD*	1.0	1.0	1.0	1.0	1.0	1.0
OMAHA	1.4	1.4	1.4	1.4	1.3	1.3
ORE CITY	11.1	10.7	10.3	9.9	9.4	9.0

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Region D Water User Group (WUG) Management Supply Factor

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	2020	2030	2040	2050	2060	2070
OVERTON*	0.9	1.0	1.0	1.0	1.0	1.0
PANOLA-BETHANY WSC*	1.0	1.1	1.0	1.0	1.0	1.0
PARIS	8.6	8.6	8.6	8.4	8.2	8.0
PINE RIDGE WSC	1.8	1.7	1.6	1.4	1.3	1.2
PITTSBURG	2.0	2.0	1.9	1.9	1.8	1.8
POETRY WSC*	1.0	1.0	1.0	1.0	1.0	1.0
POINT	1.0	1.0	1.0	1.0	1.0	1.0
PRITCHETT WSC	1.5	1.5	1.4	1.4	1.3	1.3
PRUITT SANDFLAT WSC	2.1	2.0	1.9	1.8	1.8	1.7
QUEEN CITY	1.0	1.1	1.1	1.1	1.1	1.1
QUINLAN	1.0	1.0	1.0	1.0	1.0	1.0
QUITMAN	1.0	3.2	3.2	3.1	3.0	3.0
R P M WSC*	1.1	1.0	1.0	1.0	1.0	1.0
RAMEY WSC	2.3	2.3	2.4	2.4	2.4	2.3
RED RIVER COUNTY WSC	1.4	1.4	1.4	1.4	1.4	1.3
REDWATER	1.0	1.0	1.0	1.0	1.0	1.0
RENO (Lamar)	1.1	1.3	1.3	1.4	1.5	1.6
RIVERBEND WATER RESOURCES DISTRICT	1.0	1.0	1.0	1.0	1.0	1.0
ROYSE CITY*	1.0	1.0	1.0	1.0	1.0	1.0
SAND FLAT WSC	2.2	2.1	1.9	1.8	1.6	1.5
SCOTTSVILLE	1.1	1.0	1.2	1.1	1.2	1.1
SHADY GROVE NO 2 WSC	1.0	1.0	1.0	1.0	1.0	1.0
SHADY GROVE WSC	1.0	1.0	1.0	1.0	1.0	1.0
SHARON WSC	2.2	2.2	2.3	2.2	2.1	2.1
SHIRLEY WSC	1.5	1.5	1.4	1.4	1.3	1.3
SMITH COUNTY MUD 1	1.3	1.1	1.1	1.0	1.0	1.0
SOUTH RAINS SUD	1.5	1.5	1.5	1.5	1.5	1.5
SOUTH TAWAKONI WSC	1.0	1.0	1.0	1.0	1.0	1.0
SOUTHERN UTILITIES*	1.1	1.1	1.1	1.1	1.1	1.1
STAR MOUNTAIN WSC	1.4	1.3	1.2	1.1	1.3	1.2
STARRVILLE-FRIENDSHIP WSC	1.4	1.3	1.2	1.1	1.3	1.2
STEAM ELECTRIC POWER, GREGG	2.4	2.4	2.4	2.4	2.4	2.4
STEAM ELECTRIC POWER, HARRISON	1.3	1.3	1.3	1.3	1.3	1.3
STEAM ELECTRIC POWER, HUNT	1.0	1.0	1.0	1.0	1.0	1.0
STEAM ELECTRIC POWER, LAMAR	1.6	1.6	1.6	1.6	1.6	1.6
STEAM ELECTRIC POWER, MARION	1.0	1.0	1.1	1.2	1.4	1.5
STEAM ELECTRIC POWER, MORRIS	16.4	16.4	16.4	16.4	16.4	16.4
STEAM ELECTRIC POWER, TITUS	1.0	1.0	1.0	1.0	1.0	1.0
SULPHUR SPRINGS	1.6	1.6	1.5	1.5	1.4	1.4
TALLEY WSC	2.0	2.0	2.0	1.8	1.7	1.5
TEXARKANA	1.0	1.0	1.0	1.0	1.0	1.0
TEXAS A&M UNIVERSITY COMMERCE	1.0	1.0	1.0	1.0	1.1	1.1
TRI SUD	1.0	1.0	1.0	1.0	1.0	1.0
TRYON ROAD SUD	2.5	2.4	2.2	2.1	1.9	1.7
TYLER*	1.0	1.1	1.1	1.1	1.1	1.1
UNION GROVE WSC	2.4	2.3	2.2	2.1	2.0	1.9
VAN	2.7	2.5	2.4	2.2	2.1	2.0
WAKE VILLAGE	1.0	1.0	1.0	1.0	1.0	1.0

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Region D Water User Group (WUG) Management Supply Factor

	WUG MANAGEMENT SUPPLY FACTOR					
WUG NAME	2020	2030	2040	2050	2060	2070
WASKOM	1.0	1.1	1.1	1.1	1.1	1.1
WEST GREGG SUD*	1.7	1.6	1.5	1.4	1.2	1.1
WEST HARRISON WSC	2.8	2.7	2.6	2.5	2.3	2.1
WEST LEONARD WSC*	1.9	1.8	1.8	1.6	1.3	1.0
WEST TAWAKONI	1.0	2.6	2.2	1.7	1.4	1.1
WESTERN CASS WSC	5.0	5.2	5.4	5.4	5.5	5.5
WHITE OAK	1.9	1.8	1.7	1.5	1.4	1.3
WILLS POINT	1.2	2.3	2.3	1.9	1.6	1.6
WINNSBORO	2.8	2.6	2.5	2.4	2.2	2.1
WINONA	1.3	1.1	1.0	1.5	1.3	1.1
WOLFE CITY*	1.5	1.3	1.1	1.0	1.0	1.0

*A single asterisk next to a WUG's name denotes that the WUG is split by more than one planning region.

Region D Recommended Water Management Strategy (WMS) Supply Associated with a New or Amended Inter-Basin Transfer (IBT) Permit

Region D has no recommended WMS supplies that are associated with an IBT Permit.

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Region D Recommended Water Management Strategy (WMS) Supply Associated with a New or Amended Inter-Basin Transfer (IBT) Permit

IBT WMS supply is the portion of the total WMS benefitting WUGs that will require a new or amended IBT permit that is not considered exempt under the Texas Water Code § 11.085.

			IBT WMS SUPPLY (ACRE-FEET PER YEAR)					
WMS NAME	SOURCE BASIN	RECIPIENT WUG BASIN	2020	2030	2040	2050	2060	2070

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Region D Water User Groups (WUGs)
Recommended Water Management Strategy (WMS) Supply Associated with a
New or Amended Inter-Basin Transfer (IBT) Permit and Total Recommended Conservation WMS Supply

IBT WMS supply is the portion of the total WMS benefitting the WUG basin split listed that will require a new or amended IBT permit that is not considered exempt under the Texas Water Code§ 11.085. Total conservation supply represents all conservation WMS volumes recommended within the WUG's region-basin geographic split.

BENEFITTING WUG NAME | BASIN	WMS SOURCE ORIGIN BASIN | WMS NAME	WMS SUPPLY (ACRE-FEET PER YEAR)					
		2020	2030	2040	2050	2060	2070
ABLES SPRINGS WSC | SABINE BASIN	SULPHUR BASIN | MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	0	0	0	21	35	44
	SULPHUR BASIN | WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	0	0	0	0	0	15
	TOTAL RECOMMENDED IBT WMS SUPPLY	**0**	**0**	**0**	**21**	**35**	**59**
	TOTAL RECOMMENDED CONSERVATION	**1**	**2**	**1**	**3**	**7**	**10**
B H P WSC | SABINE BASIN	SULPHUR BASIN | MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	0	0	0	68	107	125
	SULPHUR BASIN | WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	0	0	0	0	0	42
	TOTAL RECOMMENDED IBT WMS SUPPLY	**0**	**0**	**0**	**68**	**107**	**167**
	TOTAL RECOMMENDED CONSERVATION	**0**	**0**	**0**	**0**	**0**	**0**
BLACKLAND WSC | SABINE BASIN	SULPHUR BASIN | MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	0	0	0	1	1	1
	SULPHUR BASIN | WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	0	0	0	0	0	0
	TOTAL RECOMMENDED IBT WMS SUPPLY	**0**	**0**	**0**	**1**	**1**	**1**
	TOTAL RECOMMENDED CONSERVATION	**0**	**1**	**1**	**1**	**0**	**1**
CADDO BASIN SUD | SABINE BASIN	SULPHUR BASIN | MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	0	0	0	217	349	421
	SULPHUR BASIN | WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	0	0	0	0	0	142
	TOTAL RECOMMENDED IBT WMS SUPPLY	**0**	**0**	**0**	**217**	**349**	**563**
	TOTAL RECOMMENDED CONSERVATION	**1**	**2**	**3**	**5**	**9**	**15**
CASH SUD | SABINE BASIN	SULPHUR BASIN | MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	0	0	0	255	303	262
	SULPHUR BASIN | WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	0	0	0	0	0	89
	TOTAL RECOMMENDED IBT WMS SUPPLY	**0**	**0**	**0**	**255**	**303**	**351**
	TOTAL RECOMMENDED CONSERVATION	**0**	**1**	**1**	**0**	**0**	**0**
JOSEPHINE | SABINE BASIN	SULPHUR BASIN | MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	0	0	0	16	20	17
	SULPHUR BASIN | WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	0	0	0	0	0	6
	TOTAL RECOMMENDED IBT WMS SUPPLY	**0**	**0**	**0**	**16**	**20**	**23**
	TOTAL RECOMMENDED CONSERVATION	**1**	**3**	**5**	**7**	**7**	**7**
MABANK | TRINITY BASIN	SULPHUR BASIN | MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	0	0	0	16	27	36
	SULPHUR BASIN | WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	0	0	0	0	0	12
	TOTAL RECOMMENDED IBT WMS SUPPLY	**0**	**0**	**0**	**16**	**27**	**48**
	TOTAL RECOMMENDED CONSERVATION	**3**	**4**	**5**	**7**	**8**	**10**
POETRY WSC | SABINE BASIN	SULPHUR BASIN | MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	0	0	0	55	87	102
	SULPHUR BASIN | WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	0	0	0	0	0	34
	TOTAL RECOMMENDED IBT WMS SUPPLY	**0**	**0**	**0**	**55**	**87**	**136**
	TOTAL RECOMMENDED CONSERVATION	**1**	**2**	**1**	**3**	**4**	**7**
ROYSE CITY | SABINE BASIN	SULPHUR BASIN | MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD	0	0	0	9	14	17

Region D Water User Groups (WUGs)
Recommended Water Management Strategy (WMS) Supply Associated with a
New or Amended Inter-Basin Transfer (IBT) Permit and Total Recommended Conservation WMS Supply

ROYSE CITY | SABINE BASIN	SULPHUR BASIN | WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD	0	0	0	0	0	6
	TOTAL RECOMMENDED IBT WMS SUPPLY	**0**	**0**	**0**	**9**	**14**	**23**
	TOTAL RECOMMENDED CONSERVATION	**1**	**1**	**1**	**0**	**3**	**2**

Region D Sponsored Recommended Water Management Strategy (WMS) Supplies Unallocated to Water User Groups (WUG)

Region D has no recommended WMS supplies that are unallocated to a WUG.

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Region D Sponsored Recommended Water Management Strategy (WMS) Supplies Unallocated* to Water User Groups (WUG)

WMS NAME	WMS SPONSOR	SOURCE NAME	UNALLOCATED STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
			2020	2030	2040	2050	2060	2070
		TOTAL UNALLOCATED STRATEGY SUPPLIES						

* Strategy supplies created through the WMS that have not been assigned to a WUG will be allocated to the entity responsible for the water through an ‘unassigned water volumes’ entity. Only strategy supplies associated with an 'unassigned water volume' entity are shown in this report, and may not represent all strategy supplies associated with the listed WMS.

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Region D Water User Group (WUG) Strategy Supplies by Water Management Strategy (WMS) Type

WMS TYPE *	STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
AQUIFER STORAGE & RECOVERY	0	0	1	0	1	1
GROUNDWATER WELLS & OTHER	32,207	33,671	34,723	35,476	36,930	38,279
INDIRECT REUSE	323	376	434	480	665	816
MUNICIPAL CONSERVATION	4,059	4,502	5,158	6,150	7,631	9,793
NEW MAJOR RESERVOIR	4	195	267	871	1,282	1,436
OTHER CONSERVATION	211	694	694	694	694	694
OTHER SURFACE WATER	46,416	109,372	119,295	131,550	144,667	169,929
SEAWATER DESALINATION	0	0	0	0	0	0
CONJUNCTIVE USE	0	0	0	0	0	0
DIRECT POTABLE REUSE	0	0	0	0	0	0
OTHER STRATEGIES	0	0	0	0	0	0
GROUNDWATER DESALINATION	0	0	0	0	0	0
OTHER DIRECT REUSE	0	0	0	0	0	0
IRRIGATION CONSERVATION	0	0	0	0	0	0
DROUGHT MANAGEMENT	0	0	0	0	0	0
TOTAL STRATEGY SUPPLIES	**83,220**	**148,810**	**160,572**	**175,221**	**191,870**	**220,948**

* WMS type descriptions can be found on the interactive state water plan website at http://texasstatewaterplan.org/ using the 'View data for' drop-down menus to navigate to a specific WMS Type page. The data used to create each WMS type value is available in Appendix 3 of the Guidelines for Regional Water Planning Data Deliverable (Exhibit D) document at http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/doc/current_docs/contract_docs/ExhibitD.pdf

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Region D Water User Group (WUG)
Recommended Water Management Strategy (WMS) Supplies by Source Type

SOURCE SUBTYPE*	STRATEGY SUPPLY (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
AQUIFER STORAGE & RECOVERY	0	0	1	0	1	1
GROUNDWATER	32,207	33,671	34,723	35,476	36,930	38,279
GROUNDWATER TOTAL STRATEGY SUPPLIES	**32,207**	**33,671**	**34,724**	**35,476**	**36,931**	**38,280**
DIRECT NON-POTABLE REUSE	0	0	0	0	0	0
DIRECT POTABLE REUSE	0	0	0	0	0	0
INDIRECT NON-POTABLE REUSE	0	0	0	0	0	0
INDIRECT POTABLE REUSE	323	376	434	480	665	816
REUSE TOTAL STRATEGY SUPPLIES	**323**	**376**	**434**	**480**	**665**	**816**
ATMOSPHERE	0	0	0	0	0	0
GULF OF MEXICO	0	0	0	0	0	0
LIVESTOCK LOCAL SUPPLY	0	0	0	0	0	0
OTHER LOCAL SUPPLY	0	0	0	0	0	0
RAINWATER HARVESTING	0	0	0	0	0	0
RESERVOIR	46,074	108,822	118,363	131,107	144,566	169,696
RESERVOIR SYSTEM	346	745	1,199	1,314	1,383	1,372
RUN-OF-RIVER	0	0	0	0	0	297
SURFACE WATER TOTAL STRATEGY SUPPLIES	**46,420**	**109,567**	**119,562**	**132,421**	**145,949**	**171,365**
REGION D TOTAL STRATEGY SUPPLIES	**78,950**	**143,614**	**154,720**	**168,377**	**183,545**	**210,461**

* A full list of source subtype definitions can be found in section 3 of the Guidelines for Regional Water Planning Data Deliverable (Exhibit D) document at http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/doc/current_docs/contract_docs/ExhibitD.pdf.

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Region D Major Water Provider (MWP) Existing Sales and Transfers

Major Water Providers are entities of particular significance to a region's water supply as defined by the Regional Water Planning Group (RWPG), and may be a Water User Group (WUG) entity, Wholesale Water Provider (WWP) entity , or both (WUG/WWP).

Retail denotes WUG projected demands and existing water supplies used by the WUG. Wholesale denotes a WWP or WUG/WWP selling water to another entity.

CASH SUD - WUG/WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
PROJECTED RETAIL WUG DEMANDS	2,353	2,736	3,215	3,808	4,537	5,411
PROJECTED WHOLESALE CONTRACT DEMANDS	926	1,155	1,491	1,765	2,367	3,351
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**3,279**	**3,891**	**4,706**	**5,573**	**6,904**	**8,762**
REUSE SALES TO RETAIL CUSTOMERS	524	641	729	772	697	642
SURFACE WATER SALES TO RETAIL CUSTOMERS	1,918	1,734	1,477	1,690	2,494	4,074
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	357	507	738	930	1,354	2,082
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**2,799**	**2,882**	**2,944**	**3,392**	**4,545**	**6,798**

CHEROKEE WATER COMPANY - WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
PROJECTED WHOLESALE CONTRACT DEMANDS	18,000	18,000	18,000	18,000	18,000	18,094
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**18,000**	**18,000**	**18,000**	**18,000**	**18,000**	**18,094**
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	18,000	18,000	18,000	18,000	18,000	18,094
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**18,000**	**18,000**	**18,000**	**18,000**	**18,000**	**18,094**

COMMERCE - WUG/WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
PROJECTED RETAIL WUG DEMANDS	1,427	1,555	1,749	2,039	2,473	3,108
PROJECTED WHOLESALE CONTRACT DEMANDS	796	808	808	808	808	808
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**2,223**	**2,363**	**2,557**	**2,847**	**3,281**	**3,916**
GROUNDWATER SALES TO RETAIL CUSTOMERS	244	244	244	244	244	244
SURFACE WATER SALES TO RETAIL CUSTOMERS	1,427	4,586	4,609	4,249	2,694	3,078
GROUNDWATER SALES TO WHOLESALE CUSTOMERS	78	78	78	78	78	78
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	202	214	214	214	214	214
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**1,951**	**5,122**	**5,145**	**4,785**	**3,230**	**3,614**

EMORY - WUG/WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
PROJECTED RETAIL WUG DEMANDS	791	829	837	842	845	847
PROJECTED WHOLESALE CONTRACT DEMANDS	963	965	961	960	960	961
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**1,754**	**1,794**	**1,798**	**1,802**	**1,805**	**1,808**
SURFACE WATER SALES TO RETAIL CUSTOMERS	791	829	837	842	845	847
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	427	438	435	434	435	436
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**1,218**	**1,267**	**1,272**	**1,276**	**1,280**	**1,283**

FRANKLIN COUNTY WD - WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
PROJECTED WHOLESALE CONTRACT DEMANDS	9,500	9,500	9,500	9,500	9,500	9,500
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**9,500**	**9,500**	**9,500**	**9,500**	**9,500**	**9,500**
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	9,031	8,649	8,265	7,960	7,577	7,271
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**9,031**	**8,649**	**8,265**	**7,960**	**7,577**	**7,271**

GREENVILLE - WUG/WWP	WATER VOLUMES (ACRE-FEET PER YEAR)

Region D Major Water Provider (MWP) Existing Sales and Transfers

DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
PROJECTED RETAIL WUG DEMANDS	9,271	10,481	12,187	14,624	18,163	23,319
PROJECTED WHOLESALE CONTRACT DEMANDS	2,431	2,608	2,807	3,022	3,213	3,410
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**11,702**	**13,089**	**14,994**	**17,646**	**21,376**	**26,729**
SURFACE WATER SALES TO RETAIL CUSTOMERS	6,032	5,855	5,656	5,441	5,250	5,053
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	2,431	2,608	2,807	3,022	3,213	3,410
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**8,463**	**8,463**	**8,463**	**8,463**	**8,463**	**8,463**

LAMAR COUNTY WSD - WUG/WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
PROJECTED RETAIL WUG DEMANDS	2,216	2,238	2,252	2,280	2,316	2,349
PROJECTED WHOLESALE CONTRACT DEMANDS	2,776	2,900	3,008	3,100	3,222	3,317
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**4,992**	**5,138**	**5,260**	**5,380**	**5,538**	**5,666**
SURFACE WATER SALES TO RETAIL CUSTOMERS	8,891	8,796	8,715	8,655	8,597	8,512
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	2,637	2,761	2,869	2,961	3,083	3,178
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**11,528**	**11,557**	**11,584**	**11,616**	**11,680**	**11,690**

LONGVIEW - WUG/WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
PROJECTED RETAIL WUG DEMANDS	24,268	26,122	28,353	31,051	34,232	37,865
PROJECTED WHOLESALE CONTRACT DEMANDS	26,765	26,767	26,767	26,767	26,767	26,767
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**51,033**	**52,889**	**55,120**	**57,818**	**60,999**	**64,632**
SURFACE WATER SALES TO RETAIL CUSTOMERS	43,410	52,251	52,284	52,316	52,351	52,386
REUSE SALES TO WHOLESALE CUSTOMERS	6,161	6,161	6,161	6,161	6,161	6,161
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	14,144	14,146	14,146	14,146	14,146	14,146
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**63,715**	**72,558**	**72,591**	**72,623**	**72,658**	**72,693**

MARSHALL - WUG/WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
PROJECTED RETAIL WUG DEMANDS	4,994	5,232	5,499	5,959	6,500	7,148
PROJECTED WHOLESALE CONTRACT DEMANDS	2,423	2,423	2,423	2,423	2,423	2,423
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**7,417**	**7,655**	**7,922**	**8,382**	**8,923**	**9,571**
SURFACE WATER SALES TO RETAIL CUSTOMERS	13,748	13,748	13,748	13,748	13,748	13,748
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	2,423	2,423	2,423	2,423	2,423	2,423
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**16,171**	**16,171**	**16,171**	**16,171**	**16,171**	**16,171**

MOUNT PLEASANT - WUG/WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
PROJECTED RETAIL WUG DEMANDS	3,890	4,302	4,745	5,260	5,828	6,433
PROJECTED WHOLESALE CONTRACT DEMANDS	5,773	6,027	6,276	6,510	6,899	7,208
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**9,663**	**10,329**	**11,021**	**11,770**	**12,727**	**13,641**
SURFACE WATER SALES TO RETAIL CUSTOMERS	17,800	17,428	17,062	16,734	16,228	15,825
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	5,773	6,027	6,276	6,510	6,899	7,208
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**23,573**	**23,455**	**23,338**	**23,244**	**23,127**	**23,033**

NORTHEAST TEXAS MWD - WWP	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
PROJECTED WHOLESALE CONTRACT DEMANDS	164,561	163,892	163,126	162,472	161,810	161,747
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**164,561**	**163,892**	**163,126**	**162,472**	**161,810**	**161,747**

Region D Major Water Provider (MWP) Existing Sales and Transfers

SURFACE WATER SALES TO WHOLESALE CUSTOMERS	133,659	132,689	131,746	130,988	130,233	129,427
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**133,659**	**132,689**	**131,746**	**130,988**	**130,233**	**129,427**

PARIS - WUG/WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED RETAIL WUG DEMANDS	3,059	3,042	3,017	3,033	3,079	3,123
PROJECTED WHOLESALE CONTRACT DEMANDS	27,494	27,743	27,983	28,190	28,586	28,789
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**30,553**	**30,785**	**31,000**	**31,223**	**31,665**	**31,912**
SURFACE WATER SALES TO RETAIL CUSTOMERS	27,896	27,601	27,314	27,074	26,614	26,372
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	25,608	25,905	26,191	26,431	26,892	27,105
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**53,504**	**53,506**	**53,505**	**53,505**	**53,506**	**53,477**

RIVERBEND WATER RESOURCES DISTRICT - WUG/WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED RETAIL WUG DEMANDS	523	536	539	537	537	537
PROJECTED WHOLESALE CONTRACT DEMANDS	168,443	194,985	201,822	210,348	218,967	237,176
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**168,966**	**195,521**	**202,361**	**210,885**	**219,504**	**237,713**
SURFACE WATER SALES TO RETAIL CUSTOMERS	0	0	0	0	0	0
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	122,630	122,623	122,616	122,615	122,615	122,615
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**122,630**	**122,623**	**122,616**	**122,615**	**122,615**	**122,615**

SABINE RIVER AUTHORITY - WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED WHOLESALE CONTRACT DEMANDS	512,482	512,482	512,482	512,482	512,482	512,482
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**512,482**	**512,482**	**512,482**	**512,482**	**512,482**	**512,482**
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	499,343	472,640	469,585	466,299	462,823	462,734
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**499,343**	**472,640**	**469,585**	**466,299**	**462,823**	**462,734**

SULPHUR RIVER MWD - WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED WHOLESALE CONTRACT DEMANDS	13,548	13,470	13,393	13,317	13,240	13,163
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**13,548**	**13,470**	**13,393**	**13,317**	**13,240**	**13,163**
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	13,548	13,470	13,393	13,317	13,240	13,163
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**13,548**	**13,470**	**13,393**	**13,317**	**13,240**	**13,163**

SULPHUR SPRINGS - WUG/WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED RETAIL WUG DEMANDS	3,118	3,199	3,278	3,403	3,547	3,697
PROJECTED WHOLESALE CONTRACT DEMANDS	5,206	5,413	5,701	5,767	6,116	6,397
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**8,324**	**8,612**	**8,979**	**9,170**	**9,663**	**10,094**
SURFACE WATER SALES TO RETAIL CUSTOMERS	5,002	5,002	5,002	5,002	5,002	5,002
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	5,206	5,413	5,701	5,767	6,116	6,397
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**10,208**	**10,415**	**10,703**	**10,769**	**11,118**	**11,399**

TEXARKANA - WUG/WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED RETAIL WUG DEMANDS	7,145	7,282	7,459	7,706	8,028	8,380
PROJECTED WHOLESALE CONTRACT DEMANDS	180,000	180,000	180,000	180,000	180,000	180,000
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**187,145**	**187,282**	**187,459**	**187,706**	**188,028**	**188,380**

Region D Major Water Provider (MWP) Existing Sales and Transfers

SURFACE WATER SALES TO RETAIL CUSTOMERS	0	0	0	0	0	0
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	122,630	122,623	122,616	122,615	122,615	122,615
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**122,630**	**122,623**	**122,616**	**122,615**	**122,615**	**122,615**

TITUS COUNTY FWD #1 - WWP	**WATER VOLUMES (ACRE-FEET PER YEAR)**					
DATA DESCRIPTION	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
PROJECTED WHOLESALE CONTRACT DEMANDS	40,000	40,000	40,000	40,000	40,000	40,000
TOTAL PROJECTED WHOLESALE CONTRACT AND RETAIL DEMANDS	**40,000**	**40,000**	**40,000**	**40,000**	**40,000**	**40,000**
SURFACE WATER SALES TO WHOLESALE CUSTOMERS	28,900	28,900	28,900	28,900	28,900	28,900
TOTAL WHOLESALE AND RETAIL SALES TO CUSTOMERS	**28,900**	**28,900**	**28,900**	**28,900**	**28,900**	**28,900**

Region D Major Water Provider (MWP) Water Management Strategy (WMS) Summary

MWPs are entities of significance to a region's water supply as defined by the Regional Water Planning Group (RWPG) and may be a Water User Group (WUG) entity, Wholesale Water Provider (WWP) entity, or both (WUG/WWP).'MWP Retail Customers' denotes recommended WMS supply used by the WUG. 'Transfers Related to Wholesale Customers' denotes a WWP or WUG/WWP selling or transferring recommended WMS supply to another entity. Supply associated with the MWP's wholesale transfers will only display if it is listed as the main seller in the State Water Planning database, even if multiple sellers are involved with the sale o water to WUGs. Unallocated water volumes represent MWP recommended WMS supply not currently allocated to a customer of the MWP.'Total MWP Related WMS Supply' will display if the MWP's WMS is related to more than one WMS supply type (retail, wholesale, and/or unallocated). Associated WMS Projects are listed when the MWP is one of the project's sponsors. Report contains draft data and is subject to change.

CASH SUD | ADVANCED WATER CONSERVATION (CASH SUD)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	1	1	0	0	0

CASH SUD | CONSERVATION - CASH SUD						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	1	2	3	5	7

CASH SUD | CONSERVATION, IRRIGATION RESTRICTIONS– CASH SUD						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	4	5	7	8	9	11

CASH SUD | CONSERVATION, WATER LOSS CONTROL - CASH SUD						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	1	1	0	0	0	0
WMS RELATED MWP SPONSORED PROJECTS	PROJECT DESCRIPTION					
CONSERVATION, WATER LOSS CONTROL - CASH SUD	WATER LOSS CONTROL					

CASH SUD | INCREASE EXISTING CONTRACT (CASH SUD)						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	332	416	568	642	471	337
WMS RELATED MWP SPONSORED PROJECTS	PROJECT DESCRIPTION					
CASH WSC - ADDITIONAL DELIVERY INFRASTRUCTURE FROM NTMWD	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION					

CASH SUD | MARVIN NICHOLS (328) STRATEGY FOR NTMWD, TRWD, AND UTRWD						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	0	0	277	329	285

CASH SUD | NTMWD - ADDITIONAL LAVON WATERSHED REUSE						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	0	0	20	51	66

CASH SUD | NTMWD - ADDITIONAL MEASURES TO ACCESS FULL LAVON YIELD						
	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	255	318	216	253	216

Region D Major Water Provider (MWP) Water Management Strategy (WMS) Summary

WMS RELATED MWP SPONSORED PROJECTS	PROJECT DESCRIPTION
CASH WSC - ADDITIONAL DELIVERY INFRASTRUCTURE FROM NTMWD	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION

CASH SUD | NTMWD - EXPANDED WETLAND REUSE

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	17	44	40	61	64

CASH SUD | NTMWD - OKLAHOMA

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	0	0	0	0	85

CASH SUD | NTMWD - TEXOMA BLENDING

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	0	95	158	187	194

CASH SUD | WRIGHT PATMAN REALLOCATION FOR NTMWD, TRWD, AND UTRWD

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	0	0	0	0	96

CHEROKEE WATER COMPANY | NO RECOMMENDED WMS SUPPLY RELATED TO MWP

COMMERCE | NO RECOMMENDED WMS SUPPLY RELATED TO MWP

EMORY | NO RECOMMENDED WMS SUPPLY RELATED TO MWP

FRANKLIN COUNTY WD | NO RECOMMENDED WMS SUPPLY RELATED TO MWP

GREENVILLE | GREENVILLE CONSERVATION AND WTP

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	140	1,391	3,059	5,320	3,212
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	1	202	771	1,925	4,088
TOTAL MWP RELATED WMS SUPPLY	4,051	4,627	6,733	9,954	14,838	17,041

WMS RELATED MWP SPONSORED PROJECTS	PROJECT DESCRIPTION
WTP EXPANSION 2030 (GREENVILLE, SABINE)	WATER TREATMENT PLANT EXPANSION

GREENVILLE | NEW CONTRACT WITH GREENVILLE AND PIPELINE TO CELESTE

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	0	0	87

WMS RELATED MWP SPONSORED PROJECTS	PROJECT DESCRIPTION
WTP EXPANSION 2030 (GREENVILLE, SABINE)	WATER TREATMENT PLANT EXPANSION

GREENVILLE | NEW CONTRACT WITH GREENVILLE AND PIPELINE TO WOLFE CITY

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	54	157	308

Region D Major Water Provider (MWP) Water Management Strategy (WMS) Summary

WMS RELATED MWP SPONSORED PROJECTS	PROJECT DESCRIPTION
WTP EXPANSION 2030 (GREENVILLE, SABINE)	WATER TREATMENT PLANT EXPANSION

GREENVILLE | NEW WTP GREENVILLE

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	0	0	0	0	0	5,313

WMS RELATED MWP SPONSORED PROJECTS	PROJECT DESCRIPTION
NEW WTP GREENVILLE	NEW WATER TREATMENT PLANT

LAMAR COUNTY WSD | INCREASE EXISTING CONTRACT (COUNTY-OTHER LAMAR)

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	204	204	212	224	234	244

LAMAR COUNTY WSD | LAMAR LIVESTOCK PIPELINE AND CONTRACT WITH LAMAR CO WSD

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	617	617	617	617	617	617

LONGVIEW | NO RECOMMENDED WMS SUPPLY RELATED TO MWP

MARSHALL | NO RECOMMENDED WMS SUPPLY RELATED TO MWP

MOUNT PLEASANT | INCREASE EXISTING CONTRACT (MANUFACTURING TITUS FROM MT PLEASANT SURPLUS)

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	1,003	880	890	1,149	1,279

NORTHEAST TEXAS MWD | INCREASE EXISTING CONTRACT (HARLETON, CYPRESS)

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	62	74	91	127	173	230

NORTHEAST TEXAS MWD | INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS)

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	30,066	30,866	31,766	32,566	32,814	33,083

PARIS | PAT MAYSE RAW WATER PIPELINE (IRRIGATION LAMAR)

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	1,468	1,468	1,468	1,468	1,468	1,468

RIVERBEND WATER RESOURCES DISTRICT | RIVERBEND STRATEGY

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR) 2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	523	536	539	537	537	537
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	12,849	72,133	79,124	87,841	96,571	114,871
TOTAL MWP RELATED WMS SUPPLY	13,372	72,669	79,663	88,378	97,108	115,408

Region D Major Water Provider (MWP) Water Management Strategy (WMS) Summary

WMS RELATED MWP SPONSORED PROJECTS	PROJECT DESCRIPTION
RIVERBEND WMS INTERIM TO ULTIMATE STORAGE CONVERSION	CONTRACT AMENDMENT; RAISE CONSERVATION POOL
RIVERBEND WMS WATER RIGHT AMENDMENT	NEW WATER RIGHT/PERMIT AMENDMENT NON-EXEMPT IBT
RIVERBEND WMS NEW RAW WATER INTAKE 120 MGD 2030	NEW SURFACE WATER INTAKE
RIVERBEND WMS RAW WATER PUMP STATION 66 MGD 2030	PUMP STATION
RIVERBEND WMS RAW WATER PIPELINE 72 MGD 2030	CONVEYANCE/TRANSMISSION PIPELINE
RIVERBEND WMS NEW WTP 25 MGD 2030	NEW WATER TREATMENT PLANT
RIVERBEND WMS WTP EXPANSION 5 MGD 2040	WATER TREATMENT PLANT EXPANSION
RIVERBEND WMS PUMP STATION EXPANSION 6 MGD 2040	PUMP STATION
RIVERBEND WMS WTP EXPANSION 10 MGD 2050	WATER TREATMENT PLANT EXPANSION
RIVERBEND WMS PUMP STATION EXPANSION 18 MGD 2050	PUMP STATION
RIVERBEND WMS NEW RAW WATER PIPELINE 32 MGD 2050	CONVEYANCE/TRANSMISSION PIPELINE
RIVERBEND WMS PUMP STATION EXPANSION 30 MGD 2060	PUMP STATION

RIVERBEND WATER RESOURCES DISTRICT | RIVERBEND STRATEGY CASS COUNTY

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	1,119	1,179	1,253	1,250	1,250
WMS RELATED MWP SPONSORED PROJECTS	PROJECT DESCRIPTION					
RIVERBEND STRATEGY CASS NEW WTP AND TRANSMISSION LINE	CONVEYANCE/TRANSMISSION PIPELINE; NEW WATER TREATMENT PLANT					

SABINE RIVER AUTHORITY | CENT-TOL-PIPELINE FROM TOLEDO BEND TO LAKE CENTER

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	2,242	2,242	2,242	2,242

SABINE RIVER AUTHORITY | EAST TEXAS TRANSFER

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	250,000	250,000	250,000
WMS RELATED MWP SPONSORED PROJECTS	PROJECT DESCRIPTION					
EAST TEXAS TRANSFER	CONVEYANCE/TRANSMISSION PIPELINE; PUMP STATION					

SABINE RIVER AUTHORITY | LNVA-SRA-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	200,000	200,000	200,000

SABINE RIVER AUTHORITY | NEWTON MINING - TRANSFER FROM SRA

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	115	59	0	0	0	0

SABINE RIVER AUTHORITY | ORAN-IRR-PURCHASE FROM SABINE RIVER AUTHORITY (SABINE RIVER)

	WATER VOLUMES (ACRE-FEET PER YEAR)					
DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	526	526	526	526	526

SABINE RIVER AUTHORITY | RUSK-SEP-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)

	WATER VOLUMES (ACRE-FEET PER YEAR)

Region D Major Water Provider (MWP) Water Management Strategy (WMS) Summary

DATA DESCRIPTION	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	1,103	1,103	1,103	1,103	1,103

SABINE RIVER AUTHORITY | SAUG-LTK-PURCHASE FROM SRA (TOLEDO BEND)

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	1,539	1,774	2,048	2,349	2,349

SABINE RIVER AUTHORITY | SHEL-LTK-PURCHASE FROM SABINE RIVER AUTHORITY (TOLEDO BEND)

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	6,491	8,761	11,524	14,896	19,006	19,006

SABINE RIVER AUTHORITY | SHEL-SHW-PURCHASE FROM CENTER

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	61	68	77	87	97	105

SULPHUR RIVER MWD | NO RECOMMENDED WMS SUPPLY RELATED TO MWP

SULPHUR SPRINGS | INCREASE EXISTING CONTRACT (BRINKER WSC, SULPHUR)

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	12	47	83

SULPHUR SPRINGS | INCREASE EXISTING CONTRACT (MARTIN SPRINGS)

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
TRANSFERS RELATED TO WHOLESALE CUSTOMERS	0	0	0	0	0	29

TEXARKANA | RIVERBEND STRATEGY

DATA DESCRIPTION	WATER VOLUMES (ACRE-FEET PER YEAR)					
	2020	2030	2040	2050	2060	2070
MWP RETAIL CUSTOMERS	7,145	7,282	7,459	7,706	8,028	8,380

TITUS COUNTY FWD #1 | NO RECOMMENDED WMS SUPPLY RELATED TO MWP

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Chapter 1

DESCRIPTION OF THE REGIONAL WATER PLANNING AREA

1.1 Introduction

"…The water cycle and the life cycle are one."

– Jacques Cousteau

1.1.1 Overview of Texas Legislation

The population of Texas is growing rapidly and is expected to double from 2000 to 2070. As a result, water demand is expected to increase by almost 20 percent by 2070. 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 one hundred 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. More recently, 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.

Regional water planning groups have been established by the TWDB in each region to prepare and adopt a regional water plan for a designated area. Each Regional Water Planning Group (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.

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 Northeast Texas Municipal Water District (NETMWD), located in Hughes Springs, Texas.

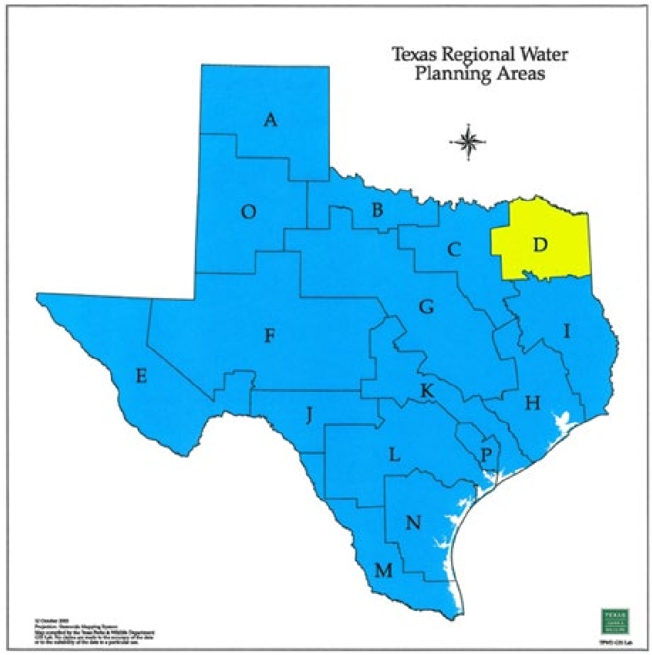


Figure 1.1 Texas Regional Water Planning Areas

(Source: Texas Parks & Wildlife Department)

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 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 Fifth Cycle of Regional Water Plan Development (Second Amended)" which includes a set of 12 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 2010 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 development of the 2021 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 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.

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 for the 2021 Plan, 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 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 2021 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 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 financing mechanisms for water management strategies in the plan.

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

Chapter 11 provides a description of the level of implementation of previously recommended WMSs for meeting needs, and a summary comparison of the present 2021 Plan to the previous 2016 Plan.

The twelfth task to be accomplished by the RWPG as established by the TWDB is for the prioritization of projects, employing a standardized methodology at the regional level that is then considered when projects are later prioritized at the state level as part of the development and implementation of the State Water Plan.

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.

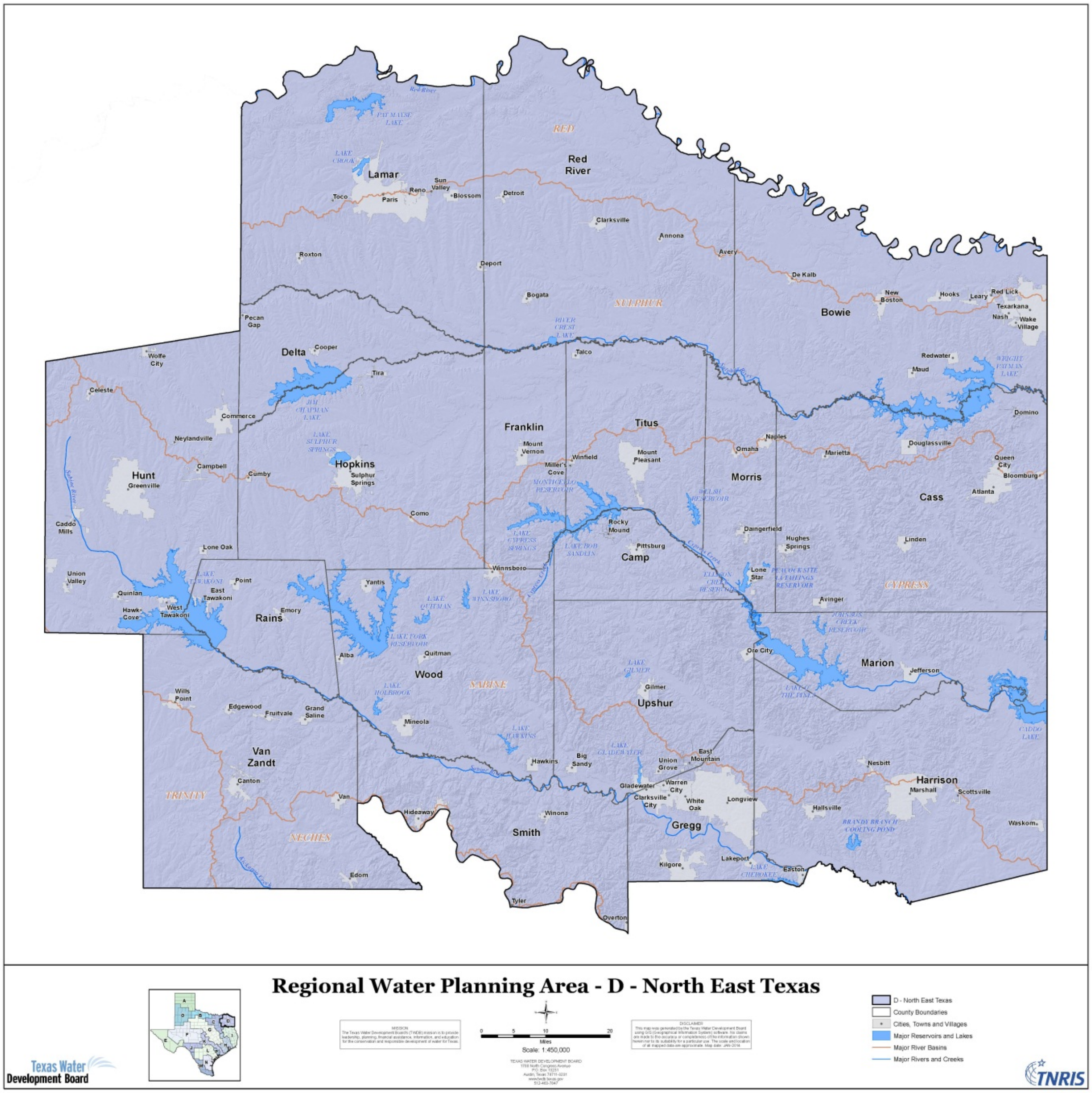


Figure 1.2 Regional Water Planning Area

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)	2010 Census	Largest City
BOWIE	923	92,565	Texarkana°
CAMP	203	12,401	Pittsburg
CASS	960	30,464	Atlanta
DELTA	278	5,231	Cooper
FRANKLIN	295	10,605	Mount Vernon
GREGG	276	121,730	Longview°
HARRISON	915	65,631	Marshall°
HOPKINS	793	35,161	Sulphur Springs
HUNT	882	86,129	Greenville°
LAMAR	932	49,793	Paris°
MARION	420	10,546	Jefferson
MORRIS	259	12,934	Daingerfield
RAINS	259	10,914	Emory
RED RIVER	1,058	12,860	Clarksville
SMITH	433*	39,186	Lindale*
TITUS	426	32,334	Mount Pleasant
UPSHUR	593	39,309	Gilmer
VAN ZANDT	860	52,579	Canton
WOOD	696	41,964	Mineola
REGION TOTAL	**11,461**	**762,336**	

**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.

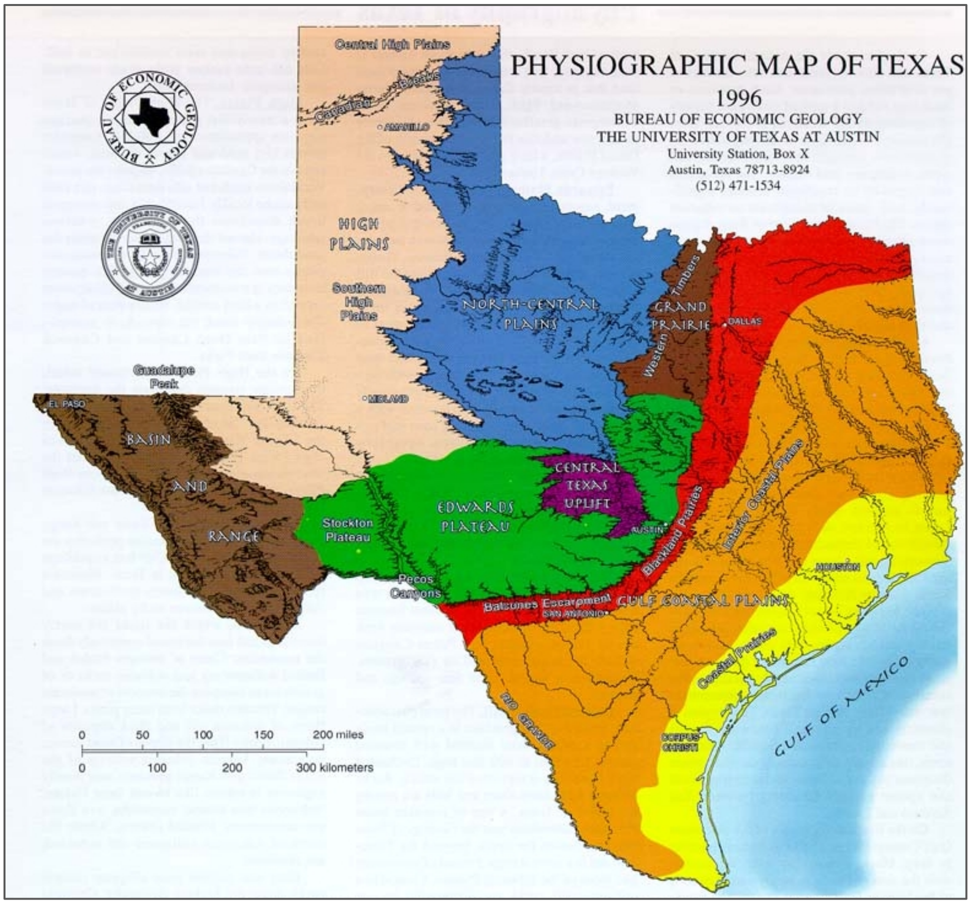


Figure 1.3 Physiographic Map of Texas

(Source: Bureau of Economic Geology, University of Texas at Austin)

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. 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 32°F. The 30-year average number of days with temperatures of 100°F and higher is 8. Relative humidity is high in the Region, which makes temperatures seem more extreme. The growing season in northeast Texas lasts approximately 239 days.

Average annual precipitation in the region is 43.7 inches (see Figure 1.4). Average annual lake surface evaporation over a five-year period, from 2013 to 2017, was 50.09 inches down from 52.45 inches from 2008 – 2012. Over the same period, the January average evaporation rate was 2.14 inches, and in August the rate was 6.16 inches. The Region experienced 17 recorded droughts from 1892 – 2017. 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.

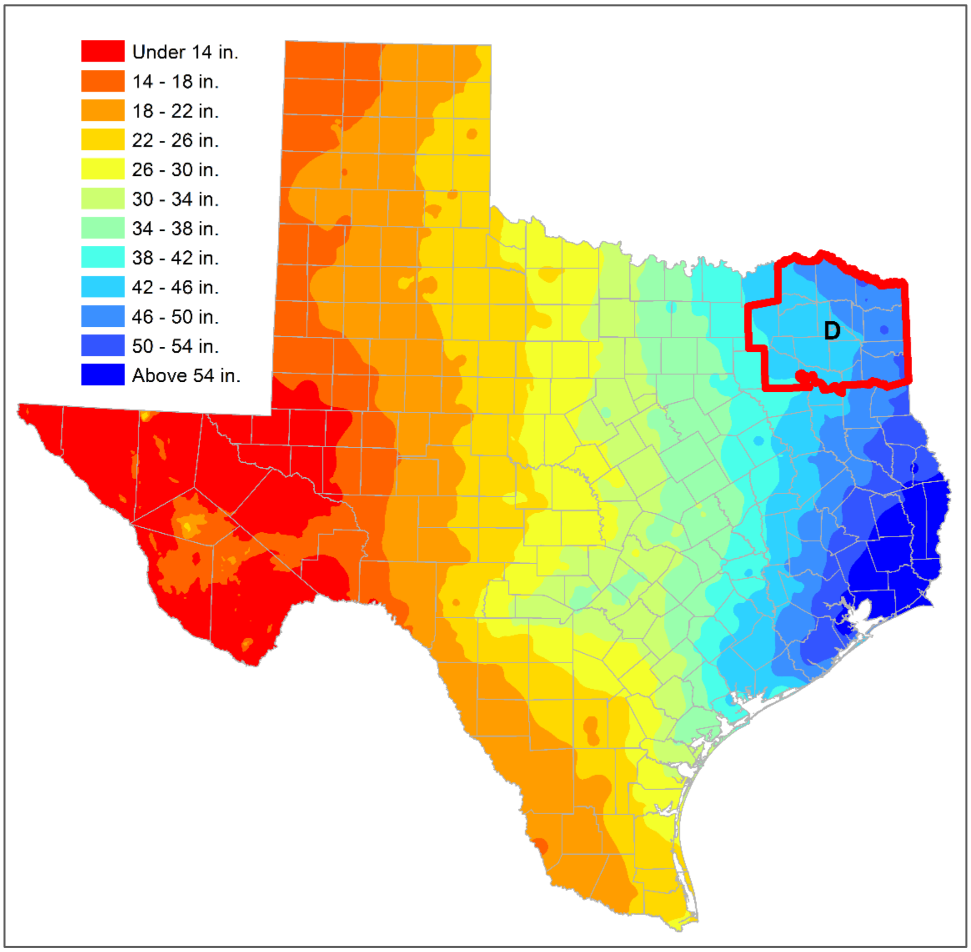


Figure 1.4 Average Annual Precipitation (1981 – 2010)

(Source: Natural Resources Conservation Service)

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 2018 – 2019 Texas Almanac, the Red River Valley, in the northern part of the Region, has the highest frequency of tornadoes in the state.

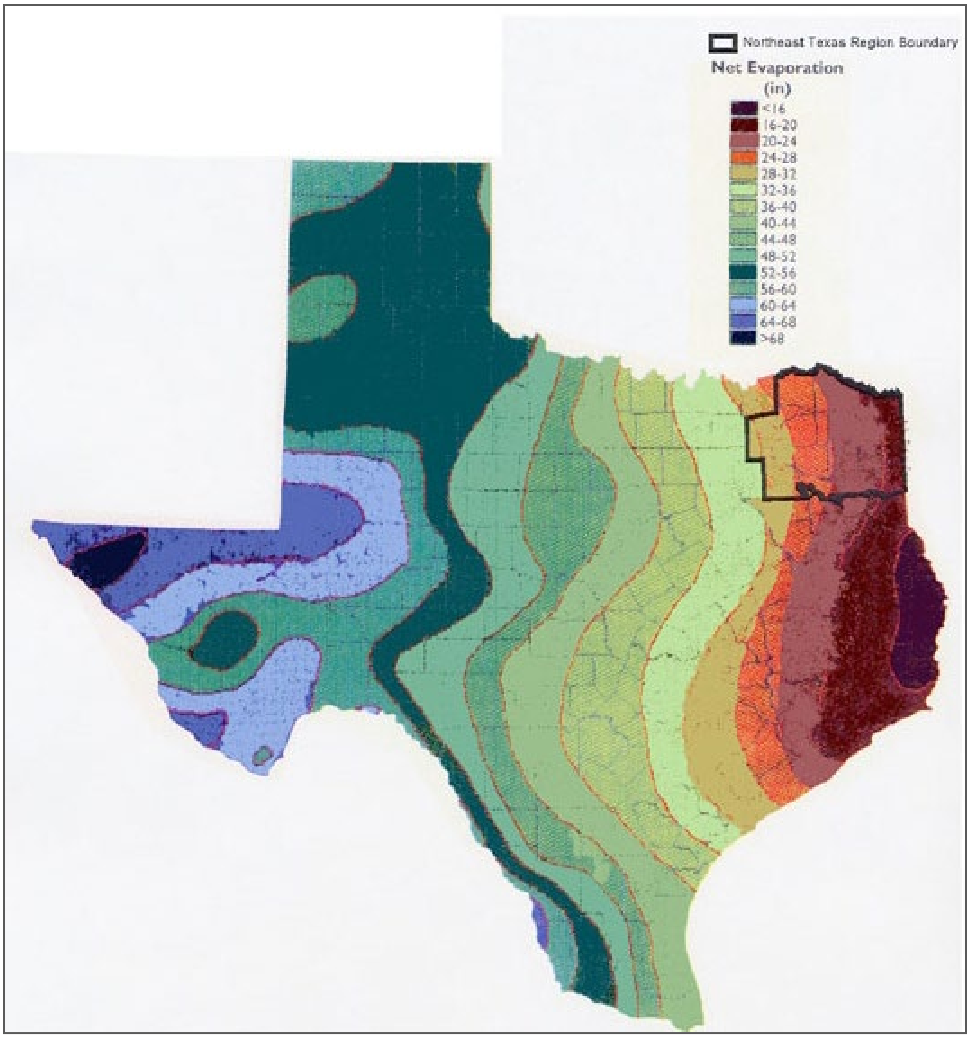


Figure 1.5 Average Net Evaporation in Texas

(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 downwarping 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.

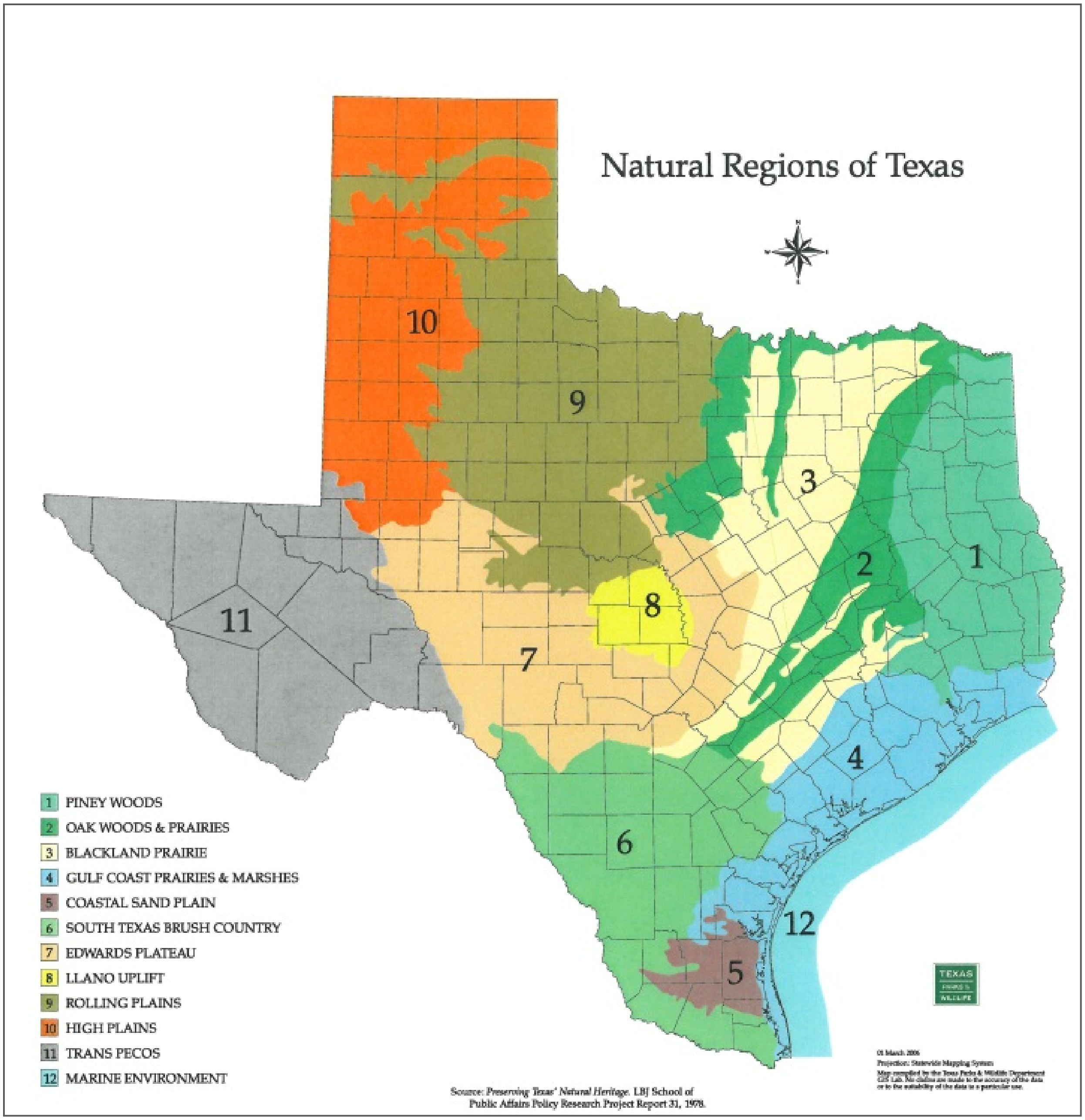


Figure 1.6 Natural Regions of Texas

(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 (5,158 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. In the RWPA, Gregg, Harrison, Smith and Upshur counties are in the non-attainment zone for ozone. Other counties do not have permanent monitoring stations.

The Haynesville Shale formation is currently being developed in western Louisiana and eastern Texas. The area being developed overlaps with the Region D water planning area primarily in Harrison and Marion Counties (Figure 1.7).

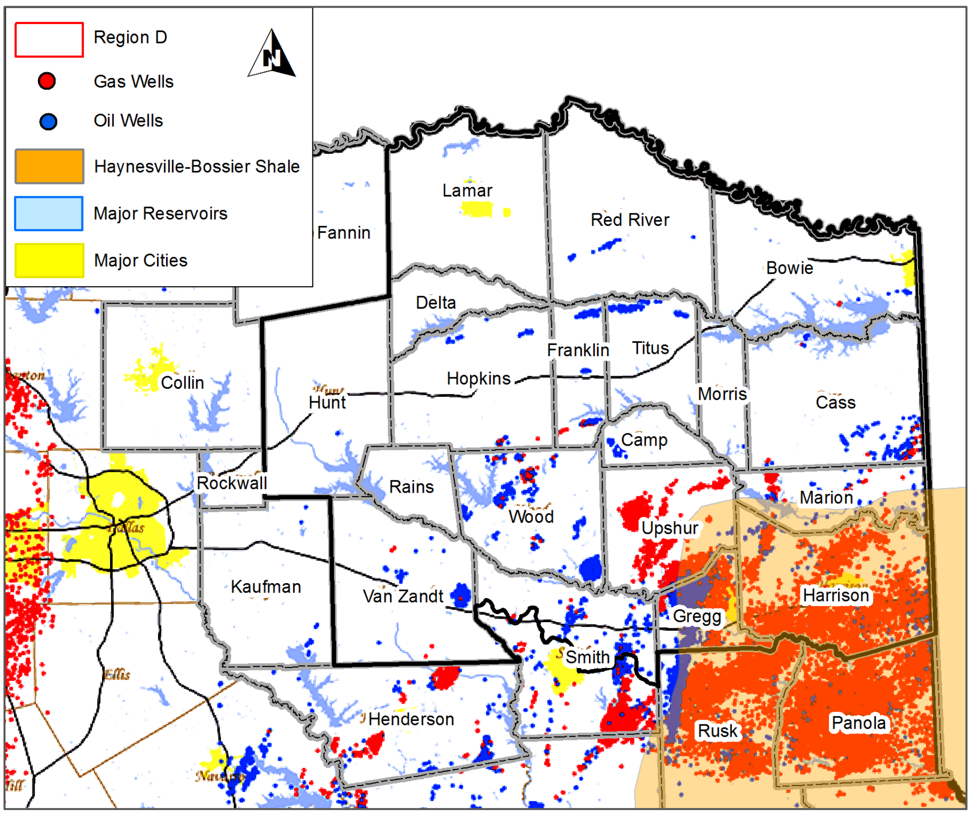


Figure 1.7 Haynesville Shale and Oil/Gas Well Location Map

(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. 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.

There are oil fields located throughout the Region, as noted on Figure 1.8. Counties in the Region with the largest oil production in 2017 include Wood, Harrison, and Smith. 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 2016 and 2017. These amounts are depicted graphically in Figure 1.9.

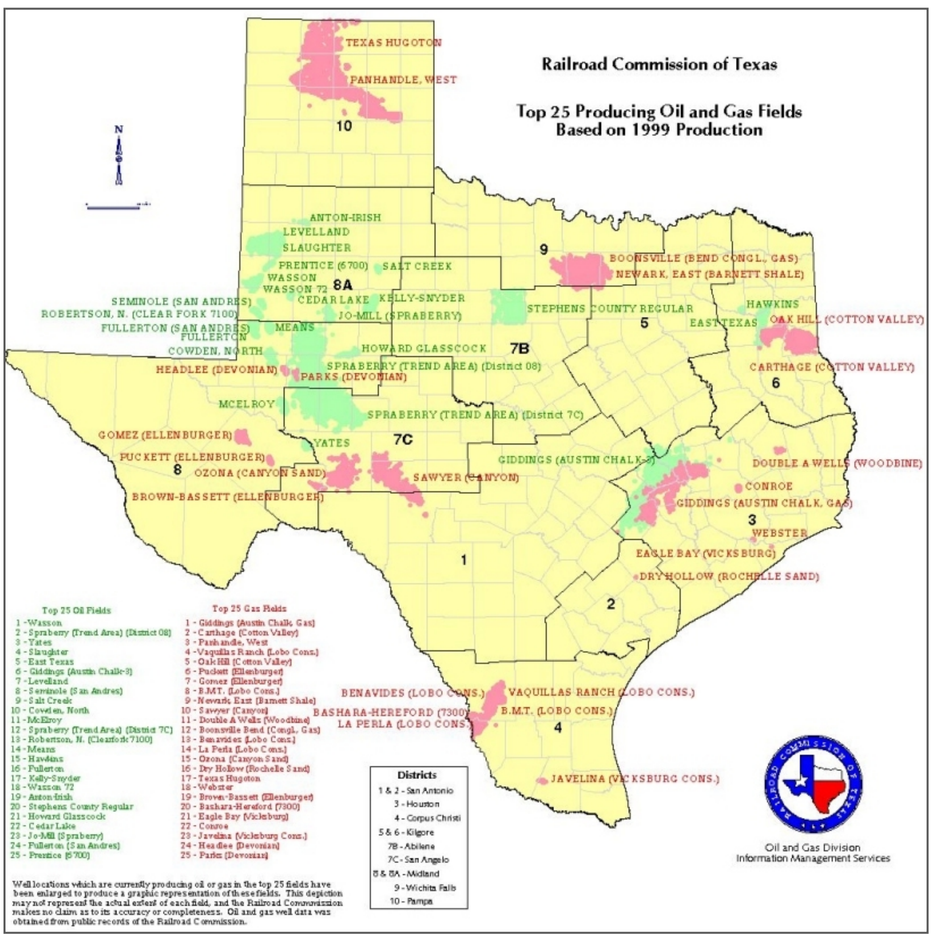


Figure 1.8 Top 25 Producing Oil and Gas Fields based on 1999 Production

(Source: Railroad Commission of Texas

Table 1.2 Regional Oil Production

County	Oil Production 2016 (barrels)	Oil Production 2017 (barrels)	Total Production since January 1, 1993
BOWIE	35,450	34,074	3,538,451
CAMP	105,147	98,463	7,676,608
CASS	356,800	356,153	10,989,046
DELTA	0	0	0
FRANKLIN	540,735	481,851	13,147,634
GREGG	363,644	374,292	12,682,989
HARRISON	856,124	758,682	26,365,781
HOPKINS	0	0	0
HUNT	0	0	0
LAMAR	0	0	0
MARION	429,510	554,462	5,897,630
MORRIS	1,410	21,263	42,806
RAINS	0	0	39
RED RIVER	76,188	68,210	5,837,094
SMITH	1,256,527	1,414,522	38,668,024
TITUS	522,090	478,934	14,005,502
UPSHUR	223,572	199,416	12,868,697
VAN ZANDT	0	0	0
WOOD	3,386,808	3,376,524	128,236,917

(Source: Railroad Commission of Texas)

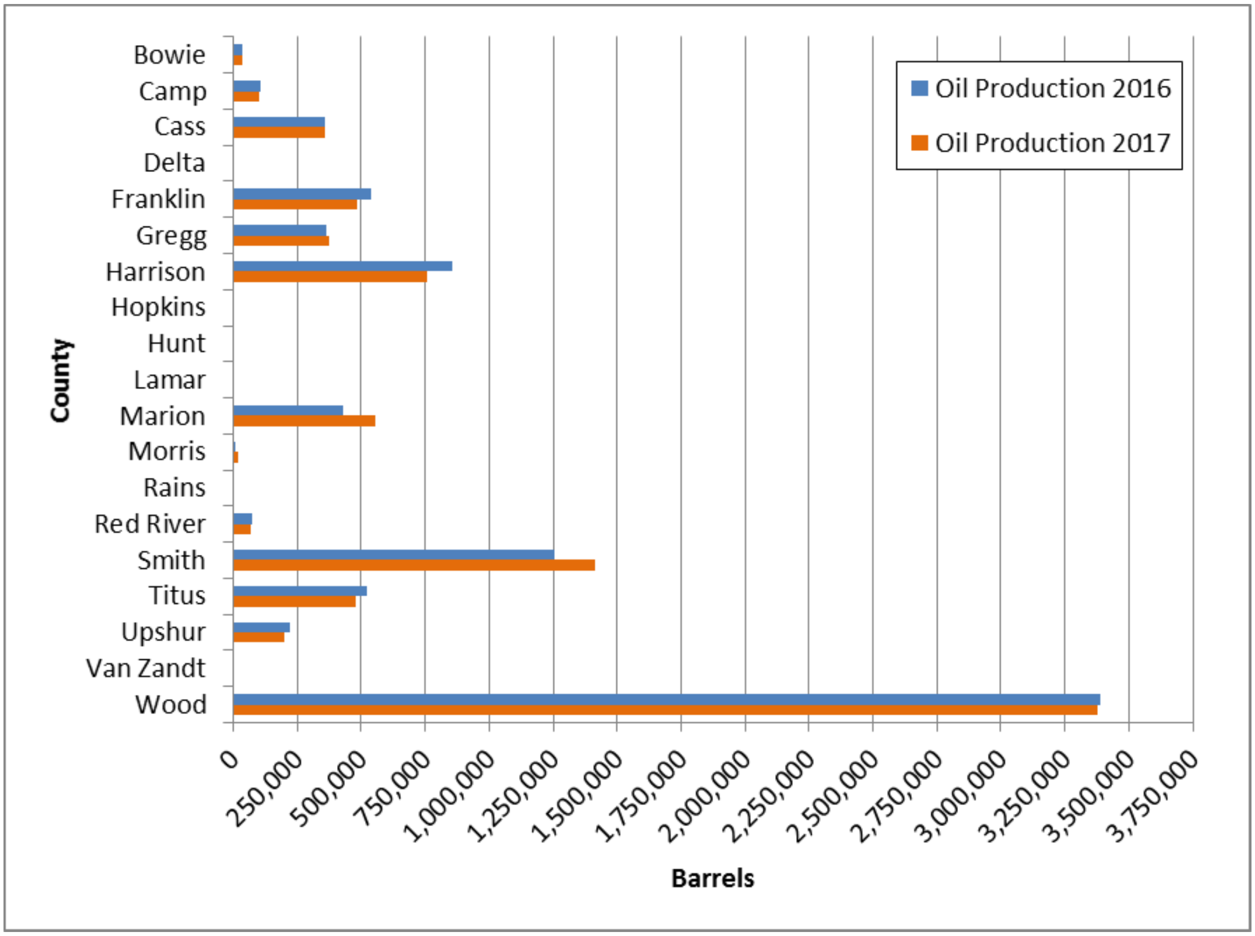


Figure 1.9 Oil Production by County (Barrels; 2016 – 2017)

(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.

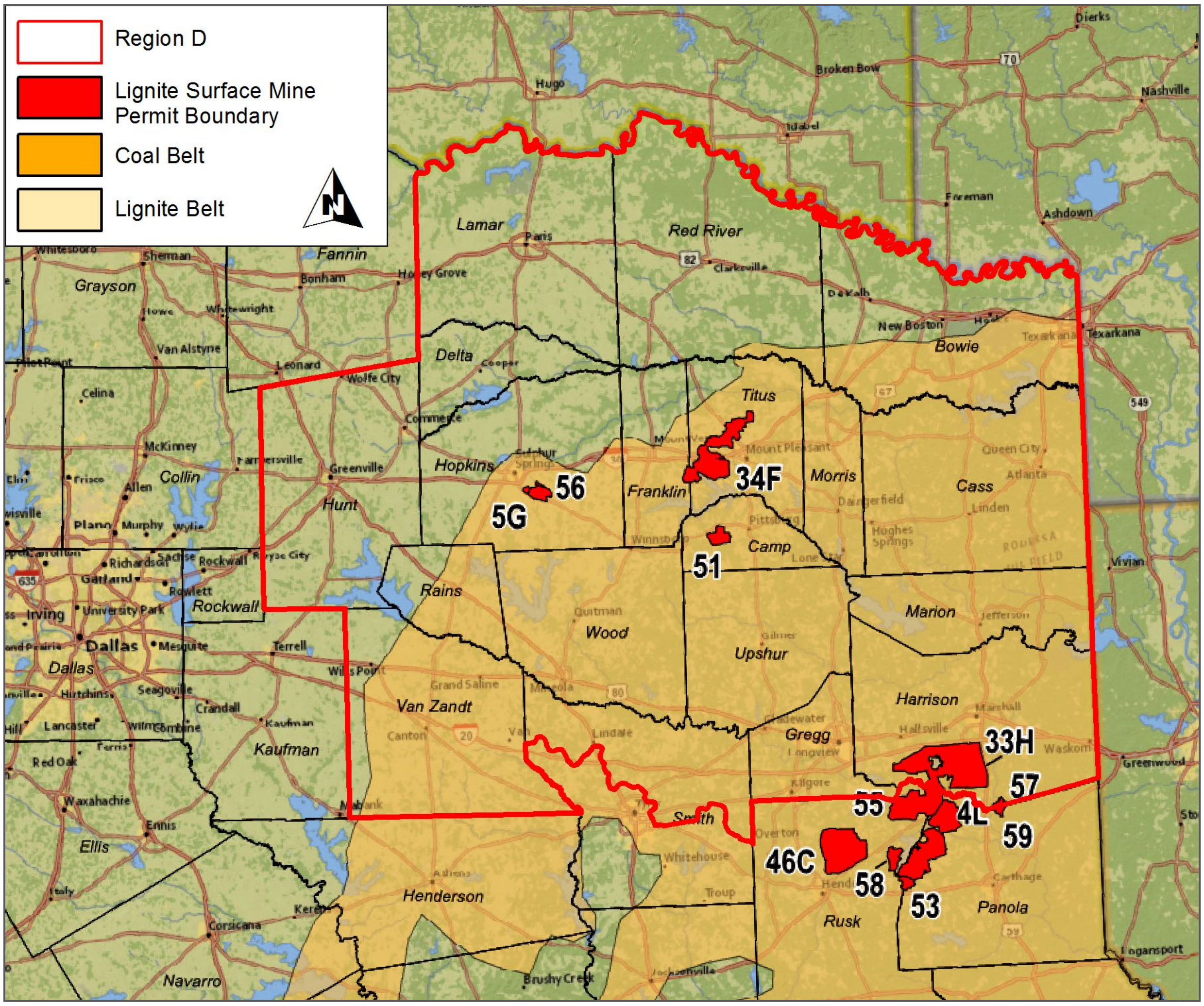


Figure 1.10 North East Texas Regional Water Planning Area Lignite Resources

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, Franklin, Gregg, Harrison, Marion, Morris, Red River, Smith, Titus, Upshur, Van Zandt, and Wood. Of these counties, only Van Zandt and Titus produce 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 2016 was $61.2 million, and the delivered value of timber was $145.3 million, both values down from 2015.

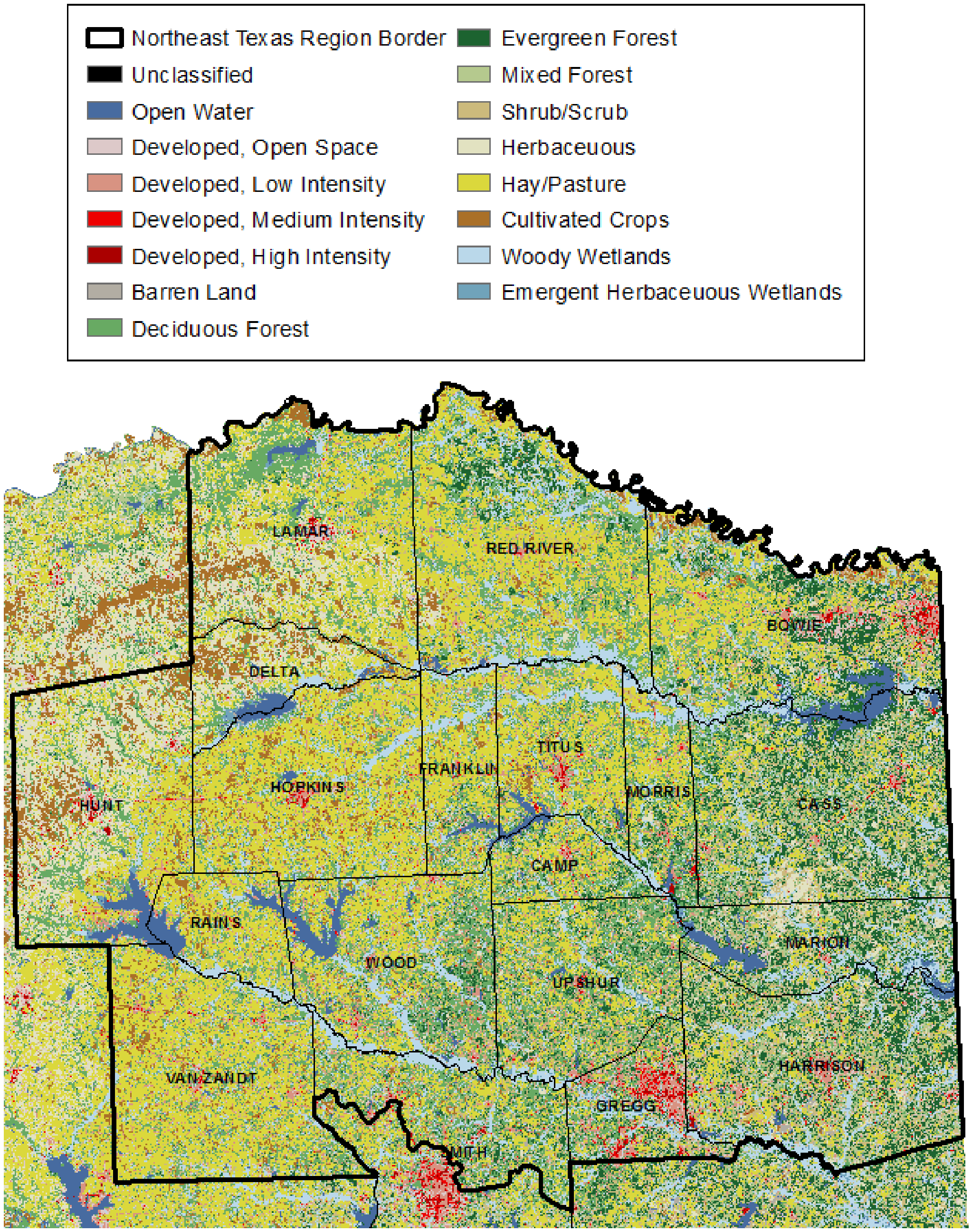
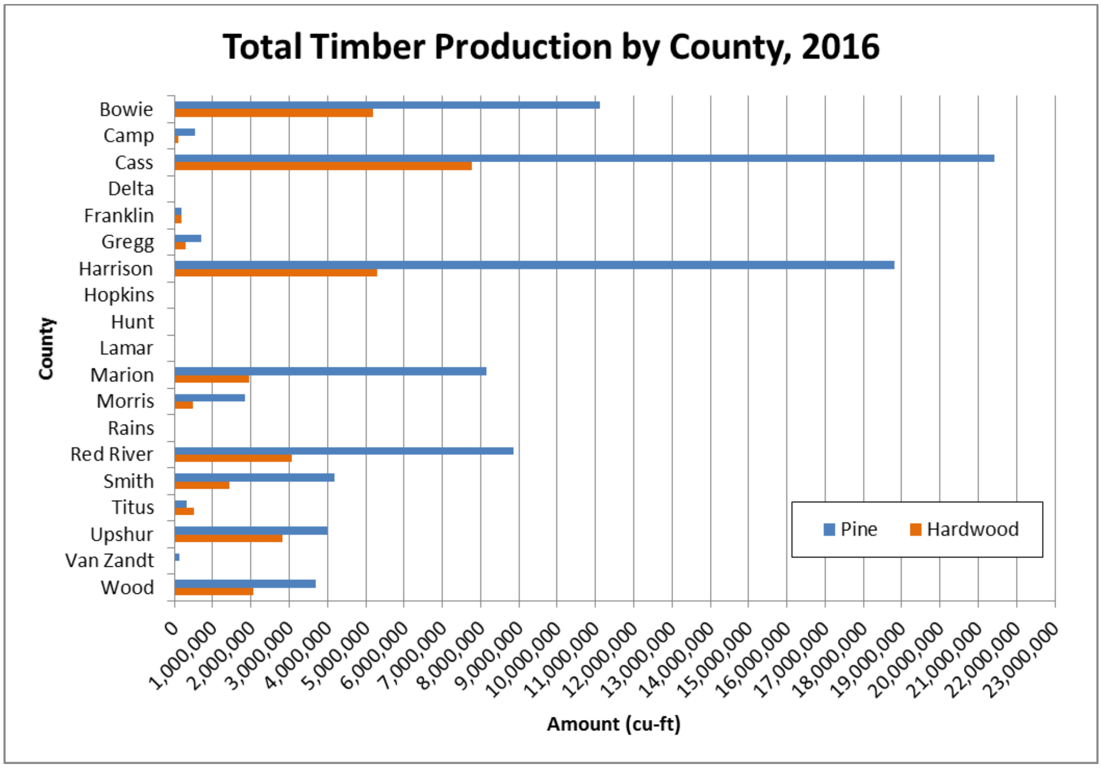


Figure 1.11 North East Texas Water Planning Area Land Use Map

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

Data taken from Harvest Trends 2016 from the Texas A&M Forest Service (see Figure 1.12) depict the counties within the Region that are important timber producers.



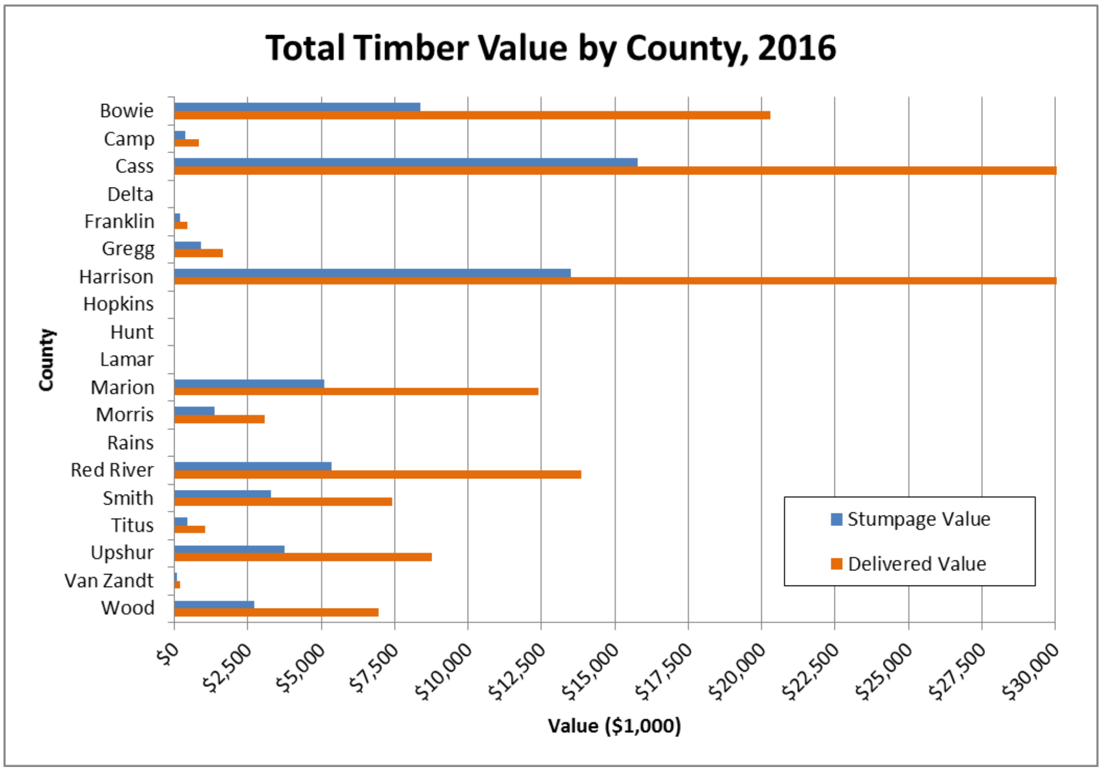


Figure 1.12 Total Timber Production and Value by County (2016)

(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 Starr Family State Historic Park
HUNT AND VAN ZANDT	Lake Tawakoni State Park
LAMAR	Pat Mayse State Park 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 census. The graph shows that most of the counties have seen growth of over 25 percent. Several counties, including Franklin, Hunt, Rains, Smith, Titus, Upshur, Van Zandt and Wood, experienced growth of over 75 percent. The Region as a whole grew 70 percent from 1970 to 2010, compared to a 125 percent growth in Texas and a 47 percent growth in the United States.

Table 1.4 Historic Population by County

County	1970	1980	% Growth	1990	% Growth	2000	% Growth	2010	% Growth	40 Yr. Growth
BOWIE	67,813	75,301	11.0%	81,665	8.5%	89,306	9.4%	92,565	3.6%	36.5%
CAMP	8,005	9,275	15.9%	9,904	6.8%	11,549	16.6%	12,401	7.4%	54.9%
CASS	24,133	29,430	21.9%	29,982	1.9%	30,438	1.5%	30,464	0.1%	26.2%
DELTA	4,927	4,839	-1.8%	4,857	0.4%	5,327	9.7%	5,231	-1.8%	6.2%
FRANKLIN	5,291	6,893	30.3%	7,802	13.2%	9,458	21.2%	10,605	12.1%	100.4%
GREGG	75,929	99,487	31.0%	104,948	5.5%	111,379	6.1%	121,730	9.3%	60.3%
HARRISON	44,841	52,265	16.6%	57,483	10.0%	62,110	8.0%	65,631	5.7%	46.4%
HOPKINS	20,710	25,247	21.9%	28,833	14.2%	31,960	10.8%	35,161	10.0%	69.8%
HUNT	47,948	55,248	15.2%	64,343	16.5%	76,596	19.0%	86,129	12.4%	79.6%
LAMAR	36,062	42,156	16.9%	43,949	4.3%	48,499	10.4%	49,793	2.7%	38.1%
MARION	8,517	10,360	21.6%	9,984	-3.6%	10,941	9.6%	10,546	-3.6%	23.8%
MORRIS	12,310	14,629	18.8%	13,200	-9.8%	13,048	-1.2%	12,934	-0.9%	5.1%
RAINS	3,752	4,839	29.0%	6,715	38.8%	9,139	36.1%	10,914	19.4%	190.9%
RED RIVER	14,298	16,101	12.6%	14,317	-11.1%	14,314	0.0%	12,860	-10.2%	-10.1%
SMITH*	97,096	128,366	32.2%	151,309	17.9%	174,706	15.5%	209,714	20.0%	116.0%
TITUS	16,702	21,442	28.4%	24,009	12.0%	28,118	17.1%	32,334	15.0%	93.6%
UPSHUR	20,976	28,595	36.3%	31,370	9.7%	35,291	12.5%	39,309	11.4%	87.4%
VAN ZANDT	22,155	31,426	41.8%	37,944	20.7%	48,140	26.9%	52,579	9.2%	137.3%
WOOD	18,589	24,697	32.9%	29,380	19.0%	36,752	25.1%	41,964	14.2%	125.7%
TOTAL	**550,054**	**680,596**	**23.7%**	**751,994**	**10.5%**	**847,071**	**12.6%**	**932,864**	**12.60%**	**69.6%**

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

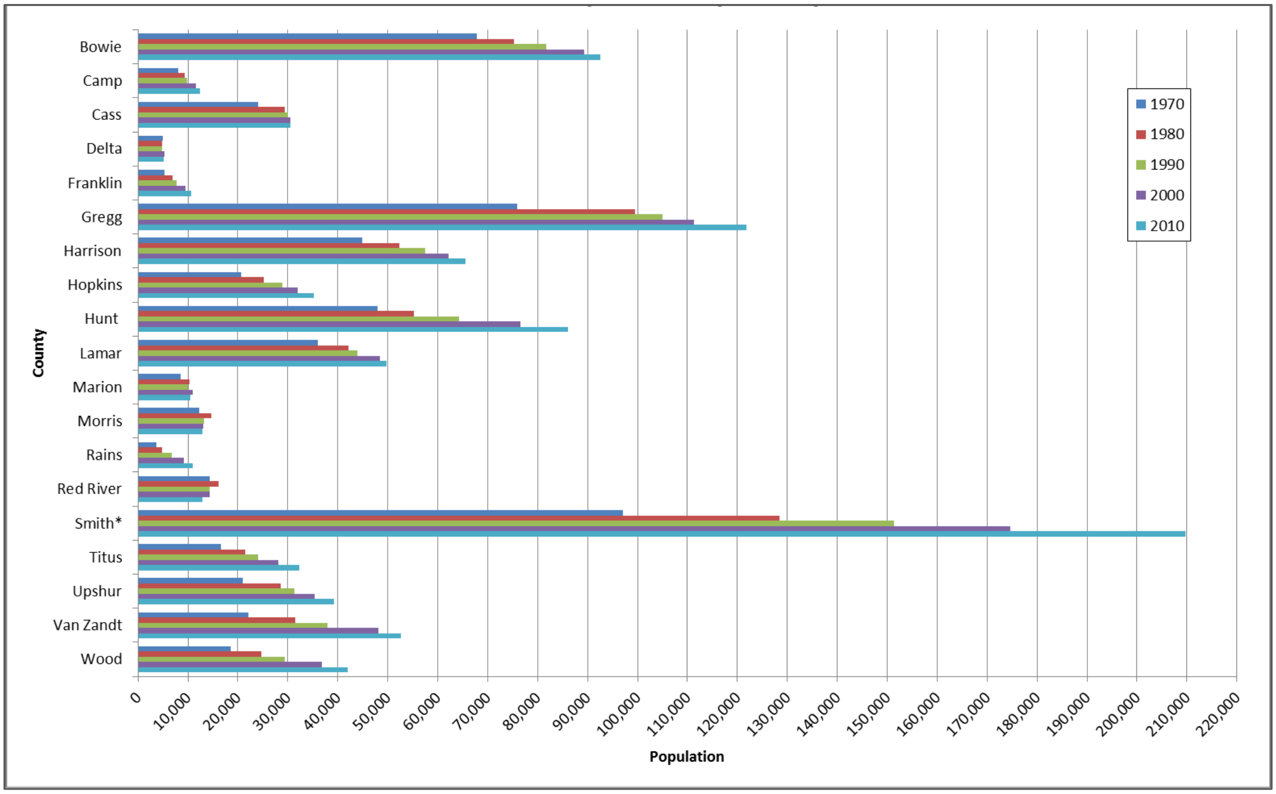


Figure 1.13 Historic Population by County, North East Texas Region (1970 – 2010)

1.3.2 Demographics

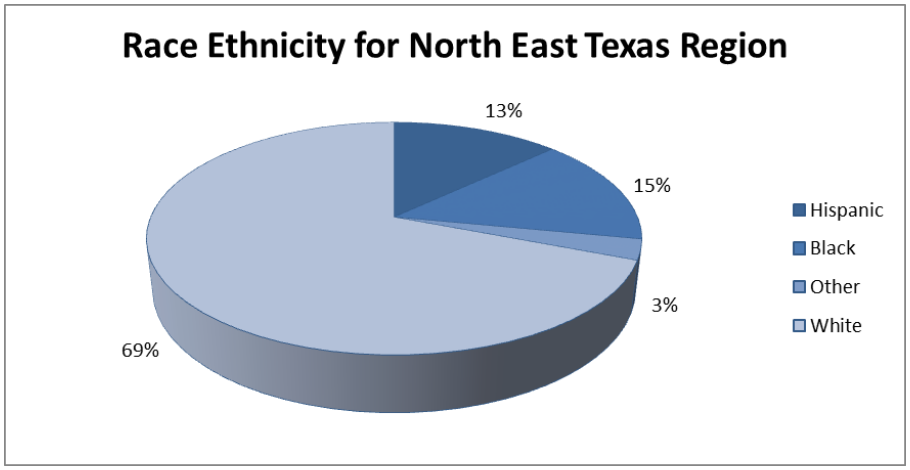
The North East Texas RWPA is largely rural. Most towns within the region have populations of less than 10,000, and there are many small, unincorporated areas within counties. Cities with populations over 10,000 are listed in Table 1.5.

Table 1.5 Cities with 2010 Populations over 10,000

City	2010 Census
GREENVILLE	25,557
KILGORE	12,975
LONGVIEW	80,455
MARSHALL	23,523
MOUNT PLEASANT	15,564
PARIS	25,171
SULPHUR SPRINGS	15,449
TEXARKANA	36,411

(Source: U.S. Census Bureau)

The 2010 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.



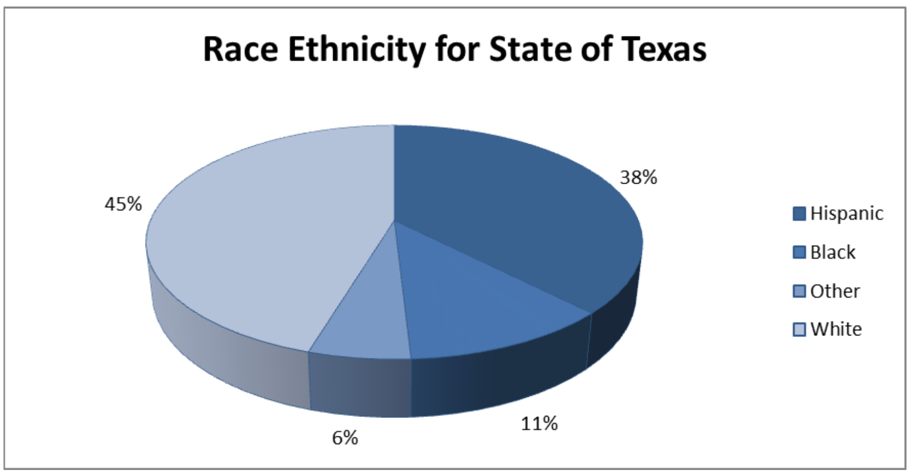


Figure 1.14 Comparison of Ethnic Percentages in the Region compared to the State.

(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 2016, as estimated in 2017 by the U.S. Census Bureau, is $43,414, which is lower than the state average of $54,727. Red River County reported the lowest median income of the Region, at $35,016, and Rains County reported the highest income at $50,405. Figure 1.15 shows the median family income by county. The average 2016 per capita income for the Region is $22,853 compared to the state average of $27,828. Camp County reported the lowest per capita income of $20,034 and Wood County reported the highest, at $25,353.

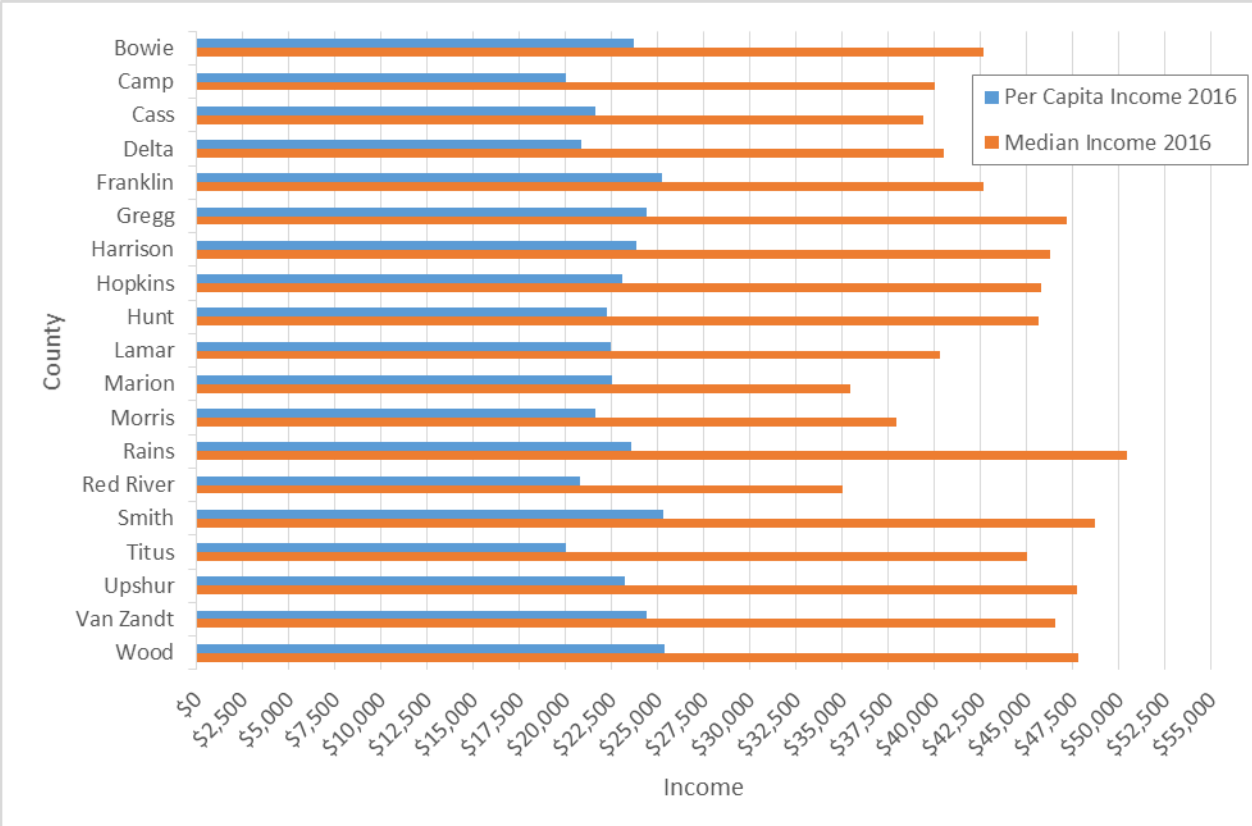


Figure 1.15 Regional Incomes by County

(Source: U.S. Census Bureau)

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 6.9% 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). Region D has some of the leading counties in Texas for producing broilers, with sales approximate to sales of cattle in Region D. Titus County is the leading broiler producer, and the region as a whole routinely has a broiler population approximating 32.6 million.

Information regarding cattle and poultry are available from the U.S. Department of Agriculture (USDA) here: https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Census_by_State/index.php. The Texas Department of Agriculture (TDA) provides further information accessible here:

https://www.texasagriculture.gov/About/TexasAgStats.aspx. The numbers for poultry in Region D are generally consistent with the trend identified by TDA.A compilation of 2017 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 2017 Census Data on Cattle and Poultry (Broilers) within Region D by County

Ranking	County	Number of Broilers (Million; rounded)	Percentage of All Texas*		Ranking	County	Number of Cattle	Percentage of All Texas**
1	Titus	6.78	5.88		1	Hopkins	124,888	0.99
2	Hopkins	6.40	5.55		2	Red River	91,253	0.73
3	Franklin	5.88	5.10		3	Van Zandt	89,422	0.71
4	Wood	4.66	4.04		4	Lamar	89,005	0.71
5	Cass	2.48	2.15		5	Bowie	62,971	0.50
6	Camp	2.43	2.11		6	Hunt	61,021	0.49
7	Morris	1.78	1.55		7	Upshur	50,499	0.40
8	Red River	0.90	0.78		8	Smith	43,874	0.35
9	Bowie	0.69	0.60		9	Franklin	35,254	0.28
10	Upshur	0.66	0.58		10	Titus	28,573	0.22
TOTAL		**32.68**	**28.34%**				**676,760**	**5.38%**

* Total broilers in Texas is 115,297,239.
** Total cattle in Texas is 12,573,876.

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 69,914 ac-ft during 2016, as represented by water use surveys. Sixty-five percent of that groundwater was used for municipal purposes. About seventeen 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 77 percent of the total groundwater pumped in 2016. 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 50,602 ac-ft during 2016. Groundwater Management Area (GMA) 11 adopted Desired Future Conditions (DFCs) for the Carrizo-Wilcox Aquifer in January of 2017. The June 2017 Modeled Available Groundwater (MAG) can be used to help evaluate available supply in this aquifer.

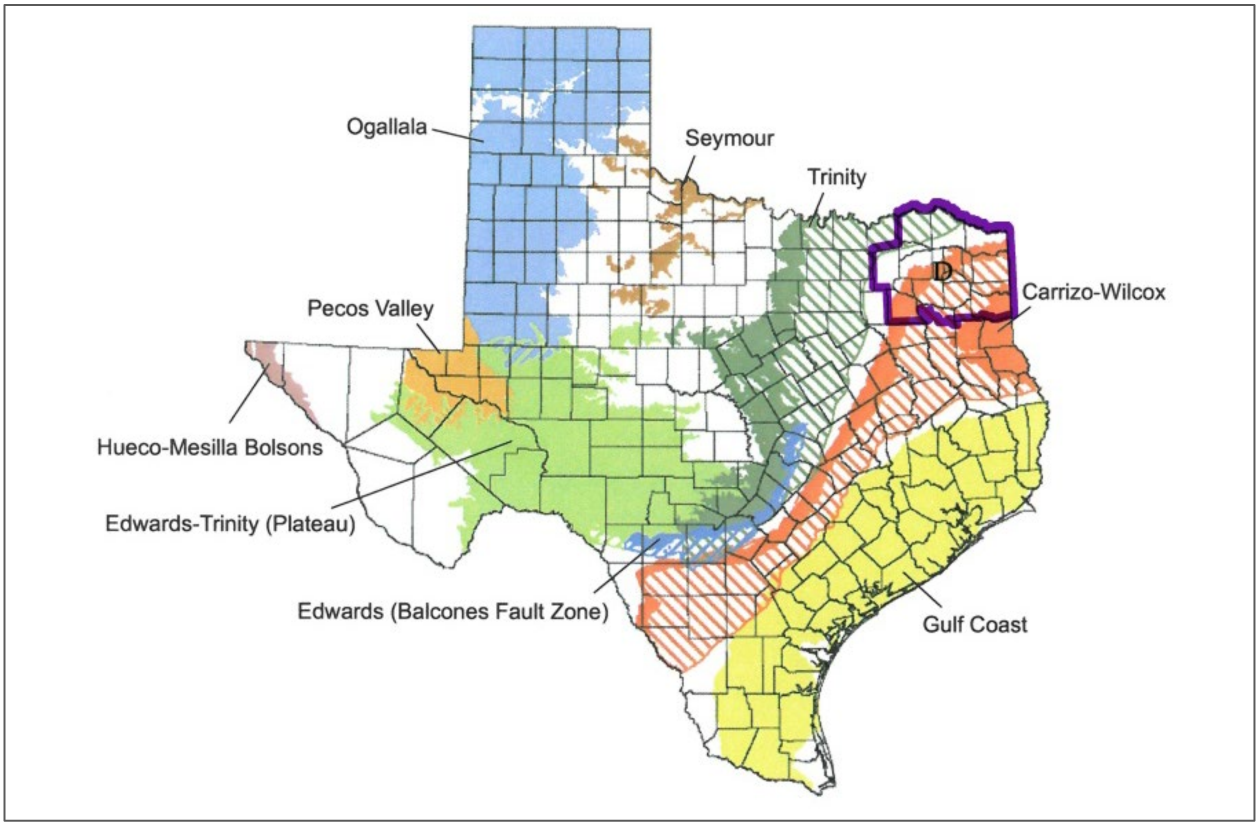


Figure 1.16 Major Aquifers

(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 2016 in the Region was 1,342 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 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 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 2016 in the Region was 3,562 ac-ft. GMA 11 adopted Desired Future Conditions (DFCs) for the Queen City Aquifer in January of 2017. The June 2017 MAG and other information can be used to help assess available supply in this aquifer.

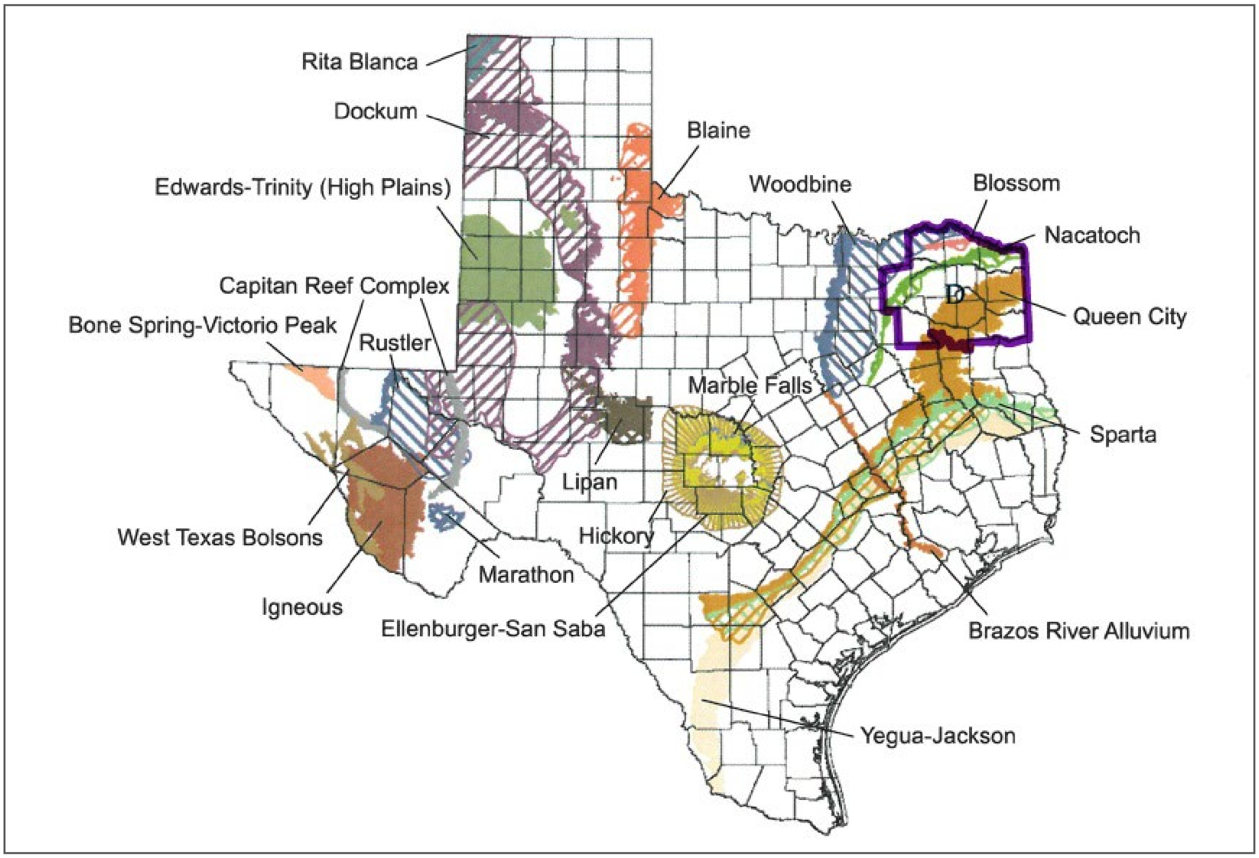


Figure 1.17 Minor Aquifers

(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 2016 was 502 ac-ft. GMA 8 re-adopted Desired Future Conditions (DFCs) for the Woodbine Aquifer in January of 2017. The June 2017 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 2016, pumpage from the aquifer totaled 2,968 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, 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 2016, 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 2017 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 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. These major river basins are shown in Figure 1.18.

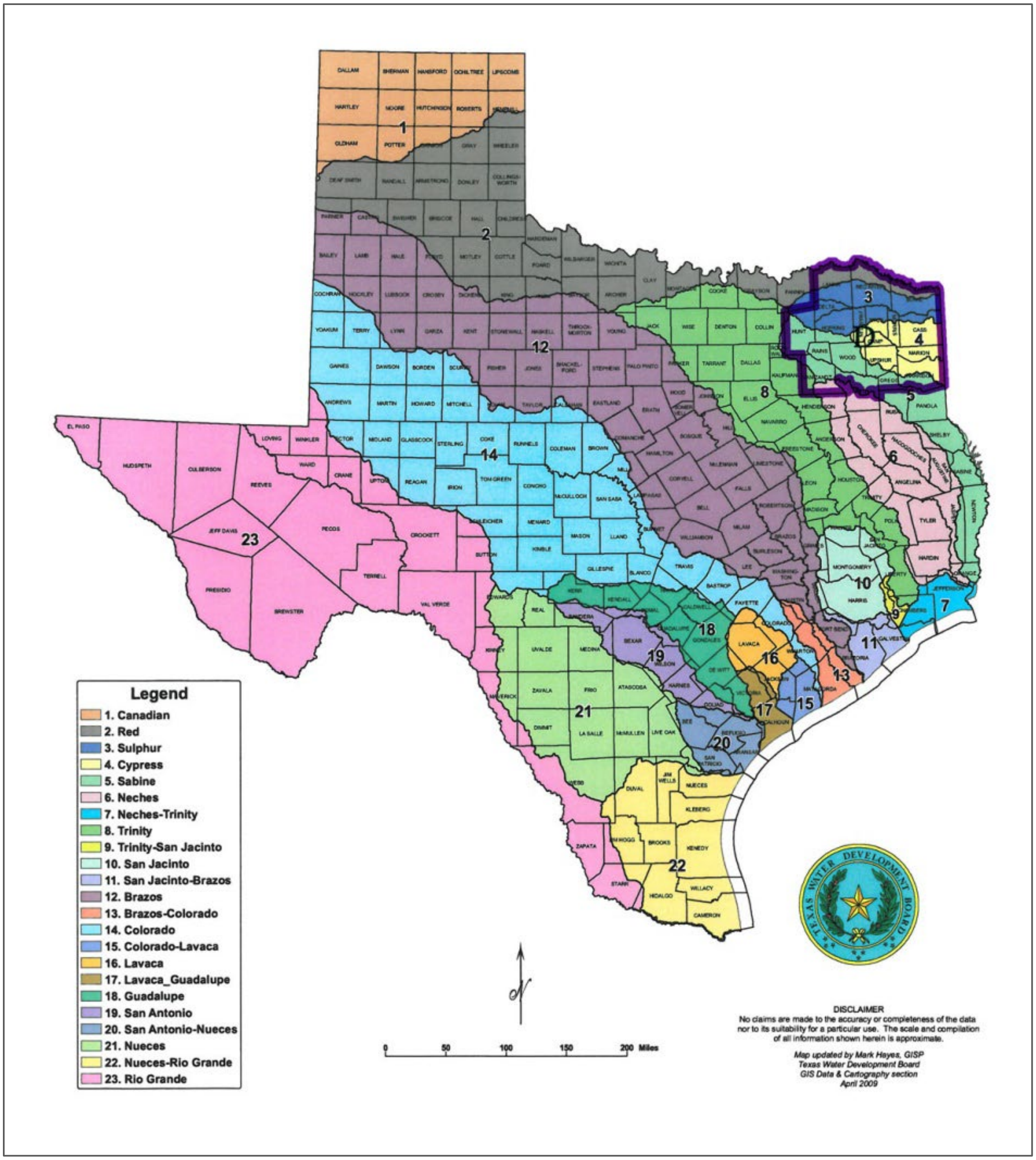


Figure 1.18 Major River Basins in Texas

(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 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

Lake/ Reservoir	County	Built	Conservation Pool			Volumetric Survey Date
			Area (acres)	Capacity (ac-ft)	Firm Yield (ac-ft)	
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*

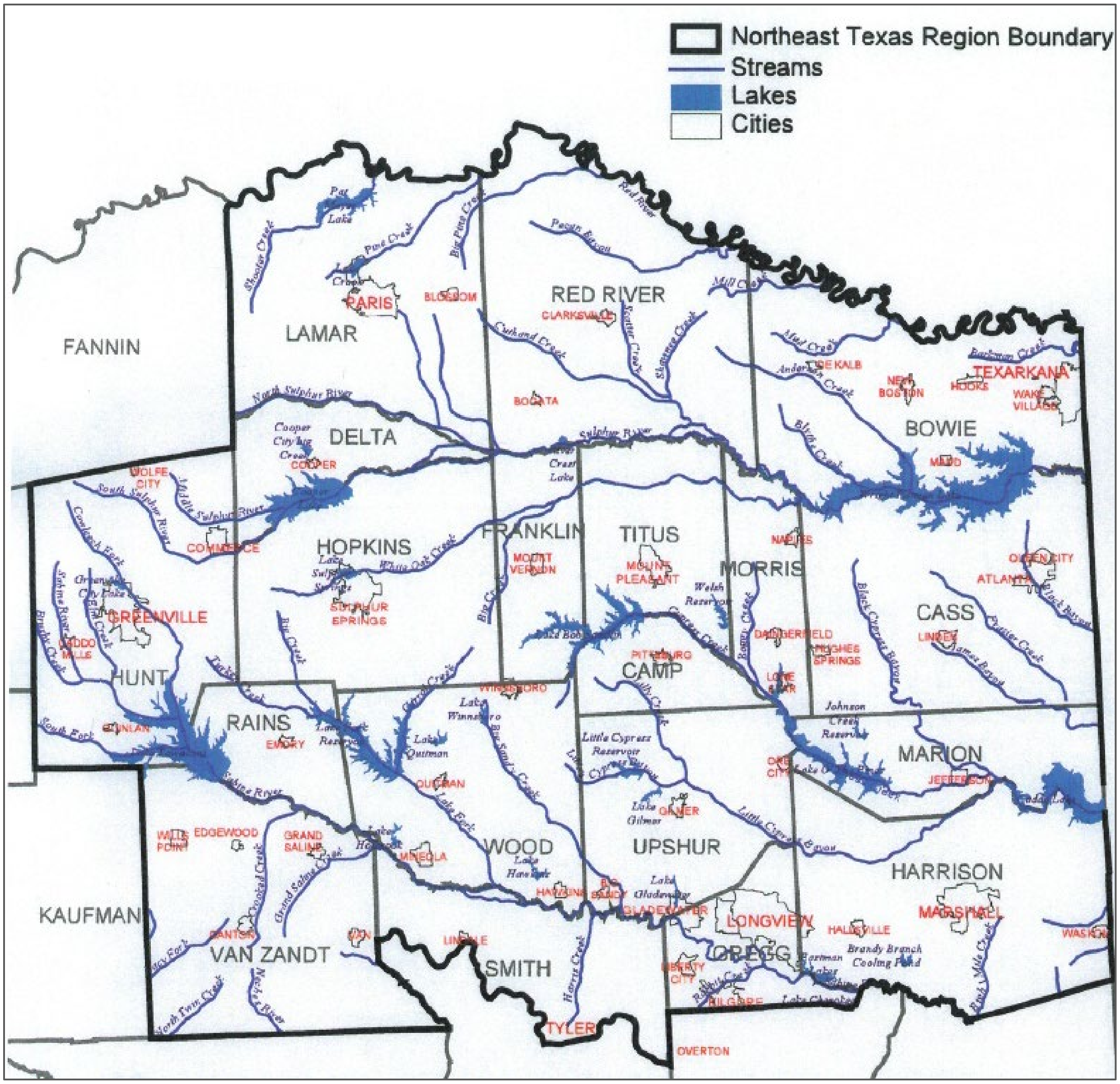


Figure 1.19 North East Texas Regional Water Planning Area Existing Reservoirs

(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		
LAKE BOB SANDLIN	213,350	1977	201,733	2008	11,617	375	239	1.57
LAKE CHAPMAN	273,120	1991	260,332	2007	12,788	799	479	1.67
LAKE CHEROKEE	49,295	1948	44,475	2015	4,820	72	158	0.46
LAKE CYPRESS SPRINGS	72,800	1971	66,756	2007	6,044	168	75	2.24
LAKE MONTICELLO	40,100	1973	34,740	1998	5,360	214	36	5.96
LAKE O' THE PINES	254,900	1957	241,363	2009	13,537	260	880	0.30
LAKE TAWAKONI	936,200	1960	871,693	2009	64,507	1316	756	1.74
WRIGHT PATMAN LAKE (TO POOL ELEV. 220.6')	158,000	1956	96,430	2018	61,570	993	3400	0.29
WRIGHT PATMAN LAKE (TO POOL ELEV. 224.0')	240,195	1956	168,736	2018	71,459	1153	3400	0.34
LAKE GLADEWATER	6,950	1952	4,738	2000	2,212	46	35	1.32
LAKE FORK	675,819	1980	636,504	2009	39,315	1356	493	2.75
WELSH RESERVOIR	23,587	1975	20,242	2001	3,345	129	21.2	6.07
LAKE CROOK	11,487	1923	9,210	2009	2,277	26	52	0.51
PAT MAYSE LAKE	124,500	1967	117,844	2009	6,656	158	175	0.91

Table 1.9 Imported and Exported Water

Entity	Imported From	Exported To
ABLES SPRINGS WSC	Region C (NTMWD)	Region C (NTMWD)
ALGONQUIN WATER RESOURCES OF TEXAS	—	Region I
BEN WHEELER WSC	—	Region I
BETHEL-ASH WSC	Region I	—
BHP WSC	Region C	Region C
BLACKLAND WSC	Region C	Region C
CADDO BASIN SPECIAL UTILITY DISTRICT	Region C	Region C
CARROLL WSC	Region I	—
CASH SUD	Region C	Region C and Region I
COMMERCE, CITY OF	—	Region C
COOPER, CITY OF	—	Region C
CROSS ROADS SPECIAL UTILITY DISTRICT	Region I	Region I
EDOM WSC	—	Region I
ELDERVILLE WSC	Region I	Region I
ELYSIAN FIELD WSC	—	Region I Panola County
FROGNOT WSC	Region C	—
GILL WSC	—	Region I
GUM SPRINGS WSC	Region I	—
HALLSVILLE, CITY OF	Region I	—
HICKORY CREEK SPECIAL UTILITY DISTRICT	—	Region C
JACKSON WSC	—	Region I
JOSEPHINE, CITY OF	Region C	Region C
KILGORE, CITY OF	—	Region I
LINDALE	Region I	—
LONGVIEW	Region I	—
MABANK, CITY OF	Region C	—
MACBEE WSC	—	Region C
NORTH HUNT SPECIAL UTILITY DISTRICT	Region C	—
PANOLA-BETHANY WSC	Region I	—
POETRY WSC	Region C	Region C
QUINLAN, CITY OF	Region C	—
ROYSE CITY, CITY OF	Region C	Region C
RPM WSC	—	Region I

Entity	Imported From	Exported To
SOUTHERN UTILITIES	Region I	Region I
TERRELL, CITY OF	—	Region C
TEXARKANA WATER UTILITIES	Arkansas (Millwood Reservoir)	Arkansas (City of Texarkana, Arkansas)
TYLER, CITY OF	Region I	—
VAN, CITY OF	—	Region I
WEST GREGG SPECIAL UTILITY DISTRICT	—	Region I
WEST LEONARD WSC	Region C	—
WOLFE CITY, CITY OF	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 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 2014 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 2014 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 2014 303(d) list.

Table 1.10 2018 Texas Surface Water Segments on 303(d) List

Segment		Pollutant	Category
0201A	MUD CREEK	bacteria depressed dissolved oxygen	5b 5c
0202G	SMITH CREEK	bacteria	5b
0202I	LITTLE PINE CREEK	depressed dissolved oxygen	5c
0302	WRIGHT PATMAN LAKE	pH	5b
0303B	WHITE OAK CREEK	depressed dissolved oxygen bacteria	5c 5b
0304C	WAGNER CREEK	bacteria	5c
0306	UPPER SOUTH SULPHUR RIVER	pH	5c
0307	COOPER LAKE	pH	5c
0401	CADDO LAKE	mercury in edible tissue depressed dissolved oxygen	5c 5c
0401A	HARRISON BAYOU	depressed dissolved oxygen	5c
0402	BIG CYPRESS CREEK BELOW LAKE O' THE PINES	mercury in edible tissue depressed dissolved oxygen	5c 5c
0403	LAKE O' THE PINES	pH	5c
0404	BIG CYPRESS CREEK BELOW LAKE BOB SANDLIN	bacteria sulfate	5b 5c

Segment		Pollutant	Category
0404A	ELLISON CREEK RESERVOIR	dioxin in edible tissue PCBs in edible tissue toxicity in sediment	5a 5a 5c
0404B	TANKERSLEY CREEK	bacteria	5b
0404C	HART CREEK	bacteria	5b
0404N	LAKE DAINGERFIELD	mercury in edible tissue	5c
0405	LAKE CYPRESS SPRINGS	excessive algal growth pH	5c 5c
0405A	BIG CYPRESS CREEK	bacteria depressed dissolved oxygen	5c 5c
0406	BLACK BAYOU	depressed dissolved oxygen bacteria	5c 5c
0407	JAMES' BAYOU	depressed dissolved oxygen bacteria	5c 5c
0409	LITTLE CYPRESS BAYOU (CREEK)	bacteria depressed dissolved oxygen	5c 5c
0409A	LILLY CREEK	bacteria	5c
0409B	SOUTH LILLY CREEK	bacteria	5b
0410	BLACK CYPRESS BAYOU (CREEK)	bacteria copper in water depressed dissolved oxygen mercury in edible tissue	5c 5c 5c 5c
0410A	BLACK CYPRESS CREEK/BAYOU	bacteria Depressed dissolved oxygen	5c 5c
0505	SABINE RIVER ABOVE TOLEDO BEND RESERVOIR	bacteria	5c
0505B	GRACE CREEK	bacteria	5c
0505G	WARDS CREEK	depressed dissolved oxygen	5c
0506A	HARRIS CREEK	depressed dissolved oxygen	5c
0507G	SOUTH FORK OF SABINE RIVER	bacteria	5b
0512	LAKE FORK RESERVOIR	pH	5c
0512A	RUNNING CREEK	bacteria	5b
0512B	ELM CREEK	bacteria	5b
0514	BIG SANDY CREEK	bacteria pH	5c 5c
0605A	KICKAPOO CREEK IN HENDERSON COUNTY	bacteria depressed dissolved oxygen	5c 5c
0606	NECHES RIVER ABOVE LAKE PALESTINE	bacteria depressed dissolved oxygen	5c 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 18 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 August 8, 2018 meeting, the Region D Planning Group 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 2021 Region D Plan.

Table 1.11 Wholesale Providers of Municipal and Manufacturing Water Supply

Wholesale Water Provider	Available 2020 Supply (ac-ft)	Wholesale Customers	
CASH SUD	3,104	Lone Oak, City of	Quinlan, City of
CHEROKEE WATER COMPANY	31,456	Longview, City of Southwestern Electric Power Company (SWEPCO)	
COMMERCE, CITY OF	2,422	Gafford Chapel WSC Maloy WSC North Hunt SUD	West Delta WSC Texas A&M University
EMORY, CITY OF	1,589	East Tawakoni	City of South Rains WSC
FRANKLIN COUNTY WATER DISTRICT	9,031	Cypress Springs SUD Winnsboro, City of	Mt. Vernon, City of
GREENVILLE, CITY OF	11,388	Caddo Mills, City of Jacobia WSC Shady Grove WSC	Manufacturing Mining
LAMAR COUNTY WATER SUPPLY DISTRICT	11,556	410 WSC Blossom, City of Deport, City of Detroit, City of Manufacturing	Pattonville WSC Red River County WSC Reno, City of Roxton, City of Toco, City of
LONGVIEW, CITY OF	77,526	Elderville WSC Gum Springs WSC Hallsville, City of Steam Electric (treated effluent)	Manufacturing White Oak, City of (treated and raw water)
MARSHALL, CITY OF	16,171	Cypress Valley WSC Gill WSC Leigh WSC	Manufacturing Talley WSC Blocker Crossroads WSC
MT. PLEASANT, CITY OF	23,573	Tri Water SUD Lake Bob Sandlin State Park Town of Miller's Cove	Manufacturing Winfield, City of
NORTHEAST TEXAS MUNICIPAL WATER DISTRICT	207,535	Avinger, City of Daingerfield, City of Diana SUD Harleton WSC Hughes Springs, City of Jefferson, City of Lone Star, City of Lone Star Steel	Longview, City of Marshall, City of Mims WSC Ore City, City of Pittsburg , City of SWEPCO Luminant Tyron Road SUD
PARIS, CITY OF	58,778	Lamar County WSD Manufacturing	MJC WSC Steam Electric
SABINE RIVER AUTHORITY*	300,851	Ables Springs WSC Cash SUD Combined Consumers SUD	Kilgore, City of Longview, City of Mac Bee SUD

Wholesale Water Provider	Available 2020 Supply (ac-ft)	Wholesale Customers	
		Commerce, City of Eastman Chemicals Edgewood, City of Emory, City of Greenville, City of Henderson, City of Bright Star-Salem	Point, City of Quitman, City of Release from TXU South Tawakoni WSC West Tawakoni, City of Wills Point, City of
SULPHUR RIVER MWD	14,347	Cooper, City of	Sulphur Springs, City of
SULPHUR SPRINGS, CITY OF	23,456	Brashear WSC Brinker WSC Gafford Chapel WSC Martin Springs WSC Livestock	North Hopkins WSC Pleasant Hill WSC Shady Grove WSC #2 Manufacturing
RIVERBEND WATER RESOURCES DISTRICT / TEXARKANA, CITY OF	122,630	Annona, City of Atlanta, City of Avery, City of Central Bowie WSC DeKalb, City of Domino, City of Hooks, City of Leary, City of Macedonia Eylau MUD Manufacturing – Cass Co. Federal Correctional Institution	Manufacturing – Bowie County Maud, City of Nash, City of New Boston, City of Oak Grove WSC Red Lick, City of Red River Water Corp. Redwater, City of Texarkana, City of Wake Village, City of TexAmericas Center
TITUS COUNTY FWD #1	28,900	Mt. Pleasant, City of	Luminant

**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*.

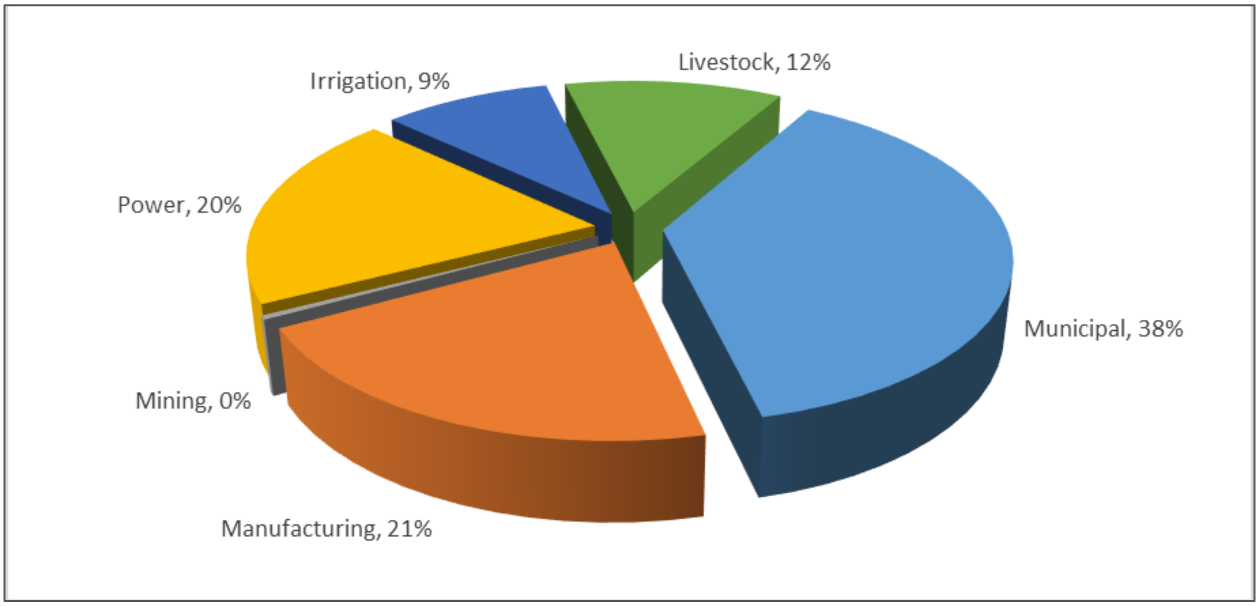


Figure 1.20 2016 Water Use Survey Summary Estimates

(Source: TWDB)

The North East Texas Region utilizes both ground and surface water supplies. Figure 1.21 shows a total percent water usage in 2010 and the projected usage in 2070.

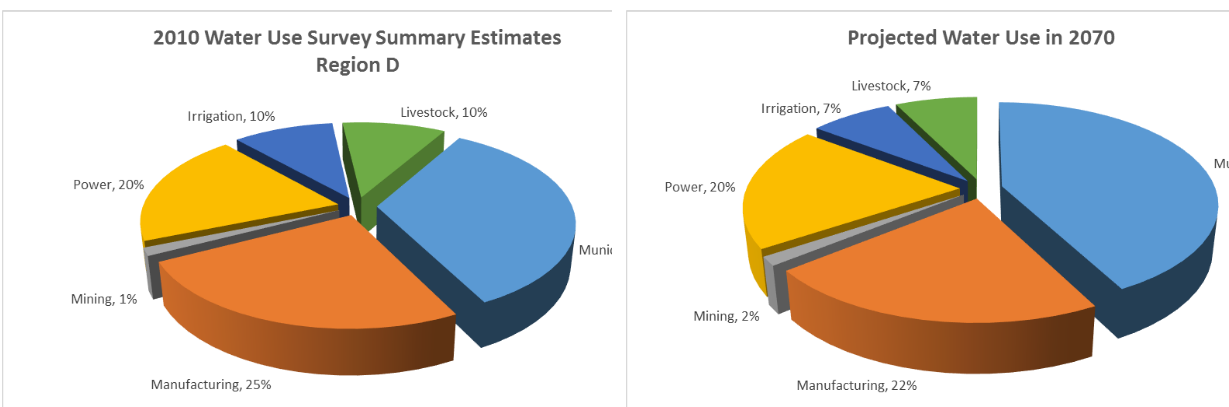


Figure 1.21 Comparison of 2010 Water Use and Projected 2070 Water Use for the North East Texas Region

(Source: TWDB)

In 2016, total estimated usage in the North East Texas Region – both ground and surface – was 302,753 ac-ft/yr, distributed as shown in Figure 1.20. By 2070, projections developed in this plan indicate usage will reach 479,321 ac-ft/yr, a 30 percent increase from 2016. 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	1990	2000	2010	2016	1990	2000	2010	2016	1990	2000	2010	2016
BOWIE	10,052	13,205	19,882	18,848	1,736	1,897	1,610	171	29	0	0	0	0	0	0	0
CAMP	1,429	1,486	1,473	843	0	37	32	37	71	0	3	0	0	0	0	0
CASS	4,445	2,968	2,728	2,672	81,743	118,718	32,724	32,311	787	0	18	37	0	0	0	0
DELTA	587	848	666	621	0	0	0	0	0	0	0	0	0	0	0	0
FRANKLIN	1,652	1,549	1,970	1,744	0	127	4	0	706	0	1	0	0	0	0	0
GREGG	17,666	25,501	25,122	24,567	14,634	1,917	1,158	787	124	114	163	106	465	414	825	361
HARRISON	7,773	10,068	10,021	8,949	75,039	16,646	19,366	17,265	351	219	1,356	371	4,869	24,336	12,193	13,103
HOPKINS	4,890	6,285	5,848	5,260	591	640	944	904	123	69	995	0	0	0	0	0
HUNT	12,000	12,644	13,776	11,975	521	361	555	285	0	0	70	0	834	498	343	191
LAMAR	10,692	8,889	6,394	5,866	4,635	4,530	5,019	4,662	20	0	0	0	0	1,135	336	4,708
MARION	1,341	1,494	1,171	1,053	0	72	0	18	68	0	212	11	1,953	2,917	2,659	1,992
MORRIS	1,500	1,723	1,709	2,023	126,770	53,402	25,148	462	7	0	0	0	8	16,775	3,421	5
RAINS	1,096	1,661	1,870	1,559	0	2	12	0	0	0	0	0	0	0	0	0
RED RIVER	1,893	1,964	1,857	1,966	5	5	3	1	0	0	1	0	1,494	162	0	0
SMITH	27,265	41,117	36,261	45,647	3,341	2,941	2,781	1,877	696	1	252	212	0	0	0	0
TITUS	4,135	6,506	5,307	4,856	2,252	2,510	2,885	2,806	1,711	9	1,705	590	36,406	27,527	52,424	38,735
UPSHUR	4,592	4,699	4,850	3,923	192	161	69	20	0	0	63	24	0	0	0	0
VAN ZANDT	5,356	5,542	7,793	6,380	223	23	203	133	836	315	235	8	0	0	0	0
WOOD	4,250	5,442	5,743	5,307	41	366	1,739	2,580	3,162	0	15	45	0	0	0	0
TOTAL	**122,614**	**153,591**	**154,441**	**154,059**	**311,723**	**204,355**	**94,252**	**64,319**	**8,691**	**727**	**5,089**	**1,404**	**46,029**	**73,764**	**72,201**	**59,095**

Table 1.12b Water Use by County and Category

County	Irrigation				Livestock				Total			
	1990	2000	2010	2016	1990	2000	2010	2016	1990	2000	2010	2016
BOWIE	3,959	2,204	7,889	9,302	1,571	1,439	2,098	1,763	17,347	18,745	31,479	30,084
CAMP	87	0	0	0	688	930	4,849	5,468	2,275	2,453	6,357	6,348
CASS	0	6	0	0	835	834	2,896	2,611	87,810	122,526	38,366	37,631
DELTA	2,000	585	333	2,704	770	11,903	524	679	3,357	13,336	1,523	4,004
FRANKLIN	33	0	0	99	1,303	1,122	2,930	2,872	3,694	2,798	4,905	4,715
GREGG	0	0	38	28	230	239	260	133	33,119	28,185	27,566	25,982
HARRISON	100	106	765	404	991	875	631	621	89,123	52,250	44,332	40,713
HOPKINS	0	50	7,867	2,591	5,990	4,856	5,524	5,614	11,594	11,900	21,178	14,369
HUNT	271	1,938	341	232	1,127	1,120	1,180	1,223	14,753	16,561	16,265	13,906
LAMAR	4,417	5,768	11,579	7,632	1,526	830	1,467	1,587	21,290	21,152	24,795	24,455
MARION	0	68	0	0	162	1,085	243	188	3,524	5,636	4,285	3,262
MORRIS	192	0	0	8	414	485	1,725	1,622	128,891	72,385	32,003	4,120
RAINS	20	0	65	63	790	675	424	466	1,906	2,338	2,371	2,088
RED RIVER	100	3,751	4,637	2,932	1,183	1,610	1,756	1,507	4,675	7,492	8,254	6,406
SMITH	180	774	818	762	1,208	1,254	1,200	936	32,690	46,087	41,312	49,434
TITUS	0	0	954	1,125	1,174	1,007	3,079	2,936	45,678	37,559	66,354	51,048
UPSHUR	0	240	116	112	1,325	1,530	1,675	1,756	6,109	6,630	6,773	5,835
VAN ZANDT	50	33	625	58	2,213	2,434	2,046	1,808	8,678	8,347	10,902	8,387
WOOD	354	373	562	512	1,816	2,063	3,281	3,345	9,623	8,244	11,340	11,789
TOTAL	**11,763**	**15,896**	**36,589**	**28,564**	**25,316**	**36,291**	**37,788**	**37,135**	**526,136**	**484,624**	**400,360**	**344,576**

1.5.2 Major Demand Centers

Major water demand centers include:

City	2016 Use*
Longview	8,329 MG/YR
Texarkana, Texas	6,029 MG/YR
Paris	5,031 MG/YR
Greenville	1,649 MG/YR
Marshall	2,076 MG/YR

*From TWDB 2016 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 2018 Tonnage (based on USACE May 2020)

Port	National Rank	Tonnage (Millions)	Description	Contributing Basin
Houston	2	268.9	#1 Foreign Tonnage & #2 Total Tonnage	Trinity & San Jacinto Rivers
Beaumont	**4**	**100.2**	**#1 Military Port in World**	**Sabine & Neches Rivers**
Corpus Christi	5	93.5	America's Energy Gateway	Nueces
Texas City	15	42.7	Services Largest Petrochemical Complex	Trinity & San Jacinto Rivers
Port Arthur	**17**	**39.9**	**Vital Break-Bulk Port**	**Sabine & Neches 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 recent 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 2021 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…".

All retail public water suppliers with more the 3,300 connections or a financial obligation to TWDB are required to complete and submit a Water Loss Audit annually. Tables of TWDB's summarized water loss data for Region D for the years 2015 - 2017 can be found in Appendix C1-1. According to the 2015 Water Loss Audit responses submitted by 116 Region D entities, total water loss is estimated at 3.487 billion gallons for the year 2015 at an estimated median cost impact of $16,929. According to the Water Loss Audit responses submitted by 24 Region D entities in 2016, total water loss was estimated at 1.321 billion gallons for the year 2016 at an estimated median cost impact of $34,828. For 2017, estimated total water loss for Region D is approximately 1.089 billion gallons. It is difficult to ascertain if numbers have been reported correctly, and if all utilities measure water loss similarly. It is anticipated that using an official method of gathering data, the Water Audit Method, and by requiring systems to complete an audit frequently, the uncertainties in these data may be reduced.

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), 82% 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.

1.7 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 is in the process of developing the "Sulphur River Feasibility Study", in cooperation with the United States Corps of Engineers. 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.

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 2017 State Water Plan

The 2017 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 411,000 ac-ft/yr, with water management strategies equaling 369,000 ac-ft/yr for a total capital cost of $1,241 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 150,000 ac-ft/yr, with manufacturing needs making up approximately 41% of that total. By 2070, the need was projected at 411,000 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 369,000 acre-feet at a total capital cost of $1,241,000.

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

Ducks on Lake Tawakoni*, *Lake Tawakoni.com

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.

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 including Gafford Chapel WSC, Maloy WSC, North Hunt WSC and West Delta WSC.

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 Texarkana Water Utilities in Red River and Bowie 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 the Region D Planning area. GMA 8 released "desired future conditions" of the Blossom, Nacatoch, Trinity, and Woodbine aquifers in 2017. GMA 11 adopted desired future conditions in the Carrizo-Wilcox and Queen City aquifers in 2017.

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.

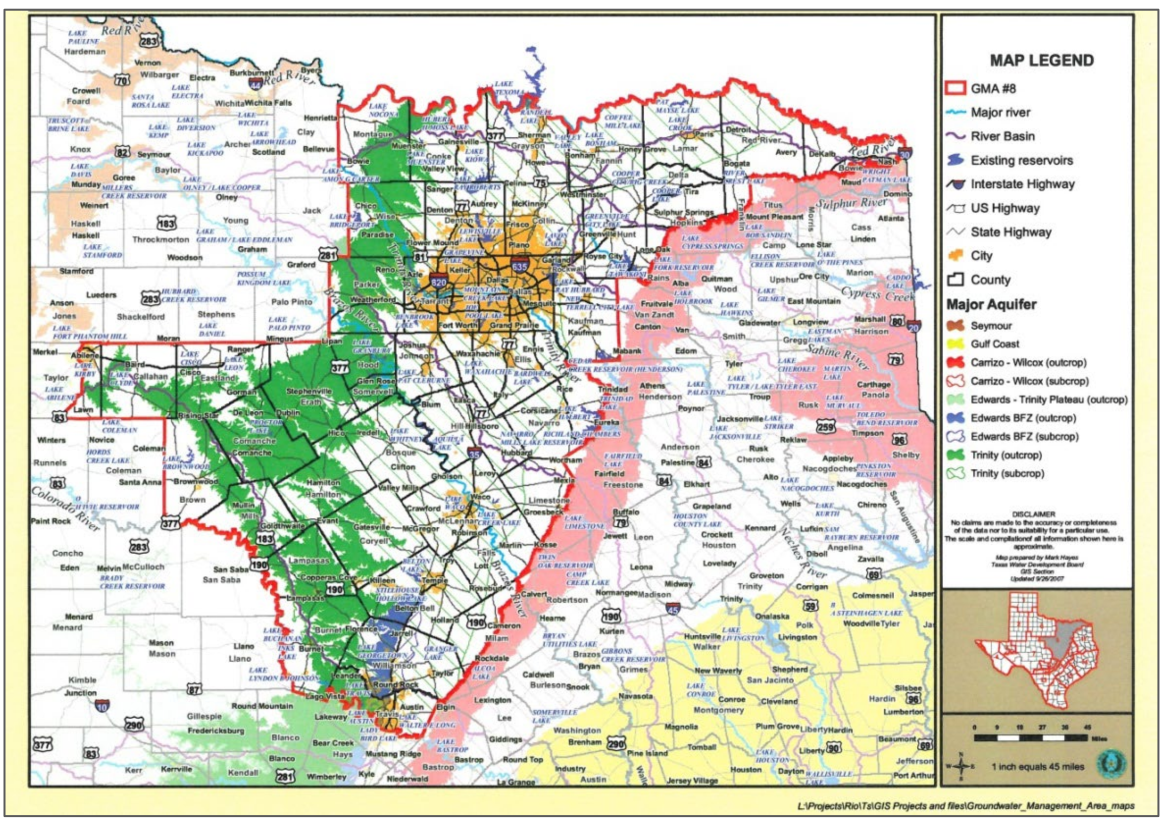


Figure 1.22 Groundwater Management Area #8

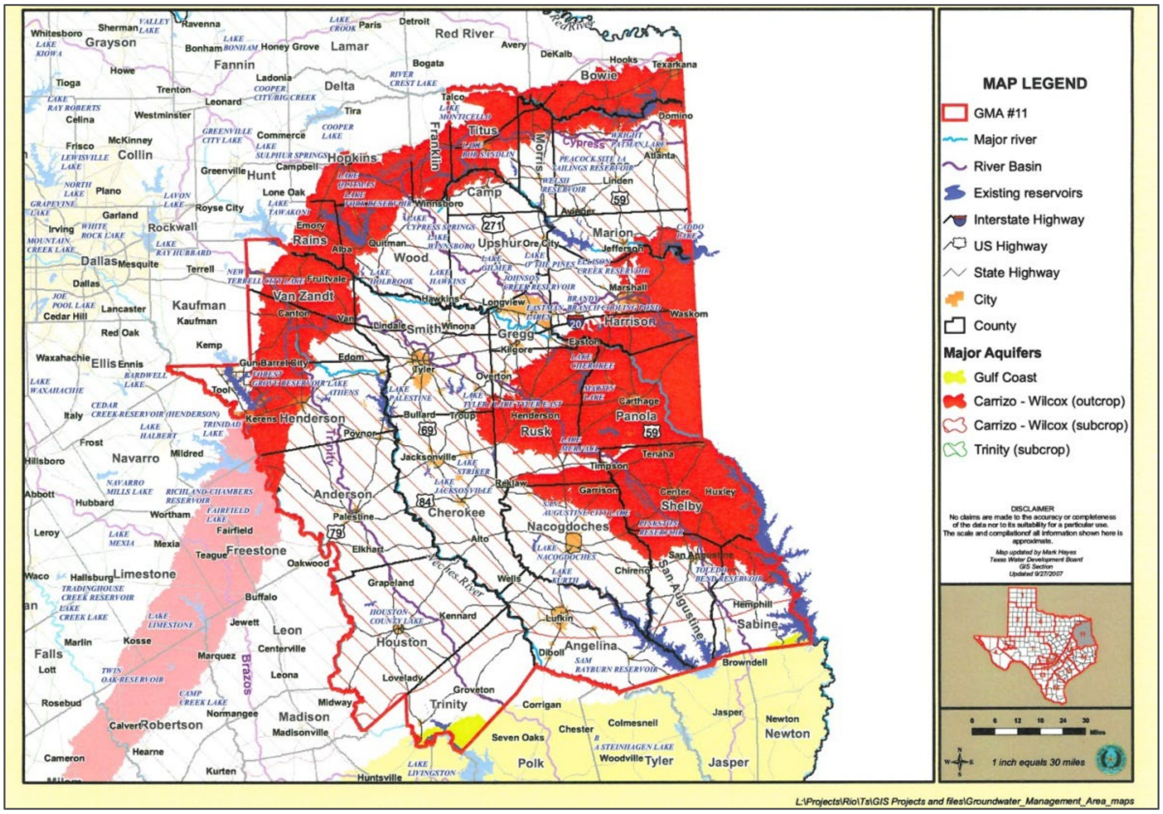


Figure 1.23 Groundwater Management Area #11

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, June 2020.) 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, Texas Heelsplitter, and the Triangle Pigtoe are ongoing 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

(Source: Texas Parks and Wildlife Department, County Lists of Protected Species and Species of Greatest Conservation Need. June 2020)

Birds

Bachman's Sparrow	*Peucaea aestivalis*	Rufa Red Knot	*Calidris canutus rufa*
Black Rail	*Laterallus jamaicensis*	Swallow-tailed Kite	*Elanoides forficatus*
Interior Least Tern	*Sternula antillarum athalassos*	White-Faced Ibis	*Plegadis chihi*
Piping Plover	*Charadrius melodus*	Wood Stork	*Mycteria americana*
		Zone-tailed Hawk	*Buteo albonotatus*

Fish

Blackside Darter	*Percina maculata*	Paddlefish	*Polyodon spathula*
Blue Sucker	*Cycleptus Elongatus*	Shovelnose Sturgeon	*Scaphirhynchus platorynchus*
Bluehead Shiner	*Pteronotropis hubbsi*	Western Creek Chubsucker	*Erimyzon claviformis*
Chub Shiner	*Notropis potteri*		

Texas Paddlefish
Source: TPWD

Insects

American Burying Beetle	*Nicrophorus americanus*

Mammals

Black Bear	*Ursus americanus*
Louisiana Black Bear	*Ursus americanus luteolus*
Rafinesque's Big-eared Bat	*Corynorhinus rafinesquii*

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

Plants	
Earth Fruit	*Geocarpon minimum*
Neches River Rose-mallow	*Hibiscus dasycalyx*
Small-Headed Pipewort	*Eriocaulon koernickianum*

Reptiles	
Alligator Snapping Turtle	*Macrochelys temminckii*
Louisiana Pine Snake	*Pituophis ruthveni*
Northern Scarlet Snake	*Cemophora coccinea copei*
Texas Horned Lizard	*Phrynosoma cornutum*

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 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) "Guidelines for Regional Water Plan Development (Fifth Cycle of Regional Water Planning)", because there are not new decennial census data available in time to be used in the 2021 regional water plans, the emphasis of this work is on the transition of the 2017 State Water Plan population projections and the associated water demand projections from political boundaries to utility service area boundaries, and to making limited modifications based on relevant changed conditions that have occurred since the development of the projections used in the 2017 State Water Plan. 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 2021 RWPs.

The new population projections used in the 2021 Regional Water Plans (RWPs) increase population projections in some locations while decreasing population projections in other locations, relative to the population projections in the 2016 RWPs. TWDB has directly populated the Regional Water Planning Application (DB22) with all WUG-level projections.

The following sections of this chapter describe the methodology that has been used in the current (fifth) 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 2021 Regional Water Plan and approval from the TWDB for inclusion in the 2022 State Water Plan.

Both population and water demand are projected to grow by approximately 65% and 19%, respectively, from the years 2020 to 2070. 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	2020	2030	2040	2050	2060	2070
Population	831,469	907,531	988,859	1,089,197	1,211,979	1,370,438
Water Demand (ac-ft)						
Municipal	129,308	137,442	147,334	161,229	179,350	202,860
Manufacturing	99,795	104,975	104,975	104,975	104,975	104,975
Irrigation	35,354	35,354	35,354	35,354	35,354	35,354
Steam Electric	94,174	94,174	94,174	94,174	94,174	94,174
Mining	7,115	7,748	7,670	7,280	6,914	6,795
Livestock	35,673	35,706	35,571	35,369	35,202	35,163
TOTAL WATER DEMAND (AC-FT)	**401,419**	**415,399**	**425,078**	**438,381**	**455,969**	**479,321**

2.1 Methodology

2.1.1 Population Projections

Population projections were developed using the 2010 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 been developed for utility service area boundaries, rather than using political boundaries (e.g. city limits) as was done in previous rounds of water planning in the State. 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 2021 Region D Plan are defined as:

A. Privately-owned utilities that provide an average of more than 100 acre-feet per year for municipal use for all owned water systems.
B. 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;
C. All other Retail Public Utilities not covered in paragraphs (A) and (B) that provide more than 100 acre-feet per year for municipal use;
D. Collective Reporting Units, or groups of Retail Public Utilities that have a common association and are requested for inclusion by the RWPG; and
E. Municipal and domestic water use, referred to as County-Other, not included in (A)-(D).

The list of WUGs for the 2021 Region D Plan was prepared based on the rules listed above and TWDB Water Use Survey data for the 2010-2014 period, revised based on input provided by the NETRWPG to the TWDB, and ultimately adopted by both the NETRWPG and TWDB.

2.1.2 Water Demand Projections

Discussion of how demand projections were developed in the fifth 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. Based upon quarterly drought indices from the National Drought Mitigation Center, TWDB staff determined that 2011 was to be used as the dry-year base for the water demand projections. 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 2020 – 2070 for all municipal WUGs using projection trends based on the population projections in the 2017 State Water Plan as reassembled by utility service areas.

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 was to use of the average of the most recent five-years of water use estimates held constant between 2020 and 2070. In counties where the total groundwater availability over the planning period was projected to be less than the groundwater-portion of the baseline water demand projections, the irrigation water demand projections were modified to decline in 2030 or later, commensurate with the groundwater availability.

For manufacturing, the 2020 water demand projections for each county are based on the highest county-aggregated manufacturing water use in the most recent five years of reported data from annual water use surveys. The most recent 10-year projections for employment growth from the Texas Workforce Commission were used as a proxy for growth by manufacturing sectors between 2020 and 2030. After 2030, the TWDB methodology is for manufacturing water use to be held constant through 2070.

For steam-electric power generation, the 2020 water demand projections for each county have been based on the highest county-aggregated steam-electric power water use in the most recent five years of reported data from annual water use surveys. The anticipated water use of future facilities listed in state and federal reports were added to the demand projections from the anticipated operation date to 2070. Subsequent demand projections after 2020 are assumed, as required by TWDB guidelines, to be constant throughout the planning period.

For mining and livestock categories, similar projections with minor adjustments from the 2017 State Water Plan were used. TWDB relied on a prior study with the Bureau of Economic Geology at the University of Texas at Austin to originally develop the draft mining water demand projections for each planning region. 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.

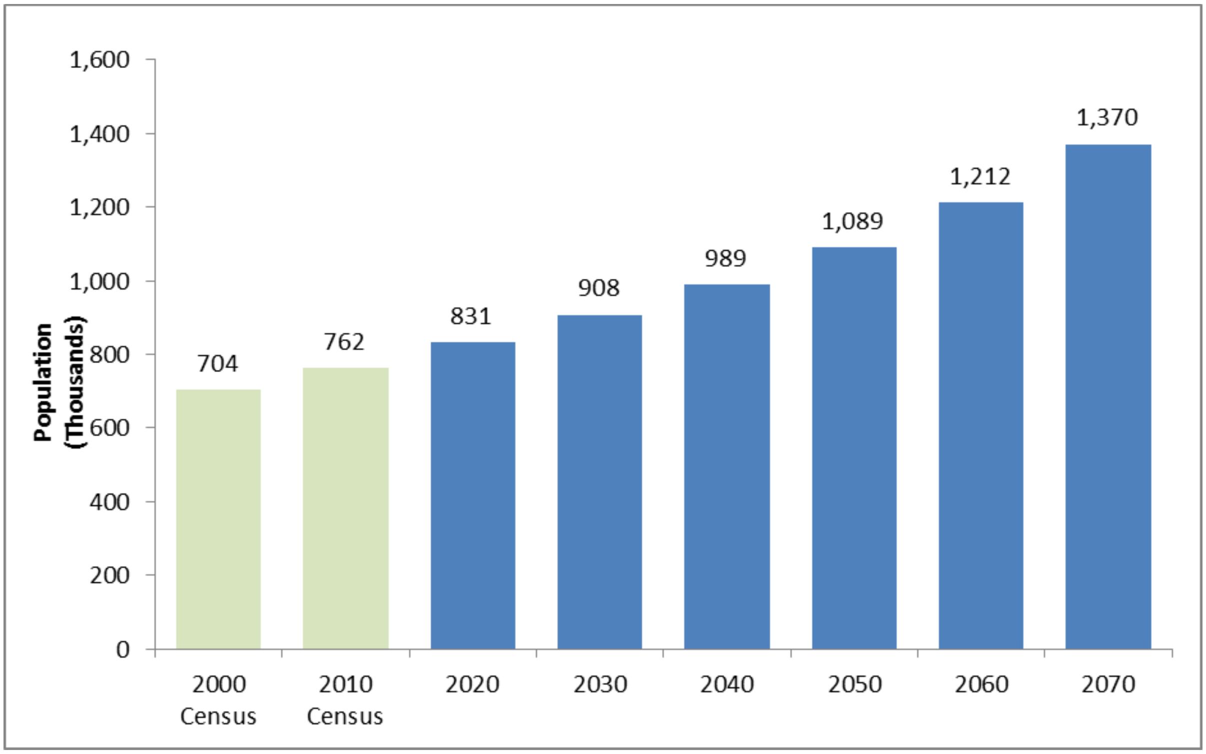


Figure 2.1 Historical and Projected Population for Region D

The Region's population is anticipated to grow by 65% overall (from 2020 to 2070) with the largest percentage growth (262%) occurring in Hunt County and 97% in Smith County. In the year 2010, the counties with the largest population were Gregg and Bowie Counties. These counties include the Cities of Longview and Texarkana, Texas, respectively. By 2070, 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. 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.

Table 2.2 Population Projection by County

County	2020	2030	2040	2050	2060	2070
BOWIE	95,703	98,413	99,263	99,263	99,263	99,263
CAMP	13,555	14,873	15,904	17,127	18,264	19,372
CASS	31,016	31,229	31,229	31,229	31,229	31,229
DELTA	5,320	5,376	5,376	5,376	5,376	5,376
FRANKLIN	11,124	11,627	11,930	12,226	12,447	12,622
GREGG	133,347	146,034	160,540	176,927	195,352	216,203
HARRISON	70,337	75,538	80,921	88,474	96,706	106,413
HOPKINS	37,978	40,895	43,555	46,610	49,556	52,517
HUNT	104,894	130,351	164,886	212,575	280,518	379,250
LAMAR	52,170	54,189	55,683	57,037	58,092	58,943
MARION	10,601	10,601	10,601	10,601	10,601	10,601

County	2020	2030	2040	2050	2060	2070
MORRIS	13,364	13,612	13,886	14,293	14,618	14,942
RAINS	11,888	12,605	12,809	12,947	13,007	13,035
RED RIVER	12,976	12,976	12,976	12,976	12,976	12,976
SMITH	44,540	50,821	57,944	66,275	76,093	87,762
TITUS	36,643	41,381	46,283	51,665	57,330	63,315
UPSHUR	42,696	46,129	49,089	52,128	54,915	57,519
VAN ZANDT	58,455	64,146	68,496	72,817	76,407	79,478
WOOD	44,862	46,735	47,488	48,651	49,229	49,622
REGION TOTAL	**831,469**	**907,531**	**988,859**	**1,089,197**	**1,211,979**	**1,370,438**

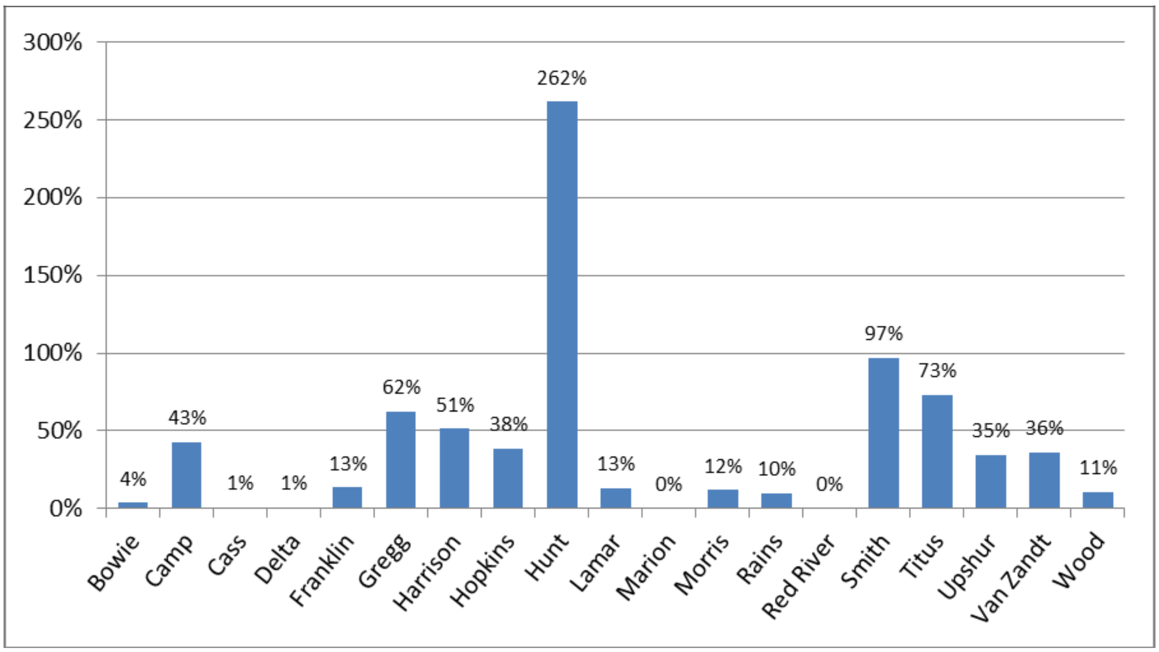


Figure 2.2 Percent Population Growth by County (2020 – 2070)

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	2020	2030	2040	2050	2060	2070
CYPRESS	160,795	171,462	181,446	193,093	204,893	217,408
NECHES	13,721	15,057	16,078	17,092	17,935	18,656
RED	43,801	45,217	46,051	46,665	46,884	47,280
SABINE	411,680	461,842	519,730	593,292	686,356	809,458
SULPHUR	187,369	198,212	208,417	220,248	235,770	255,384
TRINITY	14,103	15,741	17,137	18,807	20,141	22,252
REGION TOTAL	**831,469**	**907,531**	**988,859**	**1,089,197**	**1,211,979**	**1,370,438**

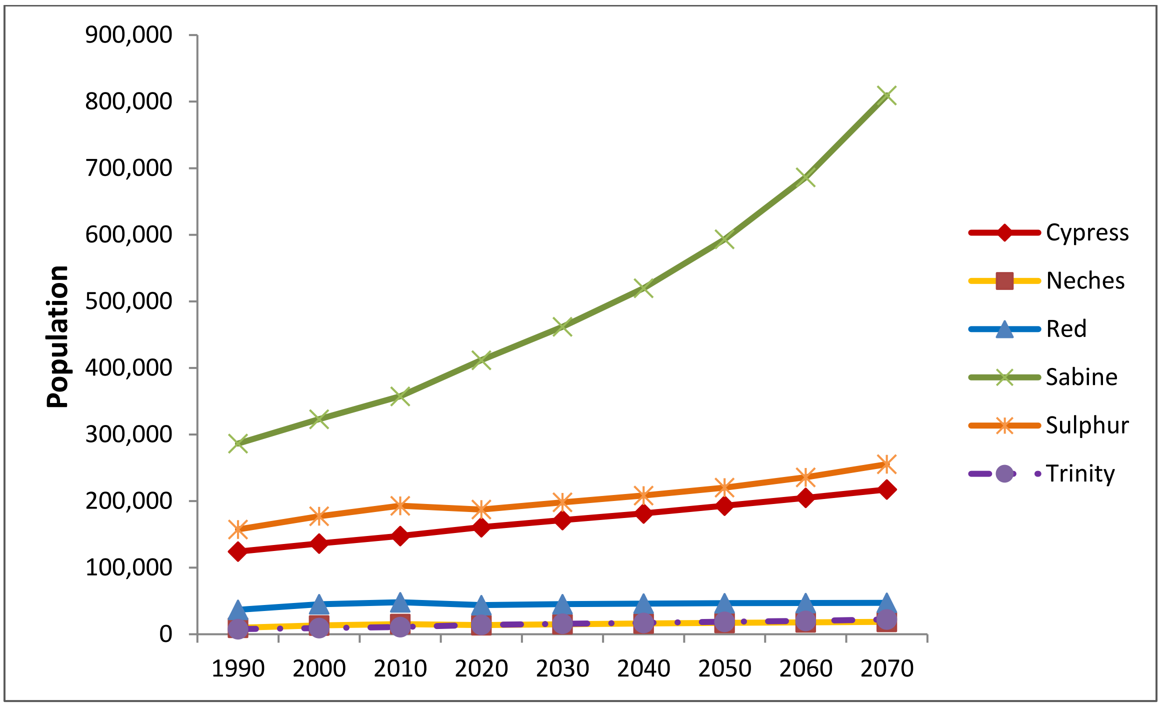


Figure 2.3 Population Projections by River Basin

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 2021 Region D Water Plan for individual municipal WUGs differ from those employed for the 2016 Plan, as for the present round of planning utility boundaries are now being used rather than political boundaries (i.e., city limits). Projections for non-municipal demands, however, differ substantially 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. These differences are apparent in the resultant projections of demand for Region D.

Total annual water demand is expected to increase approximately 19% or 77,902 ac-ft/yr, from 2020 to 2070. The projected increase in regional water demand is predominantly due to increases in municipal water demand. 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	2020	2030	2040	2050	2060	2070
Municipal	129,308	137,442	147,334	161,229	179,350	202,860
Manufacturing	99,795	104,975	104,975	104,975	104,975	104,975
Irrigation	35,354	35,354	35,354	35,354	35,354	35,354
Steam Electric	94,174	94,174	94,174	94,174	94,174	94,174
Mining	7,115	7,748	7,670	7,280	6,914	6,795
Livestock	35,673	35,706	35,571	35,369	35,202	35,163
TOTAL WATER DEMAND (AC-FT)	**401,419**	**415,399**	**425,078**	**438,381**	**455,969**	**479,321**

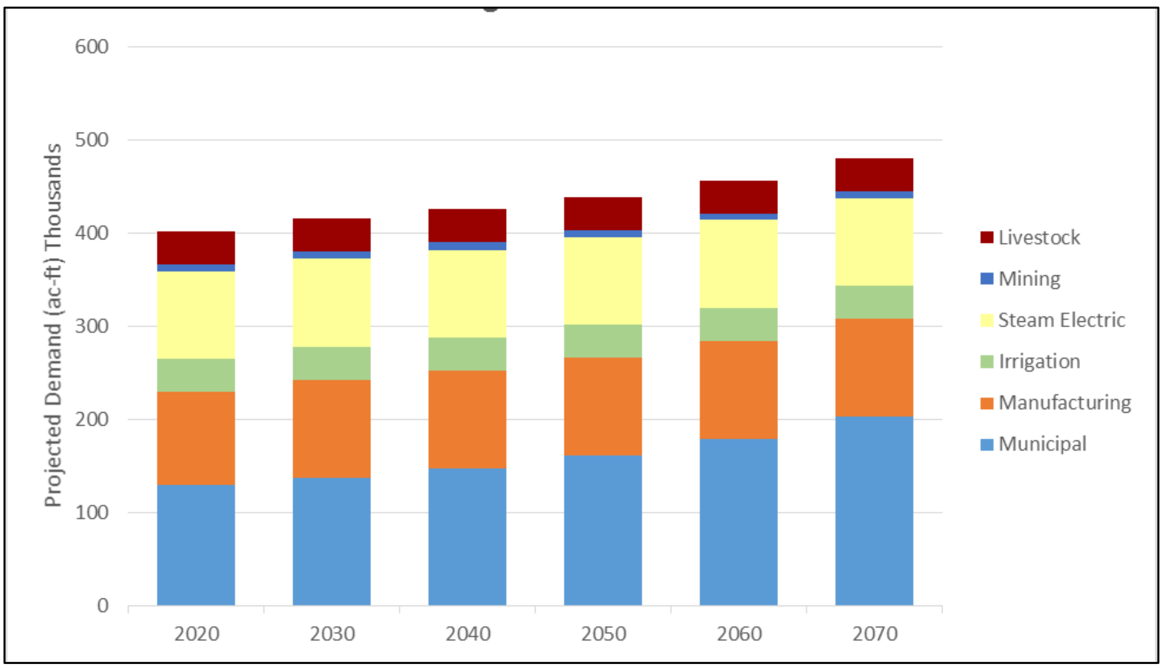


Figure 2.4 Regional Water Demand Projections by Category of Use (acre-feet)

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. Titus and Harrison Counties currently have – and are projected to continue to have – the highest overall water demand through 2070. 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 200,000 acre-feet of water will be needed in 2070 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	2020	2030	2040	2050	2060	2070
BOWIE	28,243	28,741	28,503	28,751	29,047	29,414
CAMP	6,614	6,740	6,822	6,939	7,061	7,184
CASS	38,921	38,936	38,869	38,860	38,834	38,824
DELTA	3,610	3,601	3,592	3,590	3,589	3,590
FRANKLIN	4,394	4,415	4,416	4,434	4,454	4,475
GREGG	33,483	36,208	38,989	42,288	46,222	50,752
HARRISON	60,546	63,826	64,075	64,773	65,656	66,865
HOPKINS	17,808	18,125	18,425	18,837	19,301	19,790
HUNT	20,064	23,282	27,673	33,445	42,162	55,187
LAMAR	28,570	28,698	28,703	28,765	28,866	28,962
MARION	5,995	6,250	6,181	6,057	5,941	5,860
MORRIS	29,139	29,114	29,099	29,133	29,169	29,206
RAINS	2,579	2,650	2,648	2,656	2,663	2,669
RED RIVER	6,972	6,888	6,828	6,818	6,811	6,797
SMITH	8,330	9,172	10,210	11,524	13,103	15,004
TITUS	77,600	78,422	79,219	80,139	81,159	82,253
UPSHUR	7,257	7,810	8,042	8,135	8,261	8,419
VAN ZANDT	9,865	10,515	10,844	11,240	11,630	11,996
WOOD	11,429	12,006	11,940	11,997	12,040	12,074
REGION TOTAL	**401,419**	**415,399**	**425,078**	**438,381**	**455,969**	**479,321**

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

River Basin	2020	2030	2040	2050	2060	2070
CYPRESS	133,287	134,898	135,865	137,069	138,458	140,109
NECHES	3,021	3,148	3,254	3,372	3,481	3,581
RED	23,463	23,369	23,141	23,108	23,119	23,180
SABINE	137,211	148,099	156,153	166,620	180,655	199,554
SULPHUR	102,621	103,960	104,622	106,014	107,851	110,212
TRINITY	1,816	1,925	2,043	2,198	2,405	2,685
TOTAL WATER DEMAND (AC-FT)	**401,419**	**415,399**	**425,078**	**438,381**	**455,969**	**479,321**

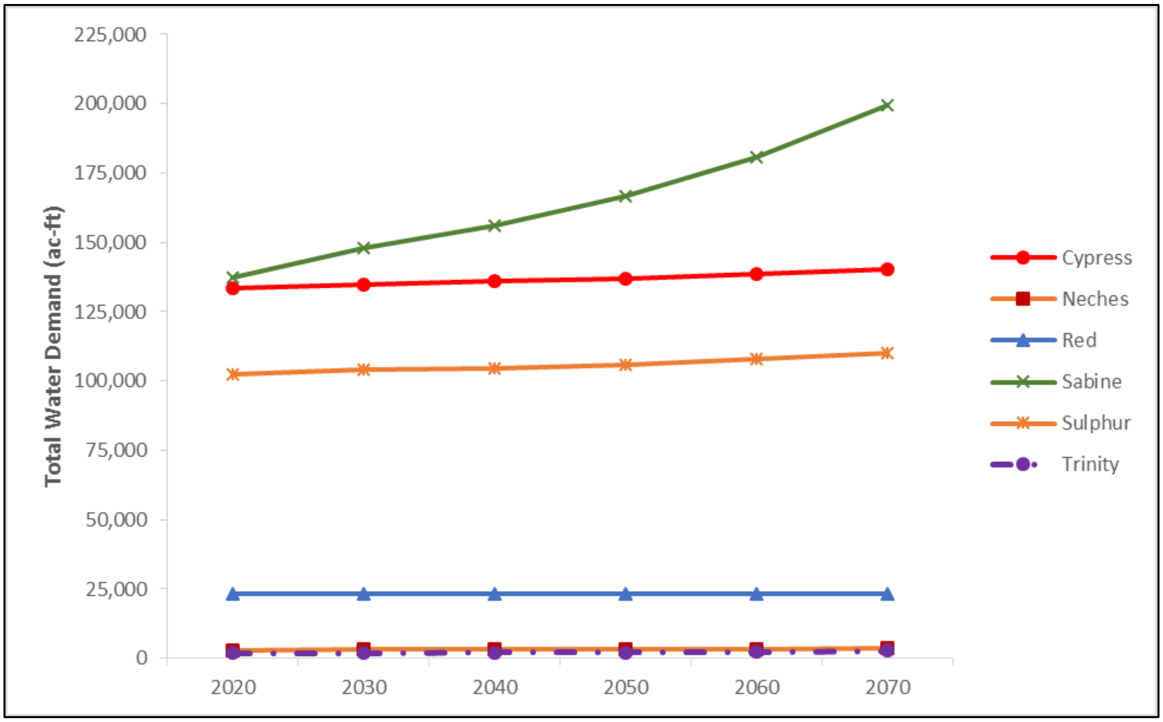


Figure 2.5 Water Demand Projections by River Basin

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 designated dry year (i.e., 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.
- 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. 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.

- 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 30% to 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 73,600 acre-feet, or 57% over the fifty year planning period (2020 to 2070). 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 200% through the year 2070.

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	2020	2030	2040	2050	2060	2070
BOWIE	14,434	14,496	14,426	14,910	15,410	15,858
CAMP	1,653	1,763	1,846	1,964	2,087	2,211
CASS	3,502	3,422	3,353	3,359	3,348	3,348
DELTA	673	664	655	653	652	653
FRANKLIN	1,431	1,450	1,452	1,470	1,491	1,513
GREGG	30,786	33,068	35,853	39,244	43,269	47,865
HARRISON	10,863	11,327	11,880	12,872	14,042	15,442
HOPKINS	5,566	5,766	5,968	6,273	6,620	6,978
HUNT	17,558	20,669	25,090	30,879	39,609	52,645
LAMAR	6,438	6,455	6,460	6,522	6,623	6,719
MARION	1,049	1,029	1,012	1,005	1,006	1,010
MORRIS	1,735	1,705	1,690	1,724	1,760	1,797
RAINS	2,074	2,145	2,143	2,151	2,158	2,164
RED RIVER	1,566	1,482	1,423	1,413	1,406	1,392
SMITH	7,201	8,020	9,026	10,287	11,822	13,664
TITUS	5,962	6,561	7,224	7,998	8,857	9,775
UPSHUR	4,988	5,187	5,374	5,629	5,914	6,189
VAN ZANDT	6,670	7,050	7,340	7,698	8,054	8,380
WOOD	5,159	5,183	5,119	5,178	5,222	5,257
REGION TOTAL	**129,308**	**137,442**	**147,334**	**161,229**	**179,350**	**202,860**

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

River Basin	2020	2030	2040	2050	2060	2070
CYPRESS	21,172	22,027	22,934	24,316	25,862	27,563
NECHES	1,425	1,547	1,642	1,750	1,850	1,939
RED	5,707	5,605	5,440	5,496	5,584	5,676
SABINE	73,236	79,791	88,035	98,778	113,088	132,132
SULPHUR	26,297	26,898	27,600	29,061	30,939	33,253
TRINITY	1,471	1,574	1,683	1,828	2,027	2,297
REGION TOTAL	**129,308**	**137,442**	**147,334**	**161,229**	**179,350**	**202,860**

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

For manufacturing, the 2020 water demand projections for each county are based on the highest county aggregated manufacturing water use in the most recent five years (2010–2014). The most recent 10-year projections for employment growth from the Texas Workforce Commission are used as proxy for growth by manufacturing sectors between 2020 and 2030. The water use within each North American Industry Classification System (NAICS) category is multiplied by the employment growth rate. In cases where the employment is projected to decrease for a three-digit NAICS sector, the water demand projections are held constant. After 2030, the manufacturing water demand is held constant through 2070. Water use estimates are developed through the TWDB's annual Water Use Survey.

Over the fifty year period from 2020 to 2070, 25% to 22% 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 5% over the 2020 to 2070 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	2020	2030	2040	2050	2060	2070
BOWIE	1,611	2,047	2,047	2,047	2,047	2,047
CAMP	35	52	52	52	52	52
CASS	32,723	32,799	32,799	32,799	32,799	32,799
DELTA	0	0	0	0	0	0
FRANKLIN	5	7	7	7	7	7
GREGG	1,233	1,517	1,517	1,517	1,517	1,517
HARRISON	24,736	27,940	27,940	27,940	27,940	27,940
HOPKINS	944	968	968	968	968	968
HUNT	555	672	672	672	672	672
LAMAR	5,026	5,137	5,137	5,137	5,137	5,137
MARION	0	0	0	0	0	0
MORRIS	25,738	25,743	25,743	25,743	25,743	25,743
RAINS	12	12	12	12	12	12
RED RIVER	3	3	3	3	3	3
SMITH	4	5	5	5	5	5
TITUS	4,063	4,155	4,155	4,155	4,155	4,155
UPSHUR	69	76	76	76	76	76
VAN ZANDT	506	757	757	757	757	757
WOOD	2,532	3,085	3,085	3,085	3,085	3,085
REGION TOTAL	**99,795**	**104,975**	**104,975**	**104,975**	**104,975**	**104,975**

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

River Basin	2020	2030	2040	2050	2060	2070
CYPRESS	30,168	30,294	30,294	30,294	30,294	30,294
NECHES	0	0	0	0	0	0
RED RIVER	313	321	321	321	321	321
SABINE	29,410	33,786	33,786	33,786	33,786	33,786
SULPHUR	39,901	40,570	40,570	40,570	40,570	40,570
TRINITY	3	4	4	4	4	4
REGION TOTAL	**99,795**	**104,975**	**104,975**	**104,975**	**104,975**	**104,975**

2.3.2.3 Regional Steam Electric Demand Projections

For steam-electric power generation projections, the 2020 water demand projections for each county are based on the highest county-aggregated historical steam-electric power water use in the most recent five years (2010–2014). The anticipated water use of future facilities listed in state and federal reports is added to the demand projections from the anticipated operation date until 2070. Subsequent demand projections after 2020 are held constant throughout the planning period. Water use estimates are developed through the TWDB's annual Water Use Survey.

Annual steam electric water demand is projected to remain constant from the year 2020 to 2070. In 2020, steam electric power generation projections represent approximately 23% of water demand for this Region. By 2070 steam electric is anticipated to require 20% of the region's water demand.

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

County	2020	2030	2040	2050	2060	2070
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	21,112	21,112	21,112	21,112	21,112	21,112
HOPKINS	0	0	0	0	0	0
HUNT	373	373	373	373	373	373
LAMAR	5,511	5,511	5,511	5,511	5,511	5,511
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	61,931	61,931	61,931	61,931	61,931	61,931
UPSHUR	0	0	0	0	0	0
VAN ZANDT	0	0	0	0	0	0
WOOD	0	0	0	0	0	0
REGION TOTAL	**94,174**	**94,174**	**94,174**	**94,174**	**94,174**	**94,174**

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

River Basin	2020	2030	2040	2050	2060	2070
CYPRESS	66,238	66,238	66,238	66,238	66,238	66,238
NECHES	0	0	0	0		0
RED	420	420	420	420	420	420
SABINE	22,425	22,425	22,425	22,425	22,425	22,425
SULPHUR	5,091	5,091	5,091	5,091	5,091	5,091
TRINITY	0	0	0	0	0	0
REGION TOTAL	**94,174**	**94,174**	**94,174**	**94,174**	**94,174**	**94,174**

2.3.2.4 Regional Mining Demand Projections

Mining water demand projections were carried forward from the 2017 State Water Plan and based largely on a 2012 TWDB-contracted study, "Oil & Gas Water Use in Texas: Update to the 2011 Mining Water Use Report," by the Bureau of Economic Geology (BEG). 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 2%). Annual water demand for mining purposes is anticipated to grow first and then decrease by about 4.5% for the fifty year period from 2020 to 2070. Mining water demand is largest in Harrison County, and is projected to be largest in Titus County by 2070. TWDB relied on a prior study with the BEG at the University of Texas at Austin to prepare mining water demand projections for each planning region.

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

County	2020	2030	2040	2050	2060	2070
BOWIE	0	0	0	0	0	0
CAMP	12	11	10	9	8	7
CASS	39	58	60	45	30	20
DELTA	0	0	0	0	0	0
FRANKLIN	5	5	4	4	3	2
GREGG	274	433	429	337	246	180
HARRISON	2,498	2,077	1,740	1,412	1,088	855
HOPKINS	1,031	1,124	1,222	1,329	1,446	1,577
HUNT	128	118	88	71	58	47
LAMAR	0	0	0	0	0	0
MARION	489	764	712	595	478	393
MORRIS	0	0	0	0	0	0
RAINS	0	0	0	0	0	0
RED	4	4	3	3	3	3

County	2020	2030	2040	2050	2060	2070
SMITH	287	309	341	394	438	497
TITUS	1,644	1,775	1,909	2,055	2,216	2,392
UPSHUR	379	726	771	609	450	333
VAN ZANDT	300	319	358	396	430	470
WOOD	25	25	23	21	20	19
REGION TOTAL	**7,115**	**7,748**	**7,670**	**7,280**	**6,914**	**6,795**

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

River Basin	2020	2030	2040	2050	2060	2070
CYPRESS	2,923	3,533	3,573	3,375	3,196	3,121
NECHES	81	86	97	107	116	127
RED	0	0	0	0	0	0
SABINE	3,174	3,1178	2,9165	2,625	2,335	2,173
SULPHUR	856	925	990	1,068	1,154	1,251
TRINITY	81	86	95	105	113	123
REGION TOTAL	**7,115**	**7,748**	**7,670**	**7,280**	**6,914**	**6,795**

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 (2010–2014) 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 2017 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 9% of water demand in the North East Texas Region in the year 2020. Livestock water demand is expected to remain relatively constant over the 50 year planning period, with a reduction to 7% of 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 5,498 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	2020	2030	2040	2050	2060	2070
BOWIE	1,825	1,825	1,657	1,421	1,217	1,136
CAMP	4,914	4,914	4,914	4,914	4,914	4,914
CASS	2,657	2,657	2,657	2,657	2,657	2,657
DELTA	541	541	541	541	541	541
FRANKLIN	2,850	2,850	2,850	2,850	2,850	2,850
GREGG	210	210	210	210	210	210
HARRISON	636	669	702	736	773	815
HOPKINS	5,498	5,498	5,498	5,498	5,498	5,498
HUNT	1,095	1,095	1,095	1,095	1,095	1,095
LAMAR	1,469	1,469	1,469	1,469	1,469	1,469
MARION	188	188	188	188	188	188
MORRIS	1,605	1,605	1,605	1,605	1,605	1,605
RAINS	428	428	428	428	428	428
RED RIVER	1,532	1,532	1,532	1,532	1,532	1,532
SMITH	514	514	514	514	514	514
TITUS	2,947	2,947	2,947	2,947	2,947	2,947
UPSHUR	1,651	1,651	1,651	1,651	1,651	1,651
VAN ZANDT	1,889	1,889	1,889	1,889	1,889	1,889
WOOD	3,224	3,224	3,224	3,224	3,224	3,224
REGION TOTAL	**35,673**	**35,706**	**35,571**	**35,369**	**35,202**	**35,163**

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

River Basin	2020	2030	2040	2050	2060	2070
CYPRESS	12,001	12,021	12,041	12,061	12,083	12,108
NECHES	1,015	1,015	1,015	1,015	1,015	1,015
RED	2,066	2,066	2,003	1,914	1,837	1,806
SABINE	7,487	7,500	7,513	7,527	7,542	7,559
SULPHUR	12,855	12,855	12,750	12,603	12,476	12,426
TRINITY	249	249	249	249	249	249
REGION TOTAL	**35,673**	**35,706**	**35,571**	**35,369**	**35,202**	**35,163**

2.3.4 Irrigation Demand

TWDB annual Irrigation water use estimates are produced by calculating a crop water need based on evapotranspiration and other climatic factors. This need per acre is then applied to irrigated acreage data obtained from the USDA Farm Service Agency in order to determine estimated irrigation water use by TWDB crop category. These estimates are then made available to Groundwater Conservation Districts (GCDs) for comment, although in the North Texas Region no GCDs presently exist.

2.3.4.1 Methodology

The baseline methodology for irrigation water demand projections is the average of the most recent five years (2010–2014) of water use estimates that is then held constant between 2020 and 2070. 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 irrigation water demand projections begin to decline in 2030 or later, commensurate with the 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, 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

Irrigation water represented approximately 9% of water demand in the North East Texas Region in 2016. Projected irrigation water demand similarly represents approximately 9% of the projected water demand in the year 2020. Irrigation demand is projected to remain relatively constant over the 50 year planning period, with a reduction in percentage to around 7% of the Region's total water demand by 2070. 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	2020	2030	2040	2050	2060	2070
BOWIE	10,373	10,373	10,373	10,373	10,373	10,373
CAMP	0	0	0	0	0	0
CASS	0	0	0	0	0	0
DELTA	2,396	2,396	2,396	2,396	2,396	2,396
FRANKLIN	103	103	103	103	103	103
GREGG	40	40	40	40	40	40
HARRISON	701	701	701	701	701	701
HOPKINS	4,769	4,769	4,769	4,769	4,769	4,769
HUNT	355	355	355	355	355	355
LAMAR	10,126	10,126	10,126	10,126	10,126	10,126
MARION	12	12	12	12	12	12
MORRIS	11	11	11	11	11	11
RAINS	65	65	65	65	65	65

County	2020	2030	2040	2050	2060	2070
RED	3,867	3,867	3,867	3,867	3,867	3,867
SMITH	324	324	324	324	324	324
TITUS	1,053	1,053	1,053	1,053	1,053	1,053
UPSHUR	170	170	170	170	170	170
VAN ZANDT	500	500	500	500	500	500
WOOD	489	489	489	489	489	489
REGION TOTAL	**35,354**	**35,354**	**35,354**	**35,354**	**35,354**	**35,354**

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

River Basin	2020	2030	2040	2050	2060	2070
CYPRESS	785	785	785	785	785	785
NECHES	500	500	500	500	500	500
RED	14,957	14,957	14,957	14,957	14,957	14,957
SABINE	1,479	1,479	1,479	1,479	1,479	1,479
SULPHUR	17,621	17,621	17,621	17,621	17,621	17,621
TRINITY	12	12	12	12	12	12
REGION TOTAL	**35,354**	**35,354**	**35,354**	**35,354**	**35,354**	**35,354**

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 demands as adopted by for the purposes of the 2021 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 2021 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	2020	2030	2040	2050	2060	2070
BI COUNTY WSC	WUG Seller	MANUFACTURING	CAMP	CYPRESS	2	2	2	2	2	2
BI COUNTY WSC	WUG Seller	STEAM ELECTRIC POWER	TITUS	CYPRESS	3	3	3	3	3	3
BRIGHT STAR SALEM SUD	WUG Seller	MUNICIPAL	RAINS	SABINE	90	90	90	90	90	90
CASH SUD	WUG Seller	MUNICIPAL	HUNT	SABINE	294	503	810	1,060	1,610	2,510
CASH SUD	WUG Seller	MUNICIPAL	HUNT	SULPHUR	19	33	53	70	106	165
CASH SUD	WUG Seller	MUNICIPAL	HUNT	TRINITY	8	14	23	30	46	71
CASH SUD	WUG Seller	MUNICIPAL	HUNT	SABINE	605	605	605	605	605	605
CHEROKEE WATER COMPANY	MWP	MUNICIPAL	GREGG	SABINE	15,636	15,643	15,652	15,654	15,658	15,660
CHEROKEE WATER COMPANY	MWP	MUNICIPAL	HARRISON	SABINE	364	357	348	346	342	340
CHEROKEE WATER COMPANY	MWP	STEAM ELECTRIC POWER	GREGG	SABINE	2,000	2,000	2,000	2,000	2,000	2,094
COMMERCE	WUG Seller	MUNICIPAL	DELTA	SULPHUR	74	74	74	74	74	74
COMMERCE	WUG Seller	MUNICIPAL	NULL	NULL	0	0	0	0	0	0
COMMERCE	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	3	3	3	3	3	3
COMMERCE	WUG Seller	MANUFACTURING	HUNT	SULPHUR	55	67	67	67	67	67
COMMERCE	WUG Seller	MUNICIPAL	FANNIN	SULPHUR	0	0	0	0	0	0
COMMERCE	WUG Seller	MUNICIPAL	DELTA	SULPHUR	49	38	30	22	17	12
COMMERCE	WUG Seller	MUNICIPAL	HUNT	SULPHUR	614	625	633	641	646	651
COMMERCE	WUG Seller	MUNICIPAL	HUNT	SULPHUR	1	1	1	1	1	1
COOPER	WUG Seller	MUNICIPAL	DELTA	SULPHUR	82	83	82	80	76	73
COOPER	WUG Seller	MUNICIPAL	HUNT	SABINE	4	6	8	12	19	21
COOPER	WUG Seller	MUNICIPAL	FANNIN	SULPHUR	0	0	0	0	0	0
COOPER	WUG Seller	MUNICIPAL	DELTA	SULPHUR	129	125	126	127	131	135
COOPER	WUG Seller	MUNICIPAL	HUNT	SULPHUR	1	1	1	1	1	1

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, UPSHUR	WUG Seller	IRRIGATION	UPSHUR	CYPRESS	350	350	350	350	350	350
EMORY	WUG Seller	MUNICIPAL	RAINS	SABINE	773	773	773	773	773	773
EMORY	WUG Seller	MUNICIPAL	RAINS	SABINE	190	192	188	187	187	188
FARMERSVILLE	WUG Seller	MUNICIPAL	COLLIN	SABINE	0	0	0	0	0	0
FARMERSVILLE	WUG Seller	MUNICIPAL	COLLIN	TRINITY	0	0	0	0	0	0
FARMERSVILLE	WUG Seller	MUNICIPAL	HUNT	SABINE	113	142	186	247	331	449
FRANKLIN COUNTY WD	MWP	MUNICIPAL	FRANKLIN	CYPRESS	2,173	2,179	2,175	2,179	2,177	2,170
FRANKLIN COUNTY WD	MWP	MUNICIPAL	FRANKLIN	SULPHUR	1,411	1,414	1,412	1,409	1,406	1,406
FRANKLIN COUNTY WD	MWP	MUNICIPAL	HOPKINS	CYPRESS	182	177	172	165	163	161
FRANKLIN COUNTY WD	MWP	MUNICIPAL	HOPKINS	SULPHUR	364	354	344	337	332	321
FRANKLIN COUNTY WD	MWP	MUNICIPAL	TITUS	CYPRESS	57	57	69	74	79	83
FRANKLIN COUNTY WD	MWP	MUNICIPAL	TITUS	SULPHUR	85	97	103	114	124	138
FRANKLIN COUNTY WD	MWP	MUNICIPAL	WOOD	CYPRESS	228	222	224	222	219	221
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	405	406	407	410	411	413
FRANKLIN COUNTY WD	MWP	MUNICIPAL	WOOD	CYPRESS	617	615	614	613	615	612
FRANKLIN COUNTY WD	MWP	MUNICIPAL	WOOD	SABINE	978	979	978	977	975	975
GLADEWATER	WUG Seller	MUNICIPAL	GREGG	SABINE	154	154	154	154	154	54
GLADEWATER	WUG Seller	MUNICIPAL	SMITH	SABINE	23	23	23	23	23	23
GLADEWATER	WUG Seller	MUNICIPAL	UPSHUR	CYPRESS	94	95	95	95	94	95

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
GLADEWATER	WUG Seller	MUNICIPAL	UPSHUR	SABINE	18	17	17	17	18	17
GOLDEN WSC	WUG Seller	MANUFACTURING	VAN ZANDT	SABINE	0	0	0	0	0	0
GRAND SALINE	WUG Seller	MANUFACTURING	VAN ZANDT	SABINE	0	0	0	0	0	0
GREENVILLE	WUG Seller	MUNICIPAL	HUNT	SABINE	178	186	201	242	309	319
GREENVILLE	WUG Seller	MUNICIPAL	HUNT	SABINE	925	900	862	807	726	607
GREENVILLE	WUG Seller	MANUFACTURING	HUNT	SABINE	580	704	836	962	1,049	1,184
GREENVILLE	WUG Seller	MANUFACTURING	HUNT	SULPHUR	217	261	310	357	389	440
GREENVILLE	WUG Seller	MINING	HUNT	SABINE	13	14	16	17	21	21
GREENVILLE	WUG Seller	MINING	HUNT	SULPHUR	5	5	6	6	8	8
GREENVILLE	WUG Seller	MINING	HUNT	TRINITY	0	1	1	1	1	1
GREENVILLE	WUG Seller	MUNICIPAL	HUNT	SABINE	139	164	202	257	338	457
GREENVILLE	WUG Seller	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	WUG Seller	MUNICIPAL	CASS	CYPRESS	60	60	60	59	59	59
HUGHES SPRINGS	WUG Seller	MUNICIPAL	MORRIS	CYPRESS	32	32	32	33	33	33
KILGORE	WUG Seller	MUNICIPAL	GREGG	CYPRESS	6	31	33	37	41	45
KILGORE	WUG Seller	MUNICIPAL	GREGG	SABINE	105	590	630	693	767	855
KILGORE	WUG Seller	MUNICIPAL	GREGG	SABINE	280	307	324	349	380	413
KILGORE	WUG Seller	MUNICIPAL	RUSK	SABINE	0	0	0	0	0	0
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	RED RIVER	RED	67	66	64	64	63	63
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	RED RIVER	SULPHUR	157	152	149	148	148	148
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	LAMAR	SULPHUR	216	230	245	245	245	245
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	LAMAR	RED	72	73	74	74	74	73
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	LAMAR	SULPHUR	202	207	211	209	207	206
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	RED RIVER	RED	107	104	102	103	101	93
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	RED RIVER	SULPHUR	146	146	145	144	146	154

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
LAMAR COUNTY WSD	WUG Seller	MANUFACTURING	LAMAR	RED	858	900	941	976	1,042	1,077
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	RED RIVER	RED	323	323	323	323	323	323
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	LAMAR	RED	83	92	99	107	115	124
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	LAMAR	SULPHUR	545	607	655	707	758	811
LONGVIEW	WUG Seller	MUNICIPAL	GREGG	CYPRESS	3	2	2	3	3	3
LONGVIEW	WUG Seller	MUNICIPAL	GREGG	SABINE	47	48	48	47	47	48
LONGVIEW	WUG Seller	MUNICIPAL	GREGG	SABINE	1,473	1,473	1,473	1,473	1,473	1,473
LONGVIEW	WUG Seller	MUNICIPAL	RUSK	SABINE	0	0	0	0	0	0
LONGVIEW	WUG Seller	MUNICIPAL	HARRISON	CYPRESS	790	788	788	790	789	791
LONGVIEW	WUG Seller	MUNICIPAL	HARRISON	SABINE	2,150	2,152	2,152	2,150	2,151	2,149
LONGVIEW	WUG Seller	MUNICIPAL	HARRISON	SABINE	1,105	1,105	1,105	1,105	1,105	1,105
LONGVIEW	WUG Seller	MANUFACTURING	GREGG	SABINE	1,092	1,094	1,094	1,094	1,094	1,094
LONGVIEW	WUG Seller	MANUFACTURING	HARRISON	SABINE	8,344	8,344	8,344	8,344	8,344	8,344
LONGVIEW	WUG Seller	STEAM ELECTRIC POWER	HARRISON	SABINE	6,161	6,161	6,161	6,161	6,161	6,161
LONGVIEW	WUG Seller	MUNICIPAL	GREGG	SABINE	5,600	5,600	5,600	5,600	5,600	5,600
MANUFACTURING, CASS	WUG Seller	MUNICIPAL	CASS	CYPRESS	2,326	2,326	2,326	2,326	2,326	2,326
MANUFACTURING, CASS	WUG Seller	MUNICIPAL	CASS	SULPHUR	2	2	2	2	2	2
MANUFACTURING, CASS	WUG Seller	MUNICIPAL	CASS	SULPHUR	44	44	44	44	44	44
MANUFACTURING, CASS	WUG Seller	MUNICIPAL	NULL	NULL	258	251	244	243	243	243
MARSHALL	WUG Seller	MUNICIPAL	HARRISON	CYPRESS	204	204	204	204	204	204
MARSHALL	WUG Seller	MUNICIPAL	HARRISON	SABINE	119	119	119	119	119	119
MARSHALL	WUG Seller	MUNICIPAL	HARRISON	SABINE	100	100	100	100	100	100
MARSHALL	WUG Seller	MUNICIPAL	PANOLA	SABINE	0	0	0	0	0	0
MARSHALL	WUG Seller	MANUFACTURING	HARRISON	SABINE	2,000	2,000	2,000	2,000	2,000	2,000
MOUNT PLEASANT	WUG Seller	MUNICIPAL	FRANKLIN	SULPHUR	14	16	17	17	17	17

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
MOUNT PLEASANT	WUG Seller	MUNICIPAL	TITUS	CYPRESS	259	281	294	307	321	337
MOUNT PLEASANT	WUG Seller	MUNICIPAL	TITUS	SULPHUR	428	462	482	503	527	553
MOUNT PLEASANT	WUG Seller	MANUFACTURING	TITUS	CYPRESS	3,345	3,409	3,472	3,483	3,617	3,651
MOUNT PLEASANT	WUG Seller	MUNICIPAL	MORRIS	CYPRESS	182	178	177	180	184	186
MOUNT PLEASANT	WUG Seller	MUNICIPAL	TITUS	CYPRESS	1,017	1,106	1,207	1,329	1,469	1,620
MOUNT PLEASANT	WUG Seller	MUNICIPAL	TITUS	SULPHUR	528	575	627	691	764	843
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SABINE	351	456	573	747	956	1,213
NORTH TEXAS MWD	MWP	MUNICIPAL	VAN ZANDT	SABINE	12	10	13	12	11	9
NORTH TEXAS MWD	MWP	MUNICIPAL	NULL	NULL	NULL	NULL	NULL	NULL	NULL	NULL
NORTH TEXAS MWD	MWP	MUNICIPAL	COLLIN	SABINE	0	0	0	0	0	0
NORTH TEXAS MWD	MWP	MUNICIPAL	COLLIN	TRINITY	0	0	0	0	0	0
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SABINE	1,015	1,275	1,670	2,219	2,983	4,044
NORTH TEXAS MWD	MWP	MUNICIPAL	ROCKWALL	SABINE	0	0	0	0	0	0
NORTH TEXAS MWD	MWP	MUNICIPAL	HOPKINS	SABINE	8	8	9	9	8	7
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SABINE	1,376	1,701	2,032	2,365	2,375	2,384
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SULPHUR	20	25	29	33	34	34
NORTH TEXAS MWD	MWP	MUNICIPAL	RAINS	SABINE	53	59	59	58	49	41
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SABINE	346	553	784	1,038	1,074	1,074
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SABINE	1,741	2,812	3,887	6,779	9,963	12,192
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	CASS	CYPRESS	1,406	1,406	1,406	1,406	1,406	1,406
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	47	47	48	49	51	53
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	MARION	CYPRESS	50	47	45	42	40	38

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	UPSHUR	CYPRESS	642	644	646	649	649	648
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	HARRISON	CYPRESS	2,304	2,303	2,304	2,304	2,306	2,306
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	MARION	CYPRESS	1,735	1,735	1,732	1,734	1,730	1,730
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	CASS	CYPRESS	3,470	3,469	3,469	3,468	3,468	3,468
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	MORRIS	CYPRESS	72	75	78	78	78	78
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	19,545	19,554	19,565	19,568	19,572	19,575
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	HARRISON	SABINE	455	446	435	432	428	425
NORTHEAST TEXAS MWD	MWP	MANUFACTURING	CAMP	CYPRESS	100	100	100	100	100	100
NORTHEAST TEXAS MWD	MWP	MANUFACTURING	MORRIS	CYPRESS	45,437	45,437	45,437	45,437	45,437	45,437
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	HARRISON	CYPRESS	1,584	1,584	1,584	1,584	1,584	1,584
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	HARRISON	SABINE	7,416	7,416	7,416	7,416	7,416	7,416
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	CASS	CYPRESS	133	133	133	133	133	133
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	MARION	CYPRESS	763	763	763	763	763	763
NORTHEAST TEXAS MWD	MWP	MINING	TITUS	CYPRESS	1,644	1,775	1,909	2,055	2,216	2,392

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
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	21,862	21,062	20,162	19,362	18,539	18,300
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	GREGG	CYPRESS	1,791	1,795	1,801	1,804	1,804	1,806
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	GREGG	SABINE	131	132	133	133	134	134
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	HARRISON	CYPRESS	341	337	329	326	324	322
PARIS	WUG Seller	MUNICIPAL	LAMAR	RED	9,439	9,442	9,443	9,439	9,437	9,442
PARIS	WUG Seller	MUNICIPAL	LAMAR	SULPHUR	4,003	4,000	3,999	4,003	4,005	4,000
PARIS	WUG Seller	MANUFACTURING	LAMAR	SULPHUR	5,091	5,340	5,580	5,787	6,183	6,386
PARIS	WUG Seller	STEAM ELECTRIC POWER	LAMAR	RED	683	683	683	683	683	683
PARIS	WUG Seller	STEAM ELECTRIC POWER	LAMAR	SULPHUR	8,278	8,278	8,278	8,278	8,278	8,278
POINT	WUG Seller	MANUFACTURING	RAINS	SABINE	12	12	12	12	12	12
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	16	16	16	16	16	16
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	94	94	94	94	94	94
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	176	186	193	193	193	193
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	315	333	348	348	348	348

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	RED RIVER	RED	45	44	45	45	45	42
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	RED RIVER	SULPHUR	61	62	63	64	64	69
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	45	44	44	44	45	45
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	250	248	245	247	249	253
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	281	278	276	271	269	269
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	552	552	552	552	552	552
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MANUFACTURING	BOWIE	RED	83	146	162	183	203	246
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MANUFACTURING	BOWIE	SULPHUR	33,521	59,782	66,347	74,552	82,758	100,567
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MANUFACTURING	CASS	CYPRESS	914	916	916	916	916	916
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MANUFACTURING	CASS	SULPHUR	121,716	121,707	121,700	121,699	121,699	121,699
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	211	226	241	238	237	237
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	368	368	368	368	368	368
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	494	494	494	494	493	493
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	1,186	1,186	1,186	1,186	1,187	1,187
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	RED RIVER	RED	57	57	57	57	57	57
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	RED RIVER	SULPHUR	159	159	159	159	159	159

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	55	55	55	55	55	55
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	843	859	880	909	947	989
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	6,302	6,423	6,579	6,797	7,081	7,391
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	699	750	802	861	932	931
ROCKWALL	WUG Seller	MUNICIPAL	HUNT	SABINE	865	961	1,017	1,038	1,167	1,256
ROYSE CITY	WUG Seller	MUNICIPAL	COLLIN	SABINE	0	0	0	0	0	0
ROYSE CITY	WUG Seller	MUNICIPAL	ROCKWALL	SABINE	0	0	0	0	0	0
ROYSE CITY	WUG Seller	MUNICIPAL	HUNT	SABINE	391	467	571	711	918	1,216
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	RAINS	SABINE	840	840	840	840	840	840
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	ROCKWALL	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HOPKINS	SABINE	9	8	7	6	6	5
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HUNT	SABINE	1,586	1,593	1,602	1,610	1,617	1,623
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HUNT	SULPHUR	23	23	23	23	23	23
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	RAINS	SABINE	61	55	46	40	33	28
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HUNT	SABINE	1,893	1,929	1,971	2,014	2,056	2,096
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	VAN ZANDT	SABINE	347	311	269	226	184	144
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

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
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	25,763	25,763	25,763	25,763	25,763	25,763
SABINE RIVER AUTHORITY	MWP	IRRIGATION	VAN ZANDT	NECHES	184	184	184	184	184	184
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	GREGG	SABINE	6,721	6,721	6,721	6,721	6,721	6,721
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	RUSK	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	GREGG	SABINE	19,545	19,554	19,565	19,568	19,572	19,575
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HARRISON	SABINE	455	446	435	432	428	425
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	KAUFMAN	SABINE	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	KAUFMAN	TRINITY	0	0	0	0	0	0
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HUNT	SABINE	103	118	140	165	203	258
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	VAN ZANDT	SABINE	814	806	799	789	774	752
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	VAN ZANDT	TRINITY	1,322	1,315	1,301	1,287	1,263	1,230
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

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HUNT	SABINE	1,120	1,120	1,120	1,120	1,120	1,120
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	VAN ZANDT	SABINE	892	895	895	894	893	894
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	VAN ZANDT	TRINITY	1,348	1,345	1,345	1,346	1,347	1,346
SULPHUR RIVER MWD	MWP	MUNICIPAL	HOPKINS	SABINE	43	42	41	43	41	39
SULPHUR RIVER MWD	MWP	MUNICIPAL	HOPKINS	SULPHUR	13,505	13,428	13,352	13,274	13,199	13,124
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SABINE	67	70	74	77	82	87
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	81	85	89	93	99	105
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	77	77	77	77	77	77
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SABINE	48	53	50	15	0	0
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	28	30	29	9	0	0
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	109	111	115	121	128	135
SULPHUR SPRINGS	WUG Seller	LIVESTOCK	HOPKINS	CYPRESS	32	34	38	38	42	44
SULPHUR SPRINGS	WUG Seller	LIVESTOCK	HOPKINS	SABINE	399	420	466	469	519	541
SULPHUR SPRINGS	WUG Seller	LIVESTOCK	HOPKINS	SULPHUR	1,042	1,097	1,216	1,223	1,353	1,411
SULPHUR SPRINGS	WUG Seller	MANUFACTURING	HOPKINS	SULPHUR	1,741	1,830	1,915	1,987	2,126	2,275
SULPHUR SPRINGS	WUG Seller	MANUFACTURING	HUNT	SABINE	50	50	50	50	50	50
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SABINE	189	189	189	189	189	189
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	34	34	34	34	34	34
SULPHUR SPRINGS	WUG Seller	MINING	HOPKINS	CYPRESS	6	7	7	8	8	9
SULPHUR SPRINGS	WUG Seller	MINING	HOPKINS	SABINE	62	68	74	81	88	96
SULPHUR SPRINGS	WUG Seller	MINING	HOPKINS	SULPHUR	132	145	158	172	188	205
SULPHUR SPRINGS	WUG Seller	MINING	TITUS	CYPRESS	80	80	80	80	80	80
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	921	921	921	921	921	921
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SABINE	48	50	53	55	59	62
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	59	62	65	68	72	76

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
TARRANT REGIONAL WD	MWP	MUNICIPAL	VAN ZANDT	TRINITY	2,044	2,220	2,388	3,143	4,379	6,073
TERRELL	WUG Seller	MUNICIPAL	KAUFMAN	SABINE	0	0	0	0	0	0
TERRELL	WUG Seller	MUNICIPAL	KAUFMAN	TRINITY	0	0	0	0	0	0
TERRELL	WUG Seller	MUNICIPAL	HUNT	SABINE	353	430	528	681	913	1,228
TEXARKANA	WUG Seller	MUNICIPAL	BOWIE	RED	30,975	30,896	30,724	30,838	30,838	30,838
TEXARKANA	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	149,025	149,104	149,276	149,162	149,162	149,162
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
TRI SUD	WUG Seller	MINING	TITUS	CYPRESS	7	7	7	7	7	7
TYLER	WUG Seller	MUNICIPAL	SMITH	NECHES	239	239	239	239	239	239
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	MWP	MUNICIPAL	SMITH	SABINE	67,200	67,200	67,200	67,200	67,200	67,200
WHITE OAK	WUG Seller	MUNICIPAL	GREGG	SABINE	50	50	50	50	50	50
WHITE OAK	WUG Seller	Municipal	Upshur	Cypress	34	34	34	34	34	34
WHITE OAK	WUG Seller	Municipal	Upshur	Sabine	6	6	6	6	6	6
				TOTAL	836,551	866,563	876,652	890,963	907,085	933,405

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

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
BI COUNTY WSC	WUG Seller	MANUFACTURING	CAMP	CYPRESS	2	2	2	2	2	2
BI COUNTY WSC	WUG Seller	STEAM ELECTRIC POWER	TITUS	CYPRESS	3	3	3	3	3	3
BRIGHT STAR SALEM SUD	WUG Seller	MUNICIPAL	RAINS	SABINE	90	90	90	90	90	90
CASH SUD	WUG Seller	MUNICIPAL	HUNT	SABINE	189	295	475	722	1,097	1,744
CASH SUD	WUG Seller	MUNICIPAL	HUNT	SULPHUR	34	67	99	48	72	115
CASH SUD	WUG Seller	MUNICIPAL	HUNT	TRINITY	0	12	30	20	31	49
CASH SUD	WUG Seller	MUNICIPAL	HUNT	SABINE	134	133	134	140	154	174
CHEROKEE WATER COMPANY	MWP	MUNICIPAL	GREGG	SABINE	7,463	7,467	7,471	7,472	7,474	7,475
CHEROKEE WATER COMPANY	MWP	MUNICIPAL	HARRISON	SABINE	174	170	166	165	163	162
CHEROKEE WATER COMPANY	MWP	STEAM ELECTRIC POWER	GREGG	SABINE	2,000	2,000	2,000	2,000	2,000	2,000
COMMERCE	WUG Seller	MUNICIPAL	DELTA	SULPHUR	74	74	74	74	74	74
COMMERCE	WUG Seller	MUNICIPAL	NULL	NULL	0	0	0	0	0	0
COMMERCE	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	3	3	3	3	3	3
COMMERCE	WUG Seller	MANUFACTURING	HUNT	SULPHUR	55	67	67	67	67	67
COMMERCE	WUG Seller	MUNICIPAL	FANNIN	SULPHUR	18	16	13	11	9	7
COMMERCE	WUG Seller	MUNICIPAL	DELTA	SULPHUR	9	7	6	4	3	3
COMMERCE	WUG Seller	MUNICIPAL	HUNT	SULPHUR	120	124	128	132	135	137
COMMERCE	WUG Seller	MUNICIPAL	HUNT	SULPHUR	1	1	1	1	1	1
COOPER	WUG Seller	MUNICIPAL	DELTA	SULPHUR	82	83	82	80	76	73
COOPER	WUG Seller	MUNICIPAL	HUNT	SABINE	4	6	8	12	19	21
COOPER	WUG Seller	MUNICIPAL	FANNIN	SULPHUR	3	3	3	3	3	3
COOPER	WUG Seller	MUNICIPAL	DELTA	SULPHUR	126	122	123	124	128	132
COOPER	WUG Seller	MUNICIPAL	HUNT	SULPHUR	1	1	1	1	1	1

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, UPSHUR	WUG Seller	IRRIGATION	UPSHUR	CYPRESS	350	350	350	350	350	350
EMORY	WUG Seller	MUNICIPAL	RAINS	SABINE	237	246	247	247	248	248
EMORY	WUG Seller	MUNICIPAL	RAINS	SABINE	190	192	188	187	187	188
FARMERSVILLE	WUG Seller	MUNICIPAL	COLLIN	SABINE	16	16	20	23	27	31
FARMERSVILLE	WUG Seller	MUNICIPAL	COLLIN	TRINITY	10	11	12	15	18	21
FARMERSVILLE	WUG Seller	MUNICIPAL	HUNT	SABINE	86	93	113	136	166	210
FRANKLIN COUNTY WD	MWP	MUNICIPAL	FRANKLIN	CYPRESS	2,067	1,983	1,892	1,825	1,735	1,660
FRANKLIN COUNTY WD	MWP	MUNICIPAL	FRANKLIN	SULPHUR	1,341	1,288	1,228	1,180	1,122	1,076
FRANKLIN COUNTY WD	MWP	MUNICIPAL	HOPKINS	CYPRESS	173	161	150	139	130	123
FRANKLIN COUNTY WD	MWP	MUNICIPAL	HOPKINS	SULPHUR	346	322	300	282	265	246
FRANKLIN COUNTY WD	MWP	MUNICIPAL	TITUS	CYPRESS	54	52	60	62	63	64
FRANKLIN COUNTY WD	MWP	MUNICIPAL	TITUS	SULPHUR	81	88	90	96	99	106
FRANKLIN COUNTY WD	MWP	MUNICIPAL	WOOD	CYPRESS	216	203	195	186	175	169
FRANKLIN COUNTY WD	MWP	MUNICIPAL	FRANKLIN	SULPHUR	2,852	2,731	2,610	2,514	2,393	2,296
FRANKLIN COUNTY WD	MWP	MUNICIPAL	FRANKLIN	CYPRESS	384	370	355	343	328	316
FRANKLIN COUNTY WD	MWP	MUNICIPAL	WOOD	CYPRESS	587	560	534	514	490	469
FRANKLIN COUNTY WD	MWP	MUNICIPAL	WOOD	SABINE	930	891	851	819	777	746
GLADEWATER	WUG Seller	MUNICIPAL	GREGG	SABINE	154	154	154	154	154	54
GLADEWATER	WUG Seller	MUNICIPAL	SMITH	SABINE	23	23	23	23	23	23
GLADEWATER	WUG Seller	MUNICIPAL	UPSHUR	CYPRESS	76	76	76	76	76	76

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
GLADEWATER	WUG Seller	MUNICIPAL	UPSHUR	SABINE	36	36	36	36	36	36
GOLDEN WSC	WUG Seller	MANUFACTURING	VAN ZANDT	SABINE	2	2	2	2	2	2
GRAND SALINE	WUG Seller	MANUFACTURING	VAN ZANDT	SABINE	15	15	15	15	14	14
GREENVILLE	WUG Seller	MUNICIPAL	HUNT	SABINE	178	186	201	242	309	319
GREENVILLE	WUG Seller	MUNICIPAL	HUNT	SABINE	925	900	862	807	726	607
GREENVILLE	WUG Seller	MANUFACTURING	HUNT	SABINE	701	850	1,031	1,204	1,323	1,509
GREENVILLE	WUG Seller	MANUFACTURING	HUNT	SULPHUR	96	115	115	115	115	115
GREENVILLE	WUG Seller	MINING	HUNT	SABINE	13	14	16	17	19	16
GREENVILLE	WUG Seller	MINING	HUNT	SULPHUR	5	5	6	6	9	13
GREENVILLE	WUG Seller	MINING	HUNT	TRINITY	1	1	1	1	1	1
GREENVILLE	WUG Seller	MUNICIPAL	HUNT	SABINE	139	164	202	257	338	457
GREENVILLE	WUG Seller	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	WUG Seller	MUNICIPAL	CASS	CYPRESS	60	60	60	59	59	59
HUGHES SPRINGS	WUG Seller	MUNICIPAL	MORRIS	CYPRESS	32	32	32	33	33	33
KILGORE	WUG Seller	MUNICIPAL	GREGG	CYPRESS	17	31	33	37	41	45
KILGORE	WUG Seller	MUNICIPAL	GREGG	SABINE	94	590	630	693	767	855
KILGORE	WUG Seller	MUNICIPAL	GREGG	SABINE	32	34	36	39	43	47
KILGORE	WUG Seller	MUNICIPAL	RUSK	SABINE	248	273	288	310	337	366
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	RED RIVER	RED	67	66	64	64	63	63
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	RED RIVER	SULPHUR	157	152	149	148	148	148
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	LAMAR	SULPHUR	216	230	245	245	245	245
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	LAMAR	RED	5	6	6	6	6	6
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	LAMAR	SULPHUR	269	274	279	277	275	273
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	RED RIVER	RED	44	33	34	35	34	32
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	RED RIVER	SULPHUR	36	47	48	48	50	52
LAMAR COUNTY WSD	WUG Seller	MANUFACTURING	LAMAR	RED	858	900	941	976	1,042	1,077
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	RED RIVER	RED	184	184	184	184	184	184

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	LAMAR	RED	115	128	138	149	160	171
LAMAR COUNTY WSD	WUG Seller	MUNICIPAL	LAMAR	SULPHUR	513	571	616	665	713	764
LONGVIEW	WUG Seller	MUNICIPAL	GREGG	CYPRESS	3	2	2	3	3	3
LONGVIEW	WUG Seller	MUNICIPAL	GREGG	SABINE	47	48	48	47	47	47
LONGVIEW	WUG Seller	MUNICIPAL	GREGG	SABINE	374	373	373	373	374	359
LONGVIEW	WUG Seller	MUNICIPAL	RUSK	SABINE	192	193	193	193	192	207
LONGVIEW	WUG Seller	MUNICIPAL	HARRISON	CYPRESS	791	788	788	789	788	791
LONGVIEW	WUG Seller	MUNICIPAL	HARRISON	SABINE	2,149	2,152	2,152	2,151	2,152	2,149
LONGVIEW	WUG Seller	MUNICIPAL	HARRISON	SABINE	737	737	737	737	737	737
LONGVIEW	WUG Seller	MANUFACTURING	GREGG	SABINE	1,092	1,094	1,094	1,094	1,094	1,094
LONGVIEW	WUG Seller	MANUFACTURING	HARRISON	SABINE	5,924	5,924	5,924	5,924	5,924	5,924
LONGVIEW	WUG Seller	STEAM ELECTRIC POWER	HARRISON	SABINE	6,161	6,161	6,161	6,161	6,161	6,161
LONGVIEW	WUG Seller	MUNICIPAL	GREGG	SABINE	2,595	2,595	2,595	2,595	2,595	2,595
MANUFACTURING, CASS	WUG Seller	MUNICIPAL	CASS	CYPRESS	1,016	1,074	1,134	1,208	1,205	1,205
MANUFACTURING, CASS	WUG Seller	MUNICIPAL	CASS	SULPHUR	1	1	1	1	1	1
MANUFACTURING, CASS	WUG Seller	MUNICIPAL	CASS	SULPHUR	44	44	44	44	44	44
MANUFACTURING, CASS	WUG Seller	MUNICIPAL	NULL	NULL	0	0	0	0	0	0
MARSHALL	WUG Seller	MUNICIPAL	HARRISON	CYPRESS	253	253	253	253	253	253
MARSHALL	WUG Seller	MUNICIPAL	HARRISON	SABINE	70	70	70	70	70	70
MARSHALL	WUG Seller	MUNICIPAL	HARRISON	SABINE	67	67	67	67	67	67
MARSHALL	WUG Seller	MUNICIPAL	PANOLA	SABINE	33	33	33	33	33	33
MARSHALL	WUG Seller	MANUFACTURING	HARRISON	SABINE	2,000	2,000	2,000	2,000	2,000	2,000
MOUNT PLEASANT	WUG Seller	MUNICIPAL	FRANKLIN	SULPHUR	14	0	0	0	0	0
MOUNT PLEASANT	WUG Seller	MUNICIPAL	TITUS	CYPRESS	87	0	0	0	0	0
MOUNT PLEASANT	WUG Seller	MUNICIPAL	TITUS	SULPHUR	600	0	0	0	0	0

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
MOUNT PLEASANT	WUG Seller	MANUFACTURING	TITUS	CYPRESS	3,345	550	550	550	550	550
MOUNT PLEASANT	WUG Seller	MUNICIPAL	MORRIS	CYPRESS	181	177	176	179	183	186
MOUNT PLEASANT	WUG Seller	MUNICIPAL	TITUS	CYPRESS	1,013	1,102	1,203	1,325	1,465	1,616
MOUNT PLEASANT	WUG Seller	MUNICIPAL	TITUS	SULPHUR	526	573	625	689	762	841
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SABINE	58	75	103	134	174	229
NORTH TEXAS MWD	MWP	MUNICIPAL	VAN ZANDT	SABINE	1	1	2	2	1	1
NORTH TEXAS MWD	MWP	MUNICIPAL	NULL	NULL	0	0	0	0	0	0
NORTH TEXAS MWD	MWP	MUNICIPAL	COLLIN	SABINE	138	142	177	211	243	277
NORTH TEXAS MWD	MWP	MUNICIPAL	COLLIN	TRINITY	92	95	116	140	162	184
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SABINE	779	840	1,011	1,218	1,496	1,904
NORTH TEXAS MWD	MWP	MUNICIPAL	ROCKWALL	SABINE	86	98	112	118	106	97
NORTH TEXAS MWD	MWP	MUNICIPAL	HOPKINS	SABINE	8	7	7	6	5	4
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SABINE	958	950	936	935	959	978
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SULPHUR	17	20	22	23	21	18
NORTH TEXAS MWD	MWP	MUNICIPAL	RAINS	SABINE	51	45	43	38	29	23
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SABINE	39	57	84	116	104	96
NORTH TEXAS MWD	MWP	MUNICIPAL	HUNT	SABINE	42	44	50	59	70	87
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	CASS	CYPRESS	302	302	302	302	302	302
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	47	47	47	47	47	47
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	MARION	CYPRESS	24	24	24	24	24	24
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	UPSHUR	CYPRESS	524	524	524	524	524	524

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	HARRISON	CYPRESS	51	51	51	51	51	51
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	MARION	CYPRESS	17	17	17	17	17	17
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	CASS	CYPRESS	562	562	562	562	562	562
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	MORRIS	CYPRESS	2	2	2	2	2	2
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	17,150	17,150	17,150	17,150	17,150	17,150
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	HARRISON	SABINE	400	400	400	400	400	400
NORTHEAST TEXAS MWD	MWP	MANUFACTURING	CAMP	CYPRESS	100	100	100	100	100	100
NORTHEAST TEXAS MWD	MWP	MANUFACTURING	MORRIS	CYPRESS	45,437	45,437	45,437	45,437	45,437	45,437
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	HARRISON	CYPRESS	1,158	1,158	1,158	1,158	1,158	1,158
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	HARRISON	SABINE	5,419	5,419	5,419	5,419	5,419	5,419
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	CASS	CYPRESS	133	133	133	133	133	133
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	MARION	CYPRESS	763	763	763	763	763	763
NORTHEAST TEXAS MWD	MWP	MINING	TITUS	CYPRESS	1,398	1,228	1,185	1,227	1,295	728
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	UPSHUR	CYPRESS	1,504	1,504	1,504	1,504	1,504	1,504

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	CAMP	CYPRESS	1,244	1,244	1,244	1,244	1,244	1,244
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	1,902	2,090	2,472	2,937	3,505	3,892
NORTHEAST TEXAS MWD	MWP	STEAM ELECTRIC POWER	TITUS	CYPRESS	21,862	21,062	20,162	19,362	18,539	18,300
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	GREGG	CYPRESS	948	948	948	948	948	948
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	GREGG	SABINE	740	740	740	740	740	740
NORTHEAST TEXAS MWD	MWP	MUNICIPAL	HARRISON	CYPRESS	134	134	134	134	134	134
PARIS	WUG Seller	MUNICIPAL	LAMAR	RED	5,334	5,278	5,229	5,193	5,159	5,108
PARIS	WUG Seller	MUNICIPAL	LAMAR	SULPHUR	3,557	3,518	3,486	3,462	3,438	3,404
PARIS	WUG Seller	MANUFACTURING	LAMAR	SULPHUR	5,091	5,340	5,580	5,787	6,183	6,386
PARIS	WUG Seller	STEAM ELECTRIC POWER	LAMAR	RED	683	683	683	683	683	683
PARIS	WUG Seller	STEAM ELECTRIC POWER	LAMAR	SULPHUR	8,278	8,278	8,278	8,278	8,278	8,278
POINT	WUG Seller	MANUFACTURING	RAINS	SABINE	12	12	12	12	12	12
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	RED RIVER	RED	0	0	0	0	0	0

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	RED RIVER	SULPHUR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MANUFACTURING	BOWIE	RED	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MANUFACTURING	BOWIE	SULPHUR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MANUFACTURING	CASS	CYPRESS	244	245	245	245	245	245
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MANUFACTURING	CASS	SULPHUR	32,479	32,554	32,554	32,554	32,554	32,554
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	RED RIVER	RED	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	RED RIVER	SULPHUR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	0	0	0	0	0	0

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	RED	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	0	0	0	0	0	0
ROCKWALL	WUG Seller	MUNICIPAL	HUNT	SABINE	9	7	6	5	5	4
ROYSE CITY	WUG Seller	MUNICIPAL	COLLIN	SABINE	38	47	53	49	44	39
ROYSE CITY	WUG Seller	MUNICIPAL	ROCKWALL	SABINE	23	22	25	28	34	43
ROYSE CITY	WUG Seller	MUNICIPAL	HUNT	SABINE	328	326	368	425	507	629
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	RAINS	SABINE	354	758	750	742	734	725
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	ROCKWALL	SABINE	79	81	73	92	141	248
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HOPKINS	SABINE	7	6	4	5	6	1
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HUNT	SABINE	1,173	1,113	967	1,198	1,860	3,340
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HUNT	SULPHUR	17	16	14	17	26	3
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	RAINS	SABINE	46	39	28	30	38	4
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HUNT	SABINE	502	589	718	911	1,197	1,615
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	VAN ZANDT	SABINE	92	95	98	102	107	111
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HUNT	SULPHUR	1,427	4,586	4,609	4,249	2,694	3,078
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	VAN ZANDT	SABINE	272	285	295	307	318	329
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	RAINS	SABINE	791	829	837	842	845	847

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HUNT	SABINE	2,714	2,537	2,338	2,123	1,932	1,735
SABINE RIVER AUTHORITY	MWP	IRRIGATION	VAN ZANDT	NECHES	184	166	164	163	161	159
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	GREGG	SABINE	1,415	4,352	4,163	3,934	3,723	4,003
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	RUSK	SABINE	434	783	848	924	1,008	1,095
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	GREGG	SABINE	6,304	15,153	15,194	15,228	15,267	15,303
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HARRISON	SABINE	331	325	317	315	311	310
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	KAUFMAN	SABINE	16	19	24	30	36	43
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	KAUFMAN	TRINITY	2	3	3	4	5	6
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	HUNT	SABINE	23	29	37	47	62	84
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	VAN ZANDT	SABINE	181	198	212	225	236	245
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	VAN ZANDT	TRINITY	294	323	345	367	385	401
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	364	379	380	381	383	383
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

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	VAN ZANDT	SABINE	300	642	637	505	417	414
SABINE RIVER AUTHORITY	MWP	MUNICIPAL	VAN ZANDT	TRINITY	453	965	957	760	628	622
SULPHUR RIVER MWD	MWP	MUNICIPAL	HOPKINS	SABINE	15	14	14	15	14	14
SULPHUR RIVER MWD	MWP	MUNICIPAL	HOPKINS	SULPHUR	4,552	4,553	4,553	4,552	4,553	4,553
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SABINE	67	70	74	77	82	87
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	81	85	89	93	99	105
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	77	77	77	77	77	77
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SABINE	48	53	50	15	0	0
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	28	30	29	9	0	0
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	109	111	115	121	128	135
SULPHUR SPRINGS	WUG Seller	LIVESTOCK	HOPKINS	CYPRESS	33	34	38	38	42	44
SULPHUR SPRINGS	WUG Seller	LIVESTOCK	HOPKINS	SABINE	399	420	466	469	519	541
SULPHUR SPRINGS	WUG Seller	LIVESTOCK	HOPKINS	SULPHUR	1,042	1,097	1,216	1,223	1,353	1,411
SULPHUR SPRINGS	WUG Seller	MANUFACTURING	HOPKINS	SULPHUR	1,741	1,830	1,915	1,987	2,126	2,275
SULPHUR SPRINGS	WUG Seller	MANUFACTURING	HUNT	SABINE	50	50	50	50	50	50
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SABINE	188	188	188	189	189	188
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	35	35	35	34	34	35
SULPHUR SPRINGS	WUG Seller	MINING	HOPKINS	CYPRESS	6	7	7	8	9	9
SULPHUR SPRINGS	WUG Seller	MINING	HOPKINS	SABINE	62	68	74	81	88	96
SULPHUR SPRINGS	WUG Seller	MINING	HOPKINS	SULPHUR	132	145	159	172	188	205
SULPHUR SPRINGS	WUG Seller	MINING	TITUS	CYPRESS	80	80	80	80	80	80
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	921	921	921	921	921	921
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SABINE	48	50	53	55	59	62
SULPHUR SPRINGS	WUG Seller	MUNICIPAL	HOPKINS	SULPHUR	59	62	65	68	72	76
TARRANT REGIONAL WD	MWP	MUNICIPAL	VAN ZANDT	TRINITY	31	31	32	31	31	31
TERRELL	WUG Seller	MUNICIPAL	KAUFMAN	SABINE	51	51	57	68	85	102

Name	MWP/WUG Seller	Use Category	County	Basin	2020	2030	2040	2050	2060	2070
TERRELL	WUG Seller	MUNICIPAL	KAUFMAN	TRINITY	50	52	57	68	82	102
TERRELL	WUG Seller	MUNICIPAL	HUNT	SABINE	254	261	299	345	416	514
TEXARKANA	WUG Seller	MUNICIPAL	BOWIE	RED	0	0	0	0	0	0
TEXARKANA	WUG Seller	MUNICIPAL	BOWIE	SULPHUR	0	0	0	0	0	0
TITUS COUNTY FWD #1	MWP	MUNICIPAL	TITUS	CYPRESS	13,677	13,423	13,174	12,940	12,551	12,242
TITUS COUNTY FWD #1	MWP	STEAM ELECTRIC POWER	TITUS	CYPRESS	10,000	10,000	10,000	10,000	10,000	10,000
TRI SUD	WUG Seller	MINING	TITUS	CYPRESS	7	7	7	7	7	7
TYLER	WUG Seller	MUNICIPAL	SMITH	NECHES	239	239	239	239	239	239
UPPER NECHES RIVER MUNICIPAL WATER AUTHORITY	MWP	MUNICIPAL	SMITH	SABINE	80	88	99	114	129	149
WHITE OAK	WUG Seller	MUNICIPAL	GREGG	SABINE	50	50	50	50	50	50
WHITE OAK	WUG Seller	MUNICIPAL	UPSHUR	CYPRESS	27	27	27	27	27	27
WHITE OAK	WUG Seller	MUNICIPAL	UPSHUR	SABINE	13	13	13	13	13	13
BI COUNTY WSC	WUG Seller	MANUFACTURING	CAMP	CYPRESS	2	2	2	2	2	2
BI COUNTY WSC	WUG Seller	STEAM ELECTRIC POWER	TITUS	CYPRESS	3	3	3	3	3	3
BRIGHT STAR SALEM SUD	WUG Seller	MUNICIPAL	RAINS	SABINE	90	90	90	90	90	90
CASH SUD	WUG Seller	MUNICIPAL	HUNT	SABINE	189	295	475	722	1,097	1,744
				TOTAL	**294234**	**308,505**	**308,713**	**308,873**	**309,327**	**313,392**

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 establishes 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).

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Chapter 3

EVALUATION OF CURRENT WATER SUPPLIES IN THE REGION

A key task in the preparation of the 2021 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 2016 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 DB22 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 2021 Region D Plan.
- In the Red River Basin, Lamar County reservoir yields were updated based upon a modification of the WAM for the Red River Basin, as developed for the City of Paris by HDR Engineers and approved by the Texas Water Development Board (TWDB).
- 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 new information related to the present storage capacity of the reservoir and sedimentation effects was incorporated to render a more accurate depiction of supply for the purposes of the 2021 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 2016 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 April 4, 2018 Water Supplies Assumption memorandum submitted to the TWDB by the NETRWPG, as approved at the April 4, 2018 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)	2020	2030	2040	2050	2060	2070
SURFACE WATER IN REGION D	1,404,054	1,386,621	1,363,661	1,343,791	1,322,922	1,301,984
GROUNDWATER IN REGION D	313,419	312,757	311,734	311,767	311,570	311,291
DIRECT REUSE	78,419	72,993	67,677	68,933	77,807	71,581
TOTAL	**1,795,892**	**1,772,371**	**1,743,072**	**1,724,491**	**1,712,299**	**1,684,856**

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 land owners are allowed to use certain surface waters without a permit. Specifically, land owners 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 2017 county 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.
- Water availability is to be based on 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 2021 Regional Water Plan the most current TCEQ Water Availability Models (WAM) for reservoirs and river systems were utilized, except for Pat Mayse and Lake Crook Reservoirs in the Red River Basin (whereby a more recent study was approved for utilization by the NETRWPG and TWDB), and for the Sulphur River Basin. A new Sulphur River Basin WAM was adopted by the TCEQ in late-2019, at a point too late to incorporate this new WAM for the purposes of the 2021 Region D Plan. With updated hydrology indicating a potential new drought of record, it is anticipated that this new official WAM for the Sulphur River Basin will be included in subsequent regional water plans.

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	Sabine	Longview	05-4759	City Of Longview
BOB SANDLIN	Cypress	Titus County FWD #1	04-4564	Titus Co FWSD 1
BOWIE	Red	Irrigation	02-3976	Ethel E Musselman Et Al
BOWIE	Red	Irrigation	02-4058	J C Dodson; Bj Shipping Co Inc; Theodorus J Deboer ET UX
BOWIE	Red	Irrigation	02-4952	Eldon K Lenth ET UX; Chris & Jason Sylte
BOWIE	Red	Irrigation	02-4953	Anne R. Farris; Robert Merritt, ET UX
BOWIE	Red	Irrigation	02-4954	John Wayne Ward; Three Sides Land Co Ltd
BOWIE	Red	Irrigation	02-4955	Milo Crop & Land N V
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
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	John Knosby Et Al
BOWIE	Red	Irrigation	02-5873	Texamericas Center
BOWIE	Sulphur	Irrigation	03-4829	William E Johnson Jr Et Al
BOWIE	Sulphur	Irrigation	03-4830	William E Johnson Jr 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	William E Johnson Jr Et Al
BOWIE	Sulphur	Irrigation	03-4837	Leon S Kennedy Jr; Henry Maddox, Jr, ET UX
BRANDY BRANCH	Sabine	Steam Electric	05-4647	Southwestern Electric Power Co
CAMP	Cypress	Irrigation	04-4561	Loyd Daily ET UX
CAMP	Cypress	Irrigation	04-4574	Princedale Country Club
CAMP	Cypress	Irrigation	04-5251	Alan H Roberts
CAMP	Cypress	Mining	04-5813	Luminant Mining Co LLC

County/ Reservoir	Basin	WUG	WR Number	Water Right Owner
CANEY CREEK	Sulphur	Riverbend Water Resources District	03-5873	Texamericas Center
CASS	Sulphur	Irrigation	03-5449	Texas Parks & Wildlife Dept
CASS	Cypress	Irrigation	04-4587	Eagle Landing Homeowners Association
CASS	Cypress	Manufacturing	04-4598	Jimmy H Wakefield
CASS	Cypress	Irrigation	04-4599	Delwin Young
CHAPMAN NON SYSTEM PORTION	Sulphur	Sulphur River MWD	03-4797	Sulphur River MWD
CHAPMAN NTMWD SYSTEM	Sulphur	North Texas MWD	03-4798	North Texas MWD
CHAPMAN SYSTEM?	Sulphur	City Of Irving	03-4799	City Of Irving
CROOK	Red	Paris	02-4943	City Of Paris
DELTA	Sulphur	Irrigation	03-3845 (APP 03-4148)	Sulphur Bluff Land
DELTA	Sulphur	Cooper	03-4800	City Of Cooper
DELTA	Sulphur	Irrigation	03-4801	Delta Country Club Inc
EDGEWOOD	Sabine	Edgewood	05-4678	City Of Edgewood
ELLIOT CREEK	Sulphur	Riverbend Water Resources District	03-5873	Texamericas Center
FORK	Sabine	Sabine River Authority	05-4669	Sabine River Authority
FRANKLIN	Sulphur	Irrigation	03-4803	Helmut Hermann ET AL
FRANKLIN	Sulphur	Mount Vernon	03-4816	City Of Mount Vernon
FRANKLIN	Sulphur	Irrigation	03-4817	Hans Weiss ET UX
FRANKLIN	Sulphur	Irrigation	03-4818	Robert W Campbell ET AL
FRANKLIN; TITUS	Cypress	Mining	04-5814	Luminant Mining Co LLC
GLADEWATER	Sabine	Gladewater	05-4762	City Of Gladewater
GRAYS CREEK	Cypress	Manufacturing	04-4254 (APP 04-4573)	Snider Industries Inc
GREENVILLE CITY LAKES	Sabine	Greenville	05-4665	City Of Greenville
GREGG	Cypress	Irrigation	04-4608	George D Grogan
GREGG	Cypress	Irrigation	04-5608	Hunters Creek HOA INC
GREGG	Sabine	Mining	05-4623	James Madison Enterprices, INC
GREGG	Sabine	Longview	05-4624	City Of Longview

County/ Reservoir	Basin	WUG	WR Number	Water Right Owner
GREGG	Sabine	Irrigation	05-4626	M F Glover Et Al
GREGG	Sabine	Irrigation	05-4628	Gino Venitucci & Kilgore Resources
GREGG	Sabine	Irrigation	05-4629	Carlos B Griffin SR ET UX
GREGG	Sabine	Irrigation	05-4630	George D Grogan
GREGG	Sabine	Irrigation	05-4732	Edwin Baggett ET UX
GREGG	Sabine	Longview	05-5090	City Of Longview
HARRISON	Cypress	Mining	04-12679	Bp America Production Co
HARRISON	Cypress	Mining	04-12685	Bp America Production Co
HARRISON	Cypress	Mining	04-12686	Bp America Production Co
HARRISON	Cypress	Mining	04-13105	Bp America Production Co
HARRISON	Cypress	Manufacturing	04-4005 (APP 04-4349)	Longhorn Army Ammunition Plant; US Dept Of The Interior
HARRISON	Cypress	Manufacturing	04-4609	T S Murrell
HARRISON	Cypress	Irrigation	04-4610	Westover Land & Livestock Co
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	Mining	05-12816	Anadarko E&P Onshore Co LLC
HARRISON	Sabine	Manufacturing	05-4631	Eastman Chemical Company
HARRISON	Sabine	Irrigation	05-4632	Pinecrest Country Club; Peppy Jean Family LTD Partnership
HARRISON	Sabine	Manufacturing	05-4633	Clarence W Young & Wife
HARRISON	Sabine	Irrigation	05-4634	E C Johnston Jr
HARRISON	Sabine	Irrigation	05-4635	R Byron Roach ET UX; Phyllis Cary Living Trust
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
HARRISON	Sabine	Mining	05-5382	Sabine Mining Co
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

County/ Reservoir	Basin	WUG	WR Number	Water Right Owner
HARRISON	Sabine	Mining	05-5662	The Sabine Mining Company
HARRISON	Sabine	Irrigation	05-5918	Larry & Charlotte Slone
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	Jerry N Jordan Trustee ET AL
HOPKINS	Sulphur	Irrigation	03-5150	Larry Miles ET AL
HOPKINS	Sulphur	Mining	03-5906	Luminant Mining Co Llc
HOPKINS	Sabine	Irrigation	05-4699	Truman L Renshaw
HOPKINS	Sabine	County Other	05-5217	Coy Johnson & Patsy Johnson; Harold Knight & Claire Knight
HUNT	Sulphur	Irrigation	03-4796	Webb Hill Country Club
HUNT	Sabine	Irrigation	05-4645	James E Utz
HUNT	Sabine	Irrigation	05-4646	Carolyn Holloway Bicknell
LAKE CHEROKEE	Sabine	Cherokee Water Company	05-4642	Cherokee Water Company
LAKE CYPRESS SPRINGS	Cypress	Franklin County Water District	04-4560	Franklin County Water District; City Of Mount Pleasant
LAKE ELLISON	Cypress	Northeast Texas Mwd	04-4582	Us Steel Tubular Products Inc
LAKE GILMER	Cypress	Gilmer	04-5272	Gilmer Economic Development Corporation
LAKE MONTICELLO	Cypress	Steam Electric	04-4563	Luminant Generation Co LLC
LAKE OF THE PINES	Cypress	Northeast Texas MWD	04-4590	Northeast Texas MWD
LAMAR	Red	Irrigation	02-12132	Robert Johns ET AL
LAMAR	Red	Irrigation	02-3888	Landrum R & Ronald B Hicks
LAMAR	Red	Irrigation	02-3924	Crawford Family Farm Partnership; Linda Crawford Graves ET VIR
LAMAR	Red	Irrigation	02-4930	The Estate Of Robert M. Ledbetter
LAMAR	Red	Irrigation	02-4934	A G Robinson
LAMAR	Red	Irrigation	02-4935	Kevin Clark Foster, ET UX
LAMAR	Red	Irrigation	02-4938	Felix Stephens
LAMAR	Red	Irrigation	02-4939	Q B Stephens & Laura Stephens

County/ Reservoir	Basin	WUG	WR Number	Water Right Owner
LAMAR	Red	Irrigation	02-4941	Charles C Taylor ET UX; Nolan Butts ET UX
LAMAR	Red	Irrigation	02-4945	James C. Darnell, ET UX
LAMAR	Red	Irrigation	02-5119	City Of Paris
LAMAR	Red	Irrigation	02-5233	Leroy H Kautz ET UX; L Harvey & Son - Kautz Farm LLC; Michael & Sons Ranch; Michael & Sons Ranch Inc
LAMAR	Red	Irrigation	02-5276	Woerner Land Corporation
LAMAR	Red	Irrigation	02-5558	Paris Golf & Country Club
LAMAR	Red	Irrigation	02-5617	Worner Land Corporation
LAMAR	Sulphur	Manufacturing	03-12810	Daisy Farms, LLC
LANGFORD LAKE	Sulphur	Clarksville	03-4809	Red River County WCID 1
LOMA	Sabine	County Other	05-4758	Institute In Basic Life Principles Inc
MARION	Cypress	Irrigation	04-4198 (APP 04-4525)	Jimmy D Moore & Jerry L Moore
MARION	Cypress	Irrigation	04-4591	H Zeke Grogan
MARION	Cypress	Irrigation	04-4592	David R & E M Key
MARION	Cypress	Irrigation	04-4593	George D Grogan
MARION	Cypress	Irrigation	04-4594	Snider Industries, L.L.P.; Robert Sanders, ET UX; Caddo Lake Institute
MARION	Cypress	Jefferson	04-4595	Jefferson Water & Sewer District
MARION	Cypress	Irrigation	04-4596	David R Key Estate
MARION	Cypress	Irrigation	04-4600	Jarvis Smoak
MARION	Cypress	Irrigation	04-4612	David R Key
MARION	Cypress	Irrigation	04-4618	James H Morris
MILL CREEK	Sabine	Canton	05-4675	City Of Canton
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	Sam L Dale
MORRIS	Cypress	Irrigation	04-4597	Lloyd Justiss Farms Inc
PAT MAYSE	Red	Paris	02-4940	City Of Paris
PATMAN	Sulphur	Texarkana	03-4836	City Of Texarkana
RAINS	Sabine	Irrigation	05-4681	Pamela H Steele ET VIR
RAINS	Sabine	Irrigation	05-4700	Nell Cobb Click
RAINS	Sabine	Irrigation	05-4701	Larry Knecht ET AL

County/ Reservoir	Basin	WUG	WR Number	Water Right Owner
RAINS	Sabine	Irrigation	05-5756	Shelton Family Partnership LTD
RED RIVER	Red	Irrigation	02-4946	Atlee M Kohl ET AL
RED RIVER	Red	Irrigation	02-4947	James E Waggoner
RED RIVER	Red	Irrigation	02-4948	James E Waggoner
RED RIVER	Red	Irrigation	02-4949	Glen E & 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 Co LLC
RED RIVER	Sulphur	Irrigation	03-4806	Mary Margaret 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	Sabine	Mining	05-12896	New Birmingham Resources LLC
SMITH	Sabine	Irrigation	05-4248 (APP 05-4575)	Robert Thomas Perry ET UX; Joe Allen 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 FMRS LP; Glenn D Childres ET UX
SMITH	Sabine	Irrigation	05-4724	Hide-A-Way Lake Club
SMITH	Sabine	Irrigation	05-4727	Oakhurst Farms LP
SMITH	Sabine	Irrigation	05-4728	Robert W Arthur ET AL
SMITH	Sabine	Irrigation	05-4739	R E Smith ET UX; R E Smith
SMITH	Sabine	Irrigation	05-4740	William L Brady ET AL
SMITH	Sabine	Irrigation	05-4742	Kambala Land, LLC
SMITH	Sabine	Irrigation	05-4743	William L Brady ET UX
SMITH	Sabine	Irrigation	05-4745	Edwin B Ashby ET UX
SMITH	Sabine	Irrigation	05-4746	William Brady ET AL
SMITH	Sabine	Irrigation	05-4747	William Brady ET AL
SMITH	Sabine	Irrigation	05-4748	Pinehurst Partners I LLC
SMITH	Sabine	Manufacturing	05-4761	Donald Therneau
SMITH	Sabine	Irrigation	05-5229	Charles Breedlove
SMITH	Neches	County Other	06-4724	Hide-A-Way Lake Club
SMITH	Neches	Irrigation	06-4850	Archie E Reynolds
SULPHUR SPRINGS	Sulphur	Sulphur Springs	03-4811	City Of Sulphur Springs
TANKERSLEY	Cypress	Mount Pleasant	04-4565	City Of Mount Pleasant

County/ Reservoir	Basin	WUG	WR Number	Water Right Owner
TAWAKONI	Sabine	Sabine River Authority	05-4670	Sabine River Authority
TITUS	Sulphur	Mining	03-12099	Luminant Mining Co Llc
TITUS	Sulphur	Irrigation	03-4805	E P Land & Cattle Co INC
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	Ardelia Gauntt
TITUS	Sulphur	Irrigation	03-4824	Walter W Lee
TITUS	Sulphur	Irrigation	03-4825	Robert CROOKS ET AL
Titus	Sulphur	Mining	03-5562	Luminant Mining Co Llc
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 LP, ET AL
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 ET AL
TITUS	Cypress	Mining	04-5167	Luminant Mining Co LLC
TITUS	Cypress	Mining	04-5850	Luminant Mining Co LLC
TITUS	Cypress	Mining	04-5914	Luminant Mining CO LLC
TURKEY CREEK	Sulphur	Wolfe City	03-4795	City Of Wolfe City
UPSHUR	Cypress	Irrigation	04-4583	JFS Timber Partners LTD
UPSHUR	Cypress	Irrigation	04-4584	Edwin Lacy Estate ET AL
UPSHUR	Cypress	Irrigation	04-4585	Gaston W Deberry
UPSHUR	Cypress	Irrigation	04-4586	Douglas Newsom
UPSHUR	Cypress	Irrigation	04-4604	Sharon Lynn Jackson ET AL
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	Jack L Phillips & Wife
VAN ZANDT	Sabine	Mining	05-12098	Sabine River Bottom Partners LP
VAN ZANDT	Sabine	Wills Point	05-4671	City Of Wills Point

County/ Reservoir	Basin	WUG	WR Number	Water Right Owner
VAN ZANDT	Sabine	County Other	05-4673	Willow Lake Estates Assn
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	City Of Grand Saline
VAN ZANDT	Sabine	Irrigation	05-4682	Gail Hill
VAN ZANDT	Sabine	Irrigation	05-4684	Jack C Kellam
VAN ZANDT	Sabine	Irrigation	05-4688	Robert Dozier ET AL; George A Shafer
VAN ZANDT	Sabine	Mining	05-4689	Morton Salt Inc
VAN ZANDT	Neches	Irrigation	06-3221	A C & Louse R Love
VAN ZANDT	Neches	Irrigation	06-3223	T Z Hamm ET UX; Baker Lucas
VAN ZANDT	Neches	Irrigation	06-3244	Charles R Easley ET UX
VAN ZANDT	Neches	Irrigation	06-3245	Arch A Beasley JR
VAN ZANDT	Neches	Irrigation	06-3247	L L Mewbourn
VAN ZANDT	Neches	Irrigation	06-3251	W L Duncan
VAN ZANDT	Neches	Irrigation	06-3252	Dwayne 7 Ann H Collins
VAN ZANDT	Neches	Irrigation	06-3253	Ted L Hand
VAN ZANDT	Neches	Manufacturing	06-5232	Robert R Waldrop ET UX
VAN ZANDT	Neches	Irrigation	06-5415	James G Wise
VAN ZANDT	Neches	Irrigation	06-5613	William W Willingham Iii; Benton Rutledge
VAN ZANDT	Neches	Irrigation	06-5746	Gideon C Dekkers ET AL
VAN ZANDT	Neches	Irrigation	06-5757	The Florida Company
WELSH RESERVOIR	Cypress	Steam Electric	04-4576	Southwestern Electric Power Co
WILKES AKA JOHNSON RESERVOIR	Cypress	Steam Electric	04-4588	Southwestern Electric Power Co
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 Mcafee ET UX
WOOD	Sabine	Irrigation	05-4710	Walter L Lengel ET UX
WOOD	Sabine	Irrigation	05-4712	Lake Lydia INC
WOOD	Sabine	Irrigation	05-4714	Tom E Glover ET AL; Allen Cooper JR
WOOD	Sabine	Irrigation	05-4716	Bank Of America N A Trustee
WOOD	Sabine	Irrigation	05-4718	H L Hobbs

County/ Reservoir	Basin	WUG	WR Number	Water Right Owner
WOOD	Sabine	Irrigation	05-4722	Barney Holmes Jr
WOOD	Sabine	Irrigation	05-4737	Joe E Holmes
WOOD	Sabine	Irrigation	05-4738	Barney Holmes JR ET UX
WOOD	Sabine	Irrigation	05-4749	Wood County
WOOD	Sabine	Irrigation	05-4750	Virgil Woodward ET UX
WOOD	Sabine	Irrigation	05-4752	Comy E Bradshaw ET UX
WOOD	Sabine	Irrigation	05-4754	Mill Creek Company
WOOD	Sabine	Irrigation	05-4755	Real Estate Holdings Inc
WOOD	Sabine	Irrigation	05-4769	Frank E Elro; Sam I Wampler ET UX
WOOD	Sabine	Irrigation	05-4771	Little Sandy Hunting & Fishing
WOOD	Sabine	Irrigation	05-4666	Mrs Edgar Hutchins
WOOD	Sabine	Irrigation	05-4667	E F Buehring; Lowell LAWSON ET UX; Dr Van G Kaden ET AL
WOOD	Sabine	Irrigation	05-4702	Dewey Dickens ET UX
WOOD	Sabine	Irrigation	05-4703	Anita L Tynes ET AL

Table 3.3 summarizes information regarding the WAM version, simulation date, and WRAP version used for simulations employed for the purposes of the Final 2021 Region D Plan.

Table 3.3 Summary of Characteristics of Water Availability Models Employed for the Final 2021 Region D Plan

Basin	WAM Version	WRAP Version	Simulation Date
Cypress Creek River Basin	June 18, 2015	May 2018	February 25, 2019
Red River Basin	January 2, 2013	May 2018	February 25, 2019
Neches River Basin	October 1, 2012	May 2018	February 25, 2019
Sabine River Basin	July 6, 2015	May 2018	February 25, 2019
Sulphur River Basin	February 1, 2018	May 2018	April 2, 2019

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 2021 Region D Plan if a reservoir is calculated to have no firm yield, that result is assumed for all decades in the 2020-2070 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 2020 through year 2070. Sediment distribution within the reservoir was calculated using the Empirical Area Reduction Method, and resultant 2020 and 2070 area-capacity curves were developed and employed within the applicable WAM to calculate 2020 through 2070 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
RED	Crook	N/A	See Region D Variance Request, material from City of Paris produced by HDR Engineering	N/A
RED	Pat Mayse	N/A	See Region D Variance Request, material from City of Paris produced by HDR Engineering	N/A
SULPHUR	Big Creek	N/A	No volumetric /sedimentation survey	1986
SULPHUR	Jim Chapman/Cooper	711	TWDB	2007
SULPHUR	Rivercrest	N/A	No volumetric /sedimentation survey	1953
SULPHUR	Langford	16	Material submitted by City of Clarksville produced by MTG Engineers	2013
SULPHUR	Sulphur Springs	N/A	No volumetric /sedimentation survey	1974
SULPHUR	Wright Patman	824*	Material submitted by Riverbend Water Resources District produced by Arroyo Environmental Inc. and LJA Engineering, and HDR Engineering	2018
SULPHUR	Elliot Creek	N/A	No volumetric /sedimentation survey	2005
SULPHUR	Caney Creek	N/A	No volumetric /sedimentation survey	2005
SULPHUR	Turkey Creek	N/A	No volumetric /sedimentation survey	1957
CYPRESS	Bob Sandlin	352	TWDB	2008
CYPRESS	Caddo	0	No volumetric /sedimentation survey	1971
CYPRESS	Cypress Springs	168	TWDB	2007
CYPRESS	Ellison Creek	N/A	No volumetric /sedimentation survey	1943

Basin	Reservoir	Average Annual Sedimentation Rate at Conservation Pool (ac-ft/yr)	Sedimentation Data Source	Year for Rating Curve
CYPRESS	Lake Gilmer	N/A	No volumetric /sedimentation survey	1998
CYPRESS	Johnson Creek	N/A	No volumetric /sedimentation survey	1961
CYPRESS	Lake O' The Pines	260	TWDB	2009
CYPRESS	Monticello	214	TWDB	1998
CYPRESS	Tankersley	N/A	No volumetric /sedimentation survey	1955
CYPRESS	Welsh	129	TWDB	2001
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	Gladewater	46	TWDB	2000
SABINE	Big Sandy Creek	N/A	No volumetric /sedimentation survey	1935
SABINE	Mill Creek	N/A	No volumetric /sedimentation survey	1970
SABINE	Greenville Lakes	N/A	No volumetric /sedimentation survey	1925
SABINE	Fork	1,356	TWDB	2009
SABINE	Hawkins	N/A	No volumetric /sedimentation survey	1962
SABINE	Holbrook	N/A	No volumetric /sedimentation survey	1962
SABINE	Loma	N/A	No volumetric /sedimentation survey	1965
SABINE	Lake Quitman	N/A	No volumetric /sedimentation survey	1962
SABINE	Lake Winnsboro	N/A	No volumetric /sedimentation survey	1962
SABINE	Tawakoni	1,316	TWDB	2009

** 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 7,400 square miles are in Texas while the remaining 2,400 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 13 reservoirs, and 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	2020	2030	2040	2050	2060	2070
BIG SANDY CREEK LAKE / RESERVOIR	2,685	2,685	2,685	2,685	2,685	2,685
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	171,982	170,192	168,378	166,644	164,793	162,920
GLADEWATER LAKE / RESERVOIR	4,840	4,736	3,865	3,438	3,046	2,690
GREENVILLE CITY LAKE / RESERVOIR	3,421	3,421	3,421	3,421	3,421	3,421
HAWKINS LAKE / RESERVOIR	-	-	-	-	-	-
HOLBROOK LAKE / RESERVOIR	-	-	-	-	-	-
LOMA LAKE / RESERVOIR	1,777	1,777	1,777	1,777	1,777	1,777
MILL CREEK LAKE / RESERVOIR	1,192	1,192	1,192	1,192	1,192	1,192
QUITMAN LAKE / RESERVOIR	-	-	-	-	-	-
TAWAKONI LAKE / RESERVOIR	229,647	227,796	225,922	224,051	222,167	220,273
WINNSBORO LAKE / RESERVOIR	-	-	-	-	-	-
SABINE RIVER COMBINED RUN OF RIVER	111,007	111,007	111,007	111,007	111,007	111,007
SABINE OTHER LOCAL SUPPLY	9,327	9,487	9,650	9,817	9,978	10,141
DIRECT REUSE	6,161	6,161	6,161	6,161	6,161	6,161
TOTAL	**562,088**	**558,503**	**554,107**	**550,242**	**546,276**	**542,316**

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 24,460 square miles of the 48,030 square mile drainage area of the basin are 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.

Pat Mayse Reservoir and Lake Crook supplies are shown in Table 3.6. HDR Engineering, at the request of the City of Paris, completed a study in which the water availability for the two lakes was analyzed. HDR developed a drainage area specific water availability model for these two reservoirs, which they based upon information from the Corps of Engineers and stream flow data from the Sulphur River gauge at Highway 24. The NETRWPG in their April 4th, 2018 meeting approved the utilization of the results from the HDR water availability model. Consideration of the minimum annual diversion for run-of-river non-municipal rights in Region D for this basin provides more water than shown in the 2016 Plan.

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

Source Name	2020	2030	2040	2050	2060	2070
CROOK LAKE / RESERVOIR	7,290	7,290	7,290	7,290	7,290	7,290
PAT MAYSE LAKE / RESERVOIR	59,670	59,670	59,670	59,670	59,670	59,670
RED RIVER COMBINED RUN OF RIVER	19,917	19,917	19,917	19,917	19,917	19,917
RED OTHER LOCAL SUPPLY	491	491	488	497	510	517
DIRECT REUSE	12	12	12	12	12	12
TOTAL	**87,380**	**87,380**	**87,377**	**87,386**	**87,399**	**87,406**

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 approx. 3,558 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	2020	2030	2040	2050	2060	2070
BIG CREEK LAKE / RESERVOIR	2,162	2,162	2,162	2,162	2,162	2,162
TURKEY CREEK LAKE	200	200	200	200	200	200
CHAPMAN/COOPER LAKE/RESERVOIR (NON-SYSTEM)	71,890	70,805	69,301	67,874	66,745	65,298
CANEY CREEK LAKE	964	964	964	964	964	964
LANGFORD LAKE / RESERVOIR	440	300	0	0	0	0
RIVER CREST LAKE / SULPHUR RUN OF THE RIVER*	-	-	-	-	-	-
SULPHUR SPRINGS LAKE	11,464	11,464	11,464	11,464	11,464	11,464
ELLIOT CREEK LAKE	1,892	1,892	1,892	1,892	1,892	1,892
WRIGHT PATMAN LAKE / RESERVOIR**	347,566	335,665	323,757	311,788	299,726	287,530
SULPHUR RIVER COMBINED RUN OF RIVER	20,469	20,469	20,469	20,469	20,469	20,469

Source Name	2020	2030	2040	2050	2060	2070
SULPHUR OTHER LOCAL SUPPLY	6,155	6,079	5,844	5,741	5,482	5,369
TOTAL	**463,202**	**450,000**	**436,053**	**422,554**	**409,104**	**395,348**

** 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 approximately 2,800 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	2020	2030	2040	2050	2060	2070
BOB SANDLIN LAKE/RESERVOIR	36,600	37,100	36,800	36,800	36,100	35,300
CADDO LAKE / RESERVOIR	10,000	10,000	10,000	10,000	10,000	10,000
CYPRESS SPRINGS LAKE / RESERVOIR	11,800	11,300	10,800	10,400	9,900	9,500
ELLISON CREEK LAKE / RESERVOIR	33,643	33,643	33,643	33,643	33,643	33,643
GILMER LAKE / RESERVOIR	6,180	6,180	6,180	6,180	6,180	6,180
JOHNSON CREEK LAKE / RESERVOIR	2,280	2,280	2,280	2,280	2,280	2,280
MONTICELLO LAKE/RESERVOIR	5,000	4,400	3,800	3,300	2,700	2,200
LAKE O' THE PINES / RESERVOIR	169,700	169,900	167,000	165,700	164,300	163,000
TANKERSLEY LAKE / RESERVOIR	1,500	1,500	1,500	1,500	1,500	1,500
WELSH LAKE / RESERVOIR	3,000	2,800	2,500	2,200	1,900	1,700
DIRECT REUSE	72,246	66,820	61,504	62,760	71,634	65,408
CYPRESS RIVER COMBINED RUN-OF-RIVER	11,502	11,502	11,502	11,502	11,502	11,502
CYPRESS OTHER LOCAL SUPPLY	3,235	3,261	3,325	3,419	3,510	3,570
GRAYS CREEK RUN-OF-RIVER	12	12	12	12	12	12
TOTAL	**366,698**	**360,698**	**350,846**	**349,696**	**355,161**	**345,795**

** 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 a drainage area of approximately 10,000 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	2020	2030	2040	2050	2060	2070
RHINES LAKE / RESERVOIR	1,170	1,170	1,170	1,170	1,170	1,170
NECHES COMBINED RUN OF RIVER	166	166	166	166	166	166
NECHES OTHER LOCAL SUPPLY	1,136	1,136	1,136	1,136	1,136	1,136
TOTAL	**2,472**	**2,472**	**2,472**	**2,472**	**2,472**	**2,472**

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 nearly 18,000 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	2020	2030	2040	2050	2060	2070
TRINITY OTHER LOCAL SUPPLY	633	561	483	374	317	228
TOTAL	**633**	**561**	**483**	**374**	**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.

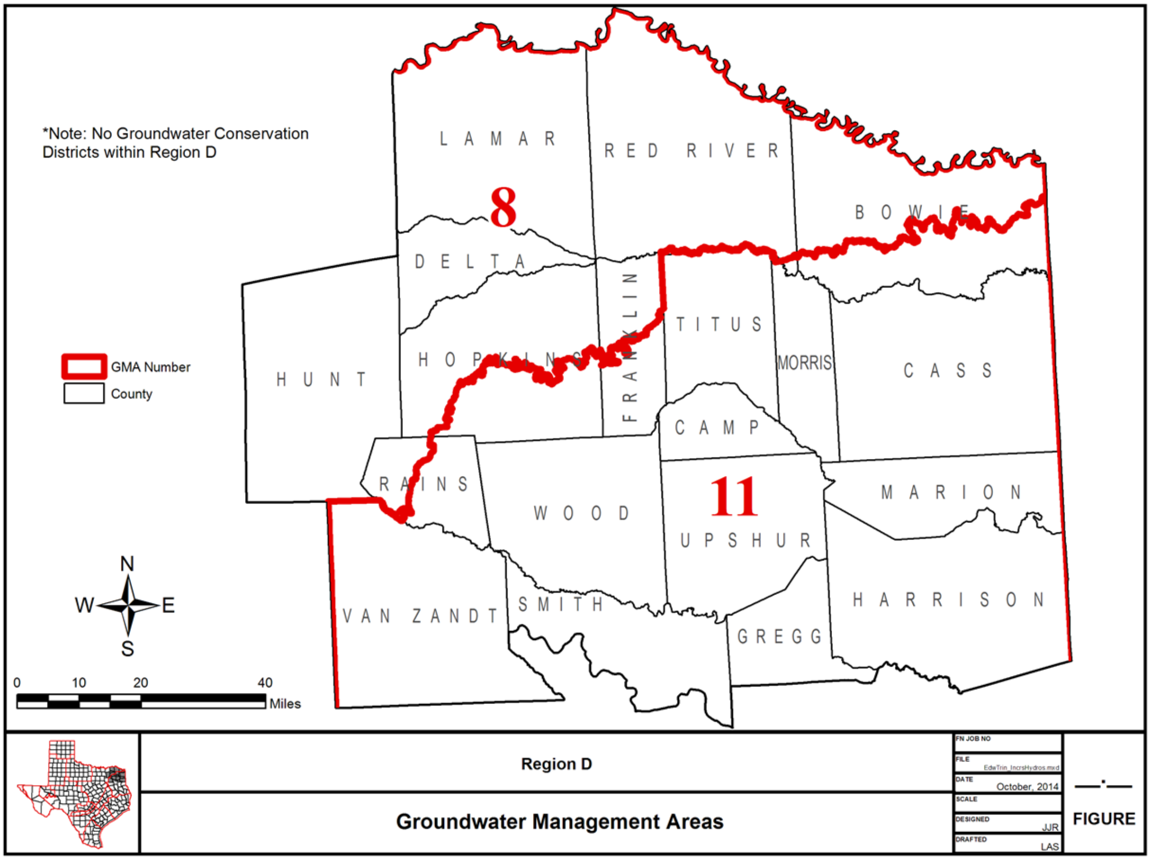

Figure 3.1 Groundwater Management Areas within Region D

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. A 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 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 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 2021 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 2021 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 2016 and 2021 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 2021 Region D Water Plan, the NETRWPG submitted a proposed methodology for determining groundwater availability in the region. TWDB staff reviewed the proposed methodology and identified modeled estimates of compatible groundwater availability for desired future conditions for relevant aquifers (i.e., Trinity, Woodbine, Carrizo-Wilcox, and Queen City aquifers) in either Groundwater Management Area 8 or 11. The Blossom and Nacatoch aquifers were declared nonrelevant in Groundwater Management Area 8 and they do not have desired future conditions, so their compatibility did not need to be reviewed and the amounts identified by Region D for these aquifers have been utilized herein. Subsequent to the TWDB staff's review, the NETRWPG identified availabilities for final TWDB review and approval. In its' January 16, 2020 meeting, the TWDB Board approved amounts for relevant aquifers that did not exceed the TWDB's modeled availabilities and were physically compatible with desired future conditions for aquifers in co-located GMAs 11 and 8, namely:

- Carrizo-Wilcox Aquifer – Titus County – Cypress Creek Basin;
- Carrizo-Wilcox Aquifer – Van Zandt County – Sabine River Basin;
- Woodbine Aquifer – Lamar County – Red River Basin;
- Trinity Aquifer - Red River County – Sulphur River Basin;
- Carrizo-Wilcox Aquifer – Hopkins County – Sulphur River Basin; and
- Trinity Aquifer – Hunt County – Sabine River Basin.

Appendix C3-3 presents the various formal communications between the NETRWPG and TWDB through this process, including the minutes of the January 16, 2020, meeting of the TWDB Board, wherein Item 5 reflects the approval of the groundwater availabilities utilized for the purposes of the 2021 Region D Water Plan. Volume adjustments for non-relevant aquifers (i.e., Nacatoch Aquifer) did not require TWDB approval and were based on the local hydrogeologic assessment. The volume adjustments to groundwater availability identified for the purposes of the 2021 Region D Plan are presented along with the original MAG amounts in Table 3.11.

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 3.12 details updated availability (MAG) numbers for 2021. 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.

Table 3.11 Region D Groundwater Source Availability Volume Adjustments (ac-ft/yr)

Source			Original Modeled Available Groundwater (MAG)						Revised Groundwater Availability for 2021 Region D Plan						Note
Aquifer	County	Basin	2020	2030	2040	2050	2060	2070	2020	2030	2040	2050	2060	2070	
WOODBINE	Lamar	Red	0	0	0	0	0	0	22	22	22	22	22	22	Local Hydrogeological Assessment approved by TWDB
CARRIZO-WILCOX	Hopkins	Sulphur	3,237	3,237	3,237	3,237	3,237	3,237	7,119	7,205	7,228	7,045	7,010	6,795	Local Hydrogeological Assessment approved by TWDB
NACATOCH	Hunt	Sulphur	491	491	491	491	491	491	491	491	513	868	1,347	2,052	Local Hydrogeological Assessment of Non-Relevant Aquifer
TRINITY	Hunt	Sabine	0	0	0	0	0	0	213	213	213	213	213	213	Local Hydrogeological Assessment approved by TWDB
NACATOCH	Red River	Sulphur	1,047	1,047	1,047	1,047	1,047	1,047	2,925	2,924	2,923	2,923	2,923	2,923	Local Hydrogeological Assessment of Non-Relevant Aquifer
TRINITY	Red River	Sulphur	125	125	125	125	125	125	234	233	234	233	234	233	Local Hydrogeological Assessment approved by TWDB
CARRIZO-WILCOX	Titus	Cypress	7,215	7,064	6,834	6,786	6,735	6,634	7,215	7,064	6,974	7,211	7,252	7,194	Local Hydrogeological Assessment approved by TWDB
CARRIZO-WILCOX	Van Zandt	Sabine	4,629	4,629	4,456	4,397	4,397	4,270	4,767	4,729	4,556	4,497	4,497	4,370	Local Hydrogeological Assessment approved by TWDB

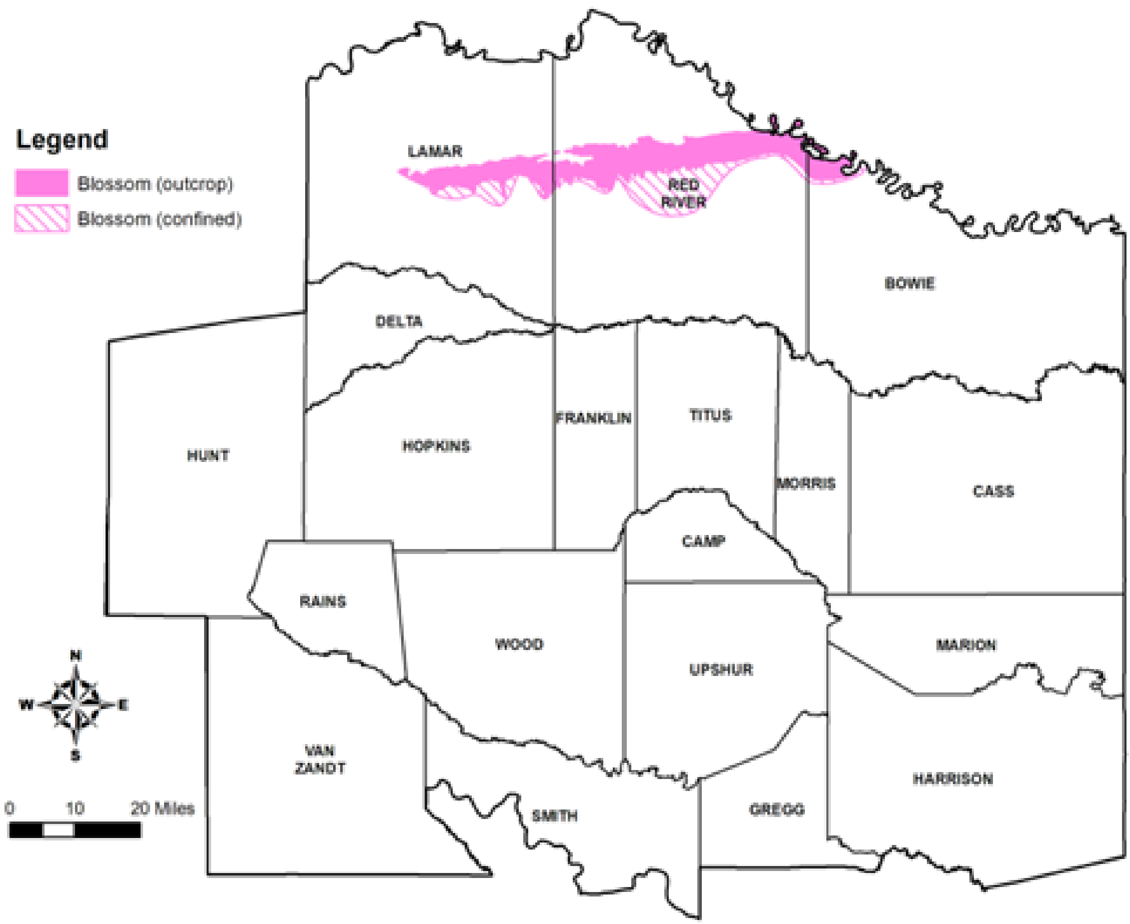

Figure 3.2 Blossom Aquifer within Region D

In 2016, 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 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 136,548 ac-ft/yr for planning year 2020. Total groundwater pumpage from the Carrizo-Wilcox Aquifer in the North East Texas Region was 50,602 ac-ft during 2016.

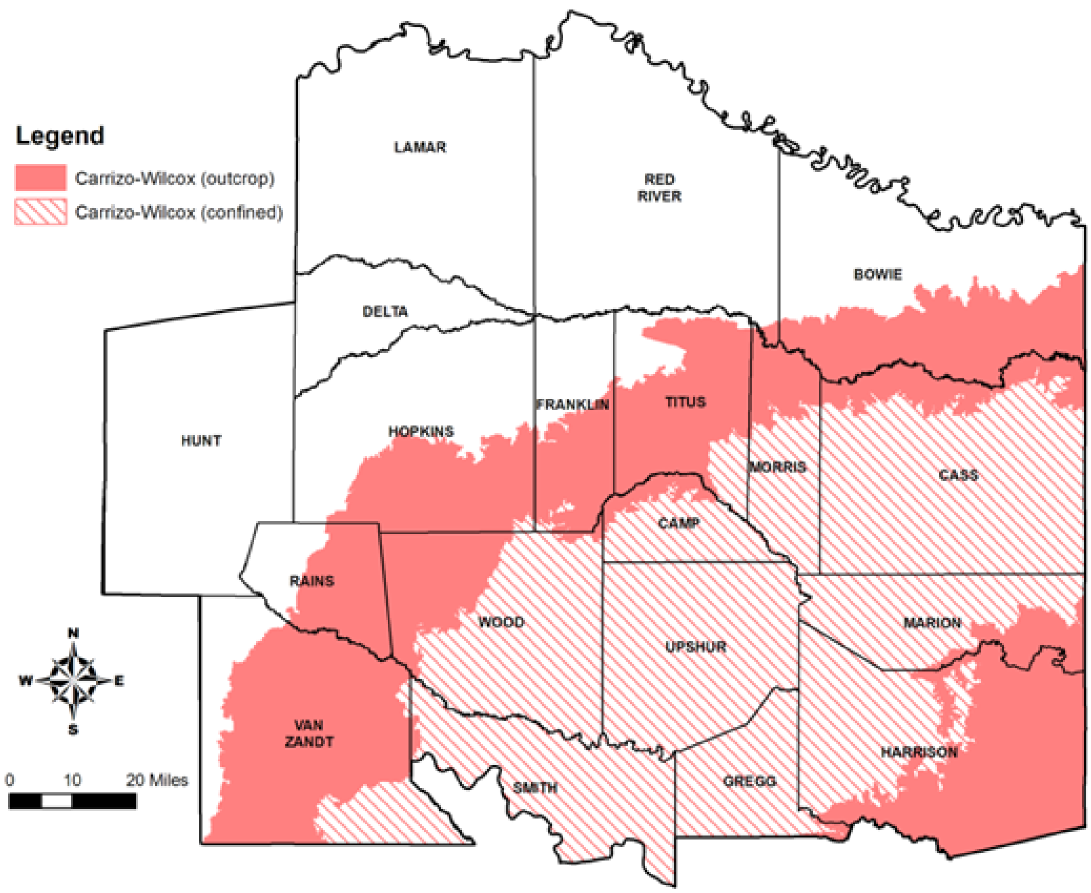

Figure 3.3 Carrizo-Wilcox Aquifer within Region D

Groundwater availability estimates for the Carrizo-Wilcox Aquifer were listed in GAM Run 17-024 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.

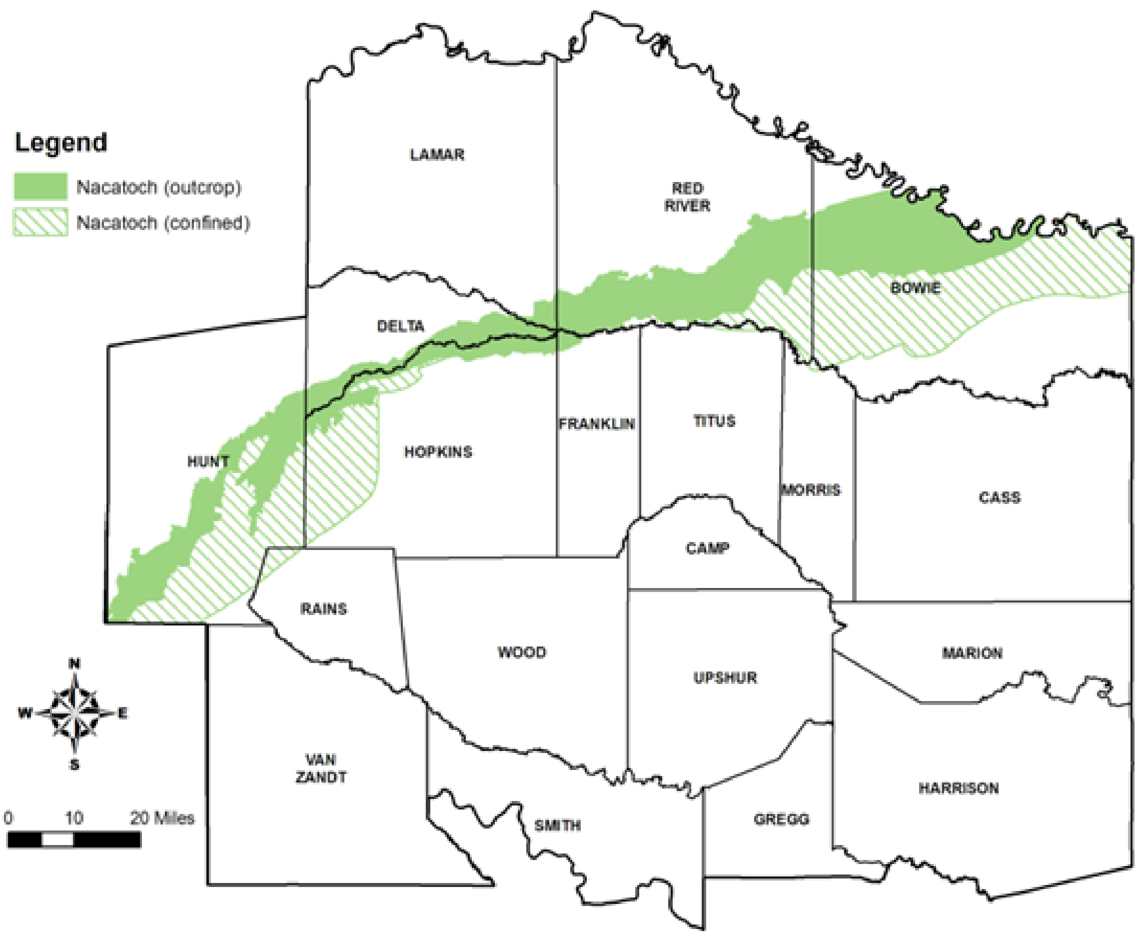

Figure 3.4 Nacatoch Aquifer within Region D

During 2016, pumpage from the aquifer totaled 2,968 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.

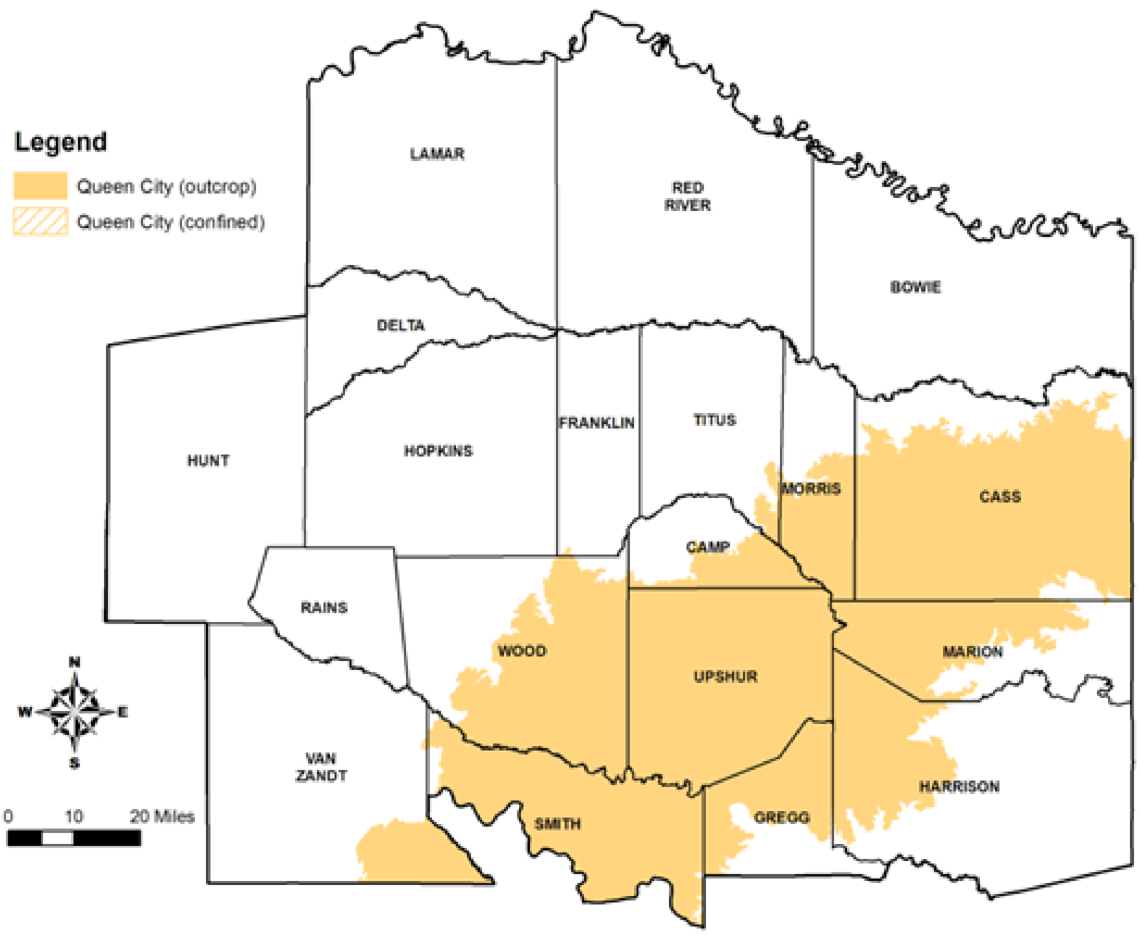

Figure 3.5 Queen City Aquifer within Region D

Groundwater availability estimates for the Queen City aquifer were listed in GAM Run 17-024 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 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 2016 in the Region was 1,342 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.

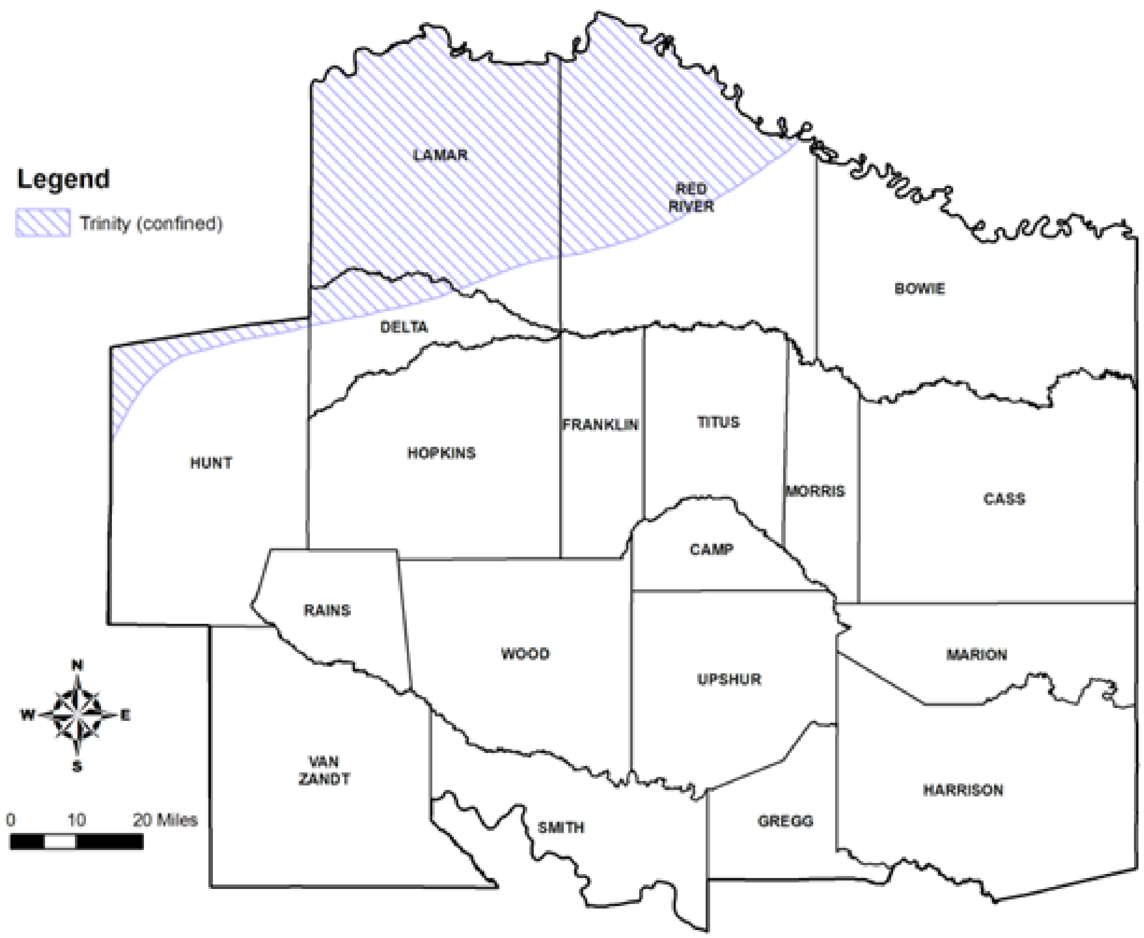

Figure 3.6 Trinity Aquifer within Region D

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.

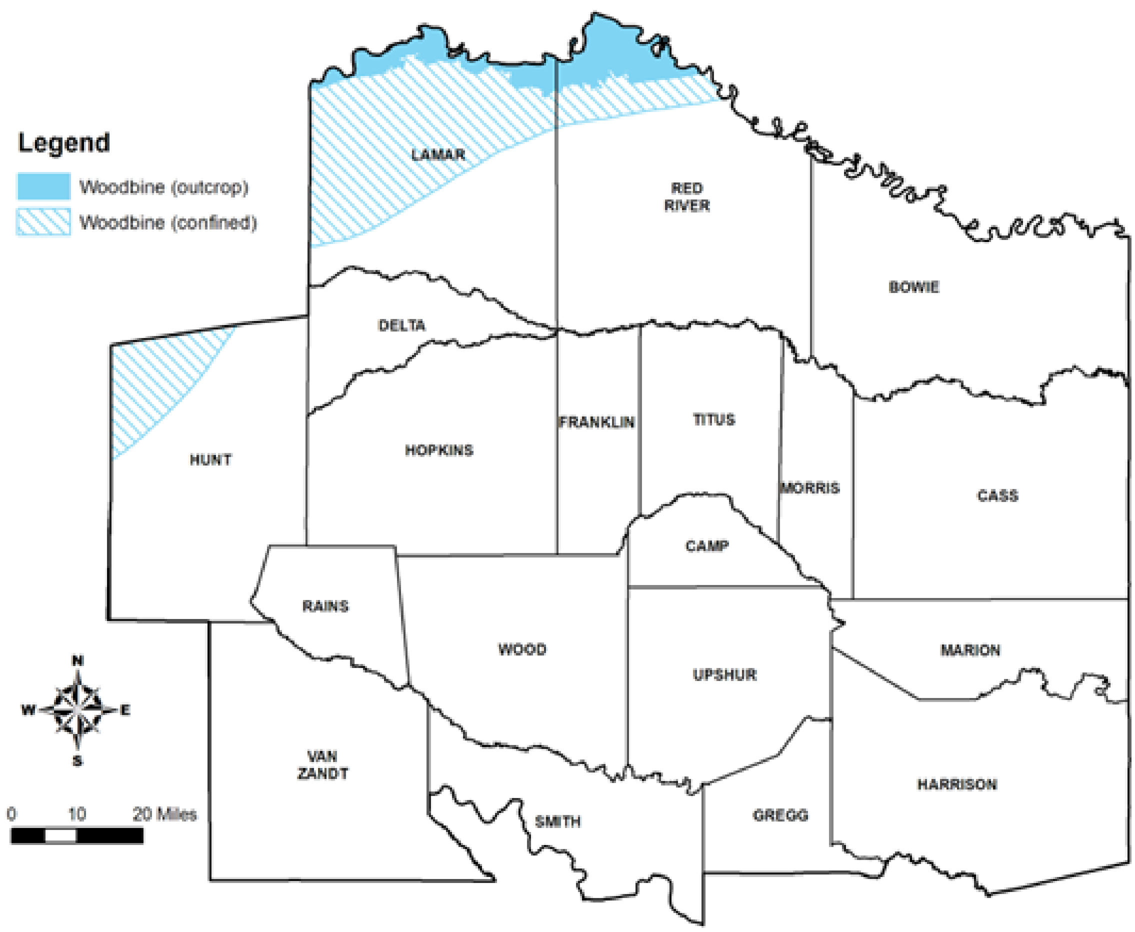

Figure 3.7 Woodbine Aquifer within Region D

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 2012 through 2016, regional groundwater sources supplied an average of 69,283 acre feet of water annually. Groundwater provides 65 percent of the municipal water used in the region, with 19 percent of groundwater 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.

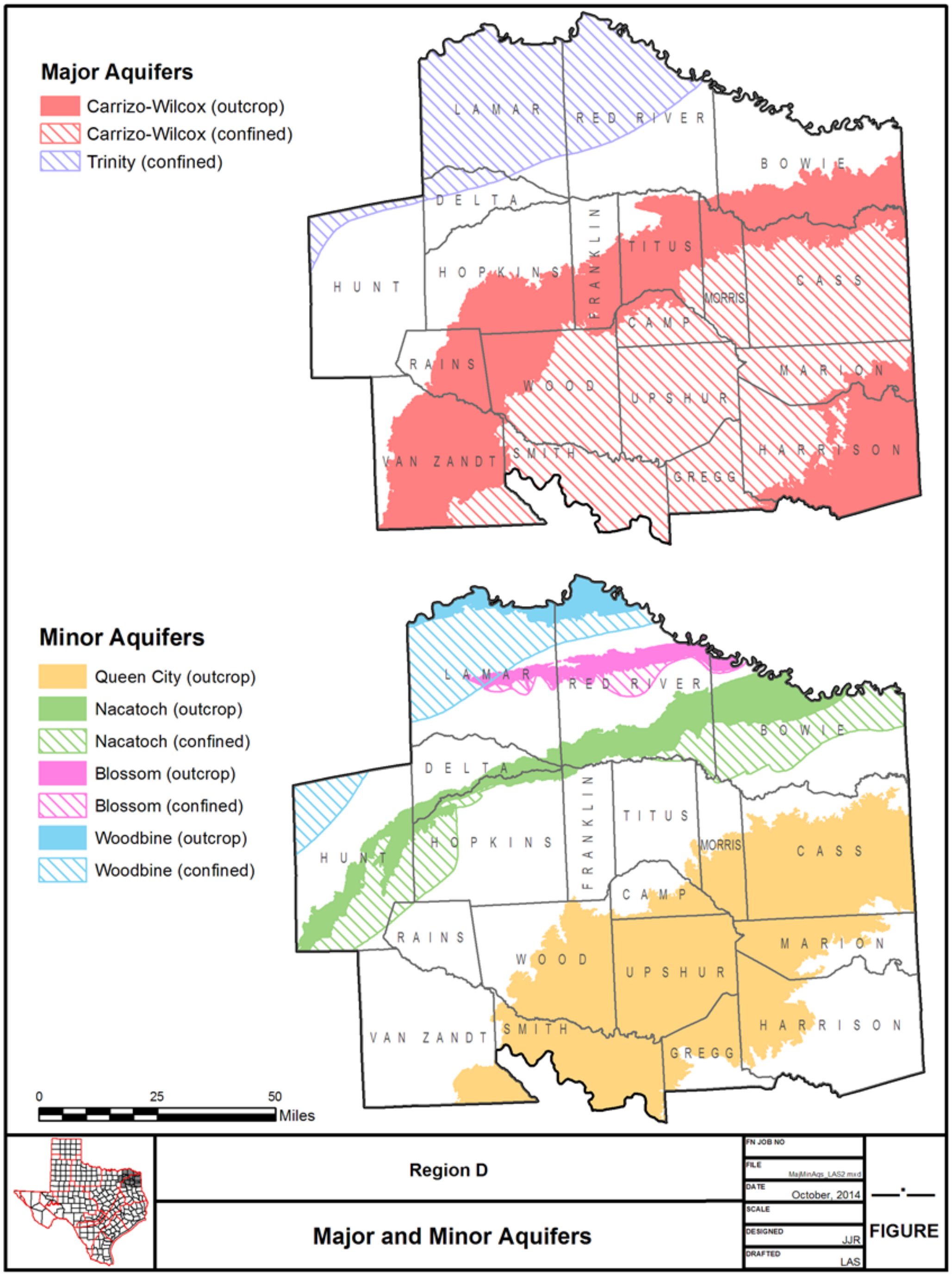

Figure 3.8 Major and Minor Aquifers in Region D

Region D historical groundwater pumping by aquifer for years 2012 through 2016 is shown in Figure 3.9. These data were calculated using the TWDB historical groundwater pumping estimates. The Carrizo-Wilcox supplied 77 percent of the region's groundwater, and the Trinity supplied two percent. The minor aquifers provided the remaining 21 percent.

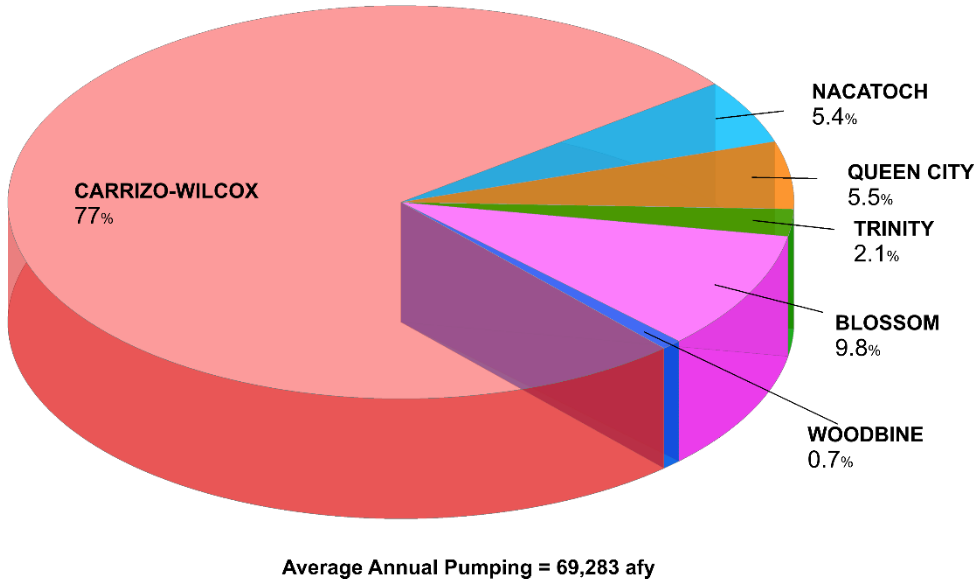

Figure 3.9 Historical Groundwater Pumping by Aquifer (2012-2016)

The same historical data set is presented in Figure 3.10 by use category. Municipal accounted for 65 percent of groundwater pumped in the region. Irrigation pumping consumed 19 percent of the groundwater and the remaining use categories collectively accounted for about 16 percent of total usage in the five-year period.

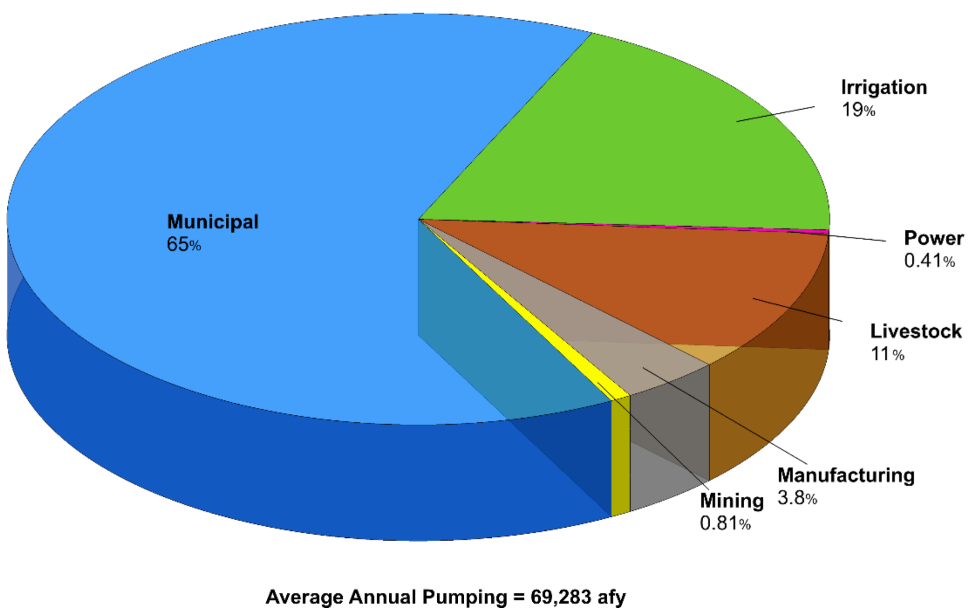

Figure 3.10 Historical Groundwater Pumping by Use (2012-2016)

Table 3.12 presents the MAG numbers by county, aquifer and river basin for planning years 2020 through 2070. MAG volumes are the largest amount of water that can be withdrawn from a given source without violating DFCs. Table 3.12 includes both non-relevant volumes, county aquifer combinations where a DFC has been defined by a GCD/GMA and the MAG subsequently has been determined by the TWDB using the GAM, and the aforementioned approved volume adjustments determined by Region D.

Table 3.12 Available Groundwater in Region D by County/Aquifer/Basin (ac-ft/yr)

LEGEND:

Non- Relevant (2016 Plan)

Non-Relevant (2021 Plan)

MAG same as 2016 Plan

New MAG

Approved Volume Adjustment above MAG determined by Region D

County	Aquifer	Basin	2020	2030	2040	2050	2060	2070
BOWIE	Carrizo-Wilcox	Sulphur	9,872	9,558	9,278	9,278	8,999	8,999
	Blossom	Red	21	21	21	21	21	21
		Sulphur	180	180	180	180	180	180
	Nacatoch	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	Cypress	4,050	4,050	4,050	4,050	4,050	4,050
	Queen-City	Cypress	4,306	4,306	4,150	4,150	4,150	4,150
CASS	Carrizo-Wilcox	Cypress	15,159	15,132	15,132	15,119	15,106	15,094
		Sulphur	2,864	2,794	2,731	2,667	2,596	2,532
	Queen-City	Cypress	35,499	35,499	35,499	35,499	35,499	35,499
		Sulphur	3,010	3,010	3,010	3,010	3,010	3,010
DELTA	Trinity	Sulphur	56	56	56	56	56	56
	Nacatoch	Sulphur	575	575	575	575	575	575
FRANKLIN	Carrizo-Wilcox	Cypress	7,765	7,765	7,765	7,765	7,765	7,765
		Sulphur	2,021	2,021	2,021	2,021	2,021	2,021
	Nacatoch	Sulphur	30	30	30	30	30	30
GREGG	Carrizo-Wilcox	Cypress	862	862	862	862	862	862
		Sabine	7,179	7,179	7,179	7,179	7,179	7,179
	Queen-City	Cypress	1,359	1,359	1,359	1,359	1,359	1,359
		Sabine	5,625	5,625	5,625	5,625	5,625	5,625
HARRISON	Carrizo-Wilcox	Cypress	6,183	6,109	6,070	6,036	6,016	5,990
		Sabine	4,851	4,851	4,851	4,837	4,837	4,837
	Queen City	Cypress	7,762	7,762	7,762	7,762	7,762	7,762
		Sabine	2,310	2,310	2,310	2,310	2,310	2,310
HOPKINS	Carrizo-Wilcox	Cypress	313	313	313	313	313	313
		Sabine	2,842	2,842	2,842	2,842	2,842	2,842
		Sulphur	7,119	7,205	7,228	7,045	7,010	6,795
	Nacatoch	Sabine	291	291	291	291	291	291
		Sulphur	916	916	916	916	916	916

LEGEND:

Non- Relevant (2016 Plan)

Non-Relevant (2021 Plan)

MAG same as 2016 Plan

New MAG

Approved Volume Adjustment above MAG determined by Region D

County	Aquifer	Basin	2020	2030	2040	2050	2060	2070
HUNT	Trinity	Sabine	213	213	213	213	213	213
		Sulphur	3	3	3	3	3	3
		Trinity	0	0	0	0	0	0
	Nacatoch	Sabine	3,303	3,303	3,303	3,303	3,303	3,303
		Sulphur	491	491	513	868	1,347	2,052
	Woodbine	Sabine	269	268	269	268	269	268
		Sulphur	165	165	165	165	165	165
		Trinity	330	329	330	329	330	329
LAMAR	Trinity	Red	0	0	0	0	0	0
		Sulphur	8	8	8	8	8	8
	Blossom	Red	323	323	323	323	323	323
		Sulphur	71	71	71	71	71	71
	Nacatoch	Sulphur	110	110	110	110	110	110
	Woodbine	Red	22	22	22	22	22	22
		Sulphur	49	49	49	49	49	49
MARION	Carrizo-Wilcox	Cypress	2,726	2,726	2,726	2,726	2,726	2,726
	Queen City	Cypress	15,407	15,407	15,407	15,407	15,338	15,271
MORRIS	Carrizo-Wilcox	Cypress	2,166	2,166	2,166	2,166	2,166	2,166
		Sulphur	402	402	402	402	402	402
	Queen City	Cypress	9,469	9,469	9,469	9,469	9,469	9,362
RAINS	Carrizo-Wilcox	Sabine	1,839	1,839	1,839	1,802	1,802	1,745
	Nacatoch	Sabine	1	1	1	1	1	1
RED RIVER	Trinity	Red	52	52	52	52	52	52
		Sulphur	234	233	234	233	234	233
	Blossom	Red	665	665	665	665	665	665
		Sulphur	1,013	1,013	1,013	1,013	1,013	1,013
	Nacatoch	Red	58	58	58	58	58	58
		Sulphur	2,925	2,924	2,923	2,923	2,923	2,923
	Woodbine	Red	2	2	2	2	2	2
SMITH	Carrizo-Wilcox	Sabine	13,246	13,220	13,220	13,220	13,206	13,196
	Queen City	Sabine	28,343	28,343	28,343	28,213	28,018	27,887
TITUS	Carrizo-Wilcox	Cypress	7,215	7,064	6,974	7,211	7,252	7,194
		Sulphur	2,838	2,838	2,838	2,838	2,838	2,838
	Queen City	Cypress	144	144	144	144	144	144

LEGEND:

Non- Relevant (2016 Plan)	MAG same as 2016 Plan
Non-Relevant (2021 Plan)	New MAG
	Approved Volume Adjustment above MAG determined by Region D

County	Aquifer	Basin	2020	2030	2040	2050	2060	2070
UPSHUR	Carrizo-Wilcox	Cypress	5,442	5,442	5,442	5,442	5,442	5,442
		Sabine	1,689	1,689	1,689	1,689	1,689	1,689
	Queen City	Cypress	19,642	19,642	19,448	19,448	19,448	19,396
		Sabine	7,749	7,749	7,749	7,749	7,749	7,749
VAN ZANDT	Carrizo-Wilcox	Neches	4,317	4,317	4,317	4,317	4,317	4,317
		Sabine	4,767	4,729	4,556	4,497	4,497	4,370
		Trinity	1,384	1,384	1,384	1,384	1,384	1,384
	Queen City	Neches	4,791	4,791	4,791	4,791	4,791	4,791
WOOD	Carrizo-Wilcox	Cypress	2,053	2,053	2,053	2,053	2,053	2,053
		Sabine	19,404	19,360	19,285	19,263	19,239	19,184
	Queen City	Cypress	986	986	986	986	986	986
		Sabine	9,060	9,060	9,060	9,060	9,060	9,060
		TOTAL	**313,419**	**312,757**	**311,734**	**311,767**	**311,570**	**311,291**

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 2012 through 2016 were also utilized for comparison against the MAGs (Table 3.13). The county-aquifer-basin combinations that are highlighted exceed the year 2020 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 3.13 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 4,374 acre-feet/year, which gives a difference of 4,051 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 2020, and the historical pumping indicates that the average pumpage for 2009 through 2016 is 405 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 22 percent of the SUD's pumping, or 89 acre-feet/year.

Table 3.13 Groundwater Supplies and Historical Pumping Estimates (2012-2016) (ac-ft/yr)

County	Aquifer	Basin	MAG 2020	Non - Relevant Groundwater Supplies	Historical Pumping Average 2012-2016
BOWIE	Carrizo-Wilcox	Sulphur	9,872		1,632
	Blossom	Red		21	0
		Sulphur		180	0
	Nacatoch	Red		3,071	756
		Sulphur		1,942	420
CAMP	Carrizo-Wilcox	Cypress	4,050		3,406
	Queen-City	Cypress		4,306	1
CASS	Carrizo-Wilcox	Cypress	15,159		1,055
		Sulphur	2,864		262
	Queen-City	Cypress	35,499		3
		Sulphur	3,010		38
DELTA	Trinity	Sulphur	56		145
	Nacatoch	Sulphur		575	162
FRANKLIN	Carrizo-Wilcox	Cypress	7,765		437
		Sulphur	2,021		618
	Nacatoch	Sulphur		30	0
GREGG	Carrizo-Wilcox	Cypress	862		367
		Sabine	7,179		1,730
	Queen-City	Cypress		1,359	110
		Sabine		5,625	0
HARRISON	Carrizo-Wilcox	Cypress	6,183		2,756
		Sabine	4,851		2,379
	Queen City	Cypress	7,762		64
		Sabine	2,310		13
HOPKINS	Carrizo-Wilcox	Cypress	313		177
		Sabine	2,842		894
		Sulphur	3,237		3,091
	Nacatoch	Sabine		291	1,029
		Sulphur		916	113

County	Aquifer	Basin	MAG 2020	Non - Relevant Groundwater Supplies	Historical Pumping Average 2012-2016
HUNT	Trinity	Sabine	0		0
		Sulphur	3		198
		Trinity	0		0
	Nacatoch	Sabine		3,303	388
		Sulphur		491	608
	Woodbine	Sabine	269		79
		Sulphur	165		405
		Trinity	330		23
LAMAR	Trinity	Red	0		0
		Sulphur	8		42
	Blossom	Red		323	4,374
		Sulphur		71	1,418
	Nacatoch	Sulphur		110	2
	Woodbine	Red	0		18
		Sulphur	49		5
MARION	Carrizo-Wilcox	Cypress	2,726		535
	Queen City	Cypress	15,407		5
MORRIS	Carrizo-Wilcox	Cypress	2,166		396
		Sulphur	402		312
	Queen City	Cypress		9,469	19
RAINS	Carrizo-Wilcox	Sabine	1,839		451
	Nacatoch	Sabine		1	0
RED RIVER	Trinity	Red	52		452
		Sulphur	125		267
	Blossom	Red		665	0
		Sulphur		1,013	860
	Nacatoch	Red		58	0
		Sulphur		1,047	519
	Woodbine	Red	2		1
SMITH	Carrizo-Wilcox	Sabine	13,246		5,289
	Queen City	Sabine	28,343		1,192
TITUS	Carrizo-Wilcox	Cypress	7,215		613
		Sulphur	2,838		366
	Queen City	Cypress		144	0

County	Aquifer	Basin	MAG 2020	Non - Relevant Groundwater Supplies	Historical Pumping Average 2012-2016
UPSHUR	Carrizo-Wilcox	Cypress	5,442		2,709
		Sabine	1,689		704
	Queen City	Cypress	19,642		240
		Sabine	7,749		349
VAN ZANDT	Carrizo-Wilcox	Neches	4,317		1,314
		Sabine	4,629		2,368
		Trinity	1,384		622
	Queen City	Neches		4,791	169
WOOD	Carrizo-Wilcox	Cypress	2,053		271
		Sabine	19,404		5,902
	Queen City	Cypress	986		40
		Sabine	9,060		531

**Red highlighted cells represent non-relevant aquifers.*

According to the Guidance Manual for Brackish Groundwater in Texas, prepared for the TWDB by NRS Consulting Engineers (2008), there exists 55.8 million acre-feet of brackish groundwater in storage beneath Region D. Brackish groundwater is groundwater with a total dissolved solids content of over 1,000 mg/l, and would require treatment to be acceptable for municipal supply. However, groundwater with TDS below 1,500 mg/l is sometimes acceptable for irrigation, and below 3,000 mg/l is acceptable for some livestock.

3.3 Reuse

As noted by the Texas WateReuse 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 3.14 below.

Table 3.14 North East Texas Reuse by River Basin (ac-ft/yr)

Source Name	2020	2030	2040	2050	2060	2070
CYPRESS CREEK BASIN DIRECT REUSE	72,246	66,820	61,504	62,760	71,634	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	**78,419**	**72,993**	**67,677**	**68,933**	**77,807**	**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 2021 Plan and the assumptions, if any, made in development of these data. Note that for the purposes of the 2021 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 C3-3, and all existing WUG water supply amounts are presented in Appendix C3-4.

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 2070. 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 3.15 North East Texas Regional Municipal Water Supply by County (ac-ft/yr)

County	Basin	2020	2030	2040	2050	2060	2070
BOWIE	Red	1,105	1,128	1,149	1,130	1,119	1,119
	Sulphur	2,462	2,508	2,550	2,506	2,482	2,482
	Total	**3,567**	**3,636**	**3,699**	**3,636**	**3,601**	**3,601**
CAMP	Cypress	3,246	3,258	3,267	3,275	3,283	3,292
	Total	**3,246**	**3,258**	**3,267**	**3,275**	**3,283**	**3,292**
CASS	Cypress	4,437	4,495	4,555	4,628	4,625	4,625
	Sulphur	451	451	451	451	451	451
	Total	**4,888**	**4,946**	**5,006**	**5,079**	**5,076**	**5,076**
DELTA	Sulphur	1,313	1,296	1,295	1,292	1,290	1,291
	Total	**1,313**	**1,296**	**1,295**	**1,292**	**1,290**	**1,291**
FRANKLIN	Cypress	2,590	2,497	2,396	2,317	2,212	2,125

County	Basin	2020	2030	2040	2050	2060	2070
	Sulphur	4,478	4,302	4,131	3,987	3,808	3,665
	Total	**7,068**	**6,799**	**6,527**	**6,304**	**6,020**	**5,790**
GREGG	Cypress	1,373	1,396	1,412	1,433	1,450	1,457
	Sabine	52,906	65,263	65,257	65,250	65,334	65,725
	Total	**54,279**	**66,659**	**66,669**	**66,683**	**66,784**	**67,182**
HARRISON	Cypress	7,566	7,619	7,662	7,710	7,791	7,864
	Sabine	18,348	18,400	18,437	18,500	18,592	18,658
	Total	**25,914**	**26,019**	**26,099**	**26,210**	**26,383**	**26,522**
HOPKINS	Cypress	449	439	427	414	407	399
	Sabine	2,113	2,126	2,129	2,105	2,098	2,108
	Sulphur	7,533	7,499	7,485	7,455	7,443	7,442
	Total	**10,095**	**10,064**	**10,041**	**9,974**	**9,948**	**9,949**
HUNT	Sabine	12,861	13,461	13,764	14,626	16,433	19,582
	Sulphur	2,443	5,645	5,707	5,305	3,786	4,189
	Trinity	102	108	124	106	116	135
	Total	**15,404**	**19,214**	**19,595**	**20,037**	**20,335**	**23,906**
LAMAR	Red	16,612	16,452	16,298	16,177	15,970	15,833
	Sulphur	21,294	21,155	21,016	20,895	20,641	20,511
	Total	**37,906**	**37,607**	**37,314**	**37,072**	**36,611**	**36,344**
MARION	Cypress	4,717	4,717	4,717	4,717	4,717	4,717
	Total	**4,717**	**4,717**	**4,717**	**4,717**	**4,717**	**4,717**
MORRIS	Cypress	3,302	3,306	3,305	3,309	3,313	3,316
	Sulphur	429	421	421	421	421	421
	Total	**3,731**	**3,727**	**3,726**	**3,730**	**3,734**	**3,737**
RAINS	Sabine	3,049	3,523	3,513	3,505	3,496	3,450
	Total	**3,049**	**3,523**	**3,513**	**3,505**	**3,496**	**3,450**
RED RIVER	Red	347	336	335	336	334	332
	Sulphur	1,542	1,546	1,543	1,542	1,544	1,546
	Total	**1,889**	**1,882**	**1,878**	**1,878**	**1,878**	**1,878**
SMITH	Sabine	8,871	9,118	9,471	10,057	10,707	11,513
	Total	**8,871**	**9,118**	**9,471**	**10,057**	**10,707**	**11,513**
TITUS	Cypress	19,445	19,096	18,858	18,672	18,271	17,997
	Sulphur	1,678	1,169	1,245	1,338	1,437	1,523
	Total	**21,123**	**20,265**	**20,103**	**20,010**	**19,708**	**19,520**
UPSHUR	Cypress	7,115	7,180	7,264	7,263	7,283	7,306
	Sabine	2,712	2,719	2,723	2,710	2,699	2,719
	Total	**9,827**	**9,899**	**9,987**	**9,973**	**9,982**	**10,025**

County	Basin	2020	2030	2040	2050	2060	2070
VAN ZANDT	Neches	3,270	3,379	3,458	3,544	3,645	3,642
	Sabine	6,194	6,615	6,588	6,504	6,489	6,477
	Trinity	1,999	2,600	2,568	2,415	2,429	2,376
	Total	**11,463**	**12,594**	**12,614**	**12,463**	**12,563**	**12,495**
WOOD	Cypress	1,757	1,721	1,696	1,660	1,634	1,603
	Sabine	12,366	13,053	12,991	12,948	12,880	12,832
	Total	**14,123**	**14,774**	**14,687**	**14,608**	**14,514**	**14,435**
REGION TOTAL		**242,475**	**259,997**	**260,208**	**260,208**	**260,630**	**264,723**

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

Basin	2020	2030	2040	2050	2060	2070
CYPRESS	55,997	55,724	55,559	55,398	54,986	54,701
NECHES	3,270	3,379	3,458	3,544	3,645	3,642
RED RIVER	18,064	17,916	17,782	17,643	17,423	17,284
SABINE	119,420	134,278	134,873	136,205	138,728	143,064
SULPHUR	43,623	45,992	45,844	45,192	43,303	43,521
TRINITY	2,101	2,708	2,692	2,521	2,545	2,511
TOTAL	**242,475**	**259,997**	**260,208**	**260,503**	**260,630**	**264,723**

3.4.3 Regional Manufacturing Supply

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

County	Basin	2020	2030	2040	2050	2060	2070
BOWIE	Red	7	7	7	7	7	7
	Sulphur	28	28	28	28	28	28
	Total	**35**	**35**	**35**	**35**	**35**	**35**
CAMP	Cypress	102	102	102	102	102	102
	Total	**102**	**102**	**102**	**102**	**102**	**102**
CASS	Cypress	244	245	245	245	245	245
	Sulphur*	32,530	32,604	32,602	32,601	32,601	32,600
	Total	32,774	32,849	32,847	32,846	32,846	32,845
DELTA	Sulphur						
	Total						
FRANKLIN	Cypress	7	7	7	7	7	7
	Sulphur						
	Total	**7**	**7**	**7**	**7**	**7**	**7**

County	Basin	2020	2030	2040	2050	2060	2070
GREGG	Cypress						
	Sabine	1,572	1,574	1,574	1,574	1,574	1,574
	Total	**1,572**	**1,574**	**1,574**	**1,574**	**1,574**	**1,574**
HARRISON	Cypress	2,533	2,533	2,533	2,533	2,533	2,533
	Sabine	105,839	105,496	105,463	105,431	105,396	105,361
	Total	**108,372**	**108,029**	**107,996**	**107,964**	**107,929**	**107,894**
HOPKINS	Cypress						
	Sabine						
	Sulphur	1,741	1,830	1,915	1,987	2,126	2,275
	Total	**1,741**	**1,830**	**1,915**	**1,987**	**2,126**	**2,275**
HUNT	Sabine	951	1,100	1,281	1,454	1,573	1,759
	Sulphur	151	182	182	182	182	182
	Trinity						
	Total	**1,102**	**1,282**	**1,463**	**1,636**	**1,755**	**1,941**
LAMAR	Red	870	912	953	988	1,054	1,089
	Sulphur	5,091	5,340	5,580	5,787	6,183	6,386
	Total	**5,961**	**6,252**	**6,533**	**6,775**	**7,237**	**7,475**
MORRIS	Cypress	121,906	116,480	111,164	112,420	121,294	115,068
	Sulphur						
	Total	**121,906**	**116,480**	**111,164**	**112,420**	**121,294**	**115,068**
RAINS	Sabine	12	12	12	12	12	12
	Total	**12**	**12**	**12**	**12**	**12**	**12**
RED RIVER	Red						
	Sulphur	8,527	8,527	8,520	8,520	8,520	8,520
	Total	**8,527**	**8,527**	**8,520**	**8,520**	**8,520**	**8,520**
SMITH	Sabine	4	5	5	5	5	5
	Total	**4**	**5**	**5**	**5**	**5**	**5**
TITUS	Cypress	5,392	2,737	2,860	2,850	2,591	2,461
	Sulphur						
	Total	**5,392**	**2,737**	**2,860**	**2,850**	**2,591**	**2,461**
UPSHUR	Cypress	6	6	6	6	6	6
	Sabine						
	Total	**6**	**6**	**6**	**6**	**6**	**6**
VAN ZANDT	Neches						
	Sabine	261	261	261	261	250	250
	Trinity	3	3	3	3	3	3
	Total	**264**	**264**	**264**	**264**	**253**	**253**

County	Basin	2020	2030	2040	2050	2060	2070
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		**289,279**	**281,493**	**276,805**	**278,505**	**287,794**	**281,975**

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. Amounts shown herein reflect supply necessary to meet all projected primary diversion demand.

Table 3.18 North East Texas Regional Manufacturing Supply by Basin (ac-ft/yr)

Basin	2020	2030	2040	2050	2060	2070
CYPRESS	130,190	122,110	116,917	118,163	126,778	120,422
NECHES	0	0	0	0	0	0
RED RIVER	877	919	960	995	1,061	1,096
SABINE	110,141	109,950	110,098	110,239	110,312	110,463
SULPHUR	48,068	48,511	48,827	49,105	49,640	49,991
TRINITY	3	3	3	3	3	3
TOTAL	**289,279**	**281,493**	**276,805**	**278,505**	**287,794**	**281,975**

3.4.4 Regional Irrigation Supply

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

County	Basin	2020	2030	2040	2050	2060	2070
BOWIE	Red	6,992	6,992	6,992	6,992	6,992	6,992
	Sulphur	169	169	169	169	169	169
	Total	**7,161**	**7,161**	**7,161**	**7,161**	**7,161**	**7,161**
CAMP	Cypress						
	Total						
CASS	Cypress						
	Sulphur						
	Total						
DELTA	Sulphur	9,163	9,176	9,186	9,191	9,191	9,203
	Total	**9,163**	**9,176**	**9,186**	**9,191**	**9,191**	**9,203**
FRANKLIN	Cypress	103	103	103	103	103	103
	Sabine	107	107	107	107	107	107
	Sulphur	104	104	104	104	104	104
	Total	**314**	**314**	**314**	**314**	**314**	**314**
GREGG	Sabine	192	192	192	192	192	192
	Total	**192**	**192**	**192**	**192**	**192**	**192**

County	Basin	2020	2030	2040	2050	2060	2070
HARRISON	Cypress	35	35	35	35	35	35
	Sabine	134	134	134	134	134	134
	Total	**169**	**169**	**169**	**169**	**169**	**169**
HOPKINS	Cypress	1	1	1	1	1	1
	Sabine	18	18	18	18	18	18
	Sulphur	125	125	125	125	125	125
	Total	**144**	**144**	**144**	**144**	**144**	**144**
HUNT	Sabine	113	113	113	113	113	113
	Sulphur						
	Trinity	12	12	12	12	12	12
	Total	**125**	**125**	**125**	**125**	**125**	**125**
LAMAR	Red	6,468	6,468	6,468	6,468	6,468	6,468
	Sulphur	2,190	2,190	2,190	2,190	2,190	2,190
	Total	**8,658**	**8,658**	**8,658**	**8,658**	**8,658**	**8,658**
MARION	Cypress	321	321	321	321	321	321
	Total	**321**	**321**	**321**	**321**	**321**	**321**
MORRIS	Cypress	62	62	62	62	62	62
	Sulphur	8	8	8	8	8	8
	Total	**70**	**70**	**70**	**70**	**70**	**70**
RAINS	Sabine	211	211	211	211	211	211
	Total	**211**	**211**	**211**	**211**	**211**	**211**
RED RIVER	Red	2,089	2,089	2,089	2,089	2,089	2,089
	Sulphur	434	434	434	434	434	434
	Total	**2,523**	**2,523**	**2,523**	**2,523**	**2,523**	**2,523**
SMITH	Sabine	324	324	324	324	324	324
	Total	**324**	**324**	**324**	**324**	**324**	**324**
TITUS	Cypress	157	157	157	157	157	157
	Sulphur	1,311	1,311	1,311	1,311	1,311	1,311
	Total	**1,468**	**1,468**	**1,468**	**1,468**	**1,468**	**1,468**
UPSHUR	Cypress	713	713	713	713	713	713
	Total	**713**	**713**	**713**	**713**	**713**	**713**
VAN ZANDT	Neches	457	439	437	436	434	432
	Total	**457**	**439**	**437**	**436**	**434**	**432**
WOOD	Cypress	125	125	125	125	125	125
	Sabine	1,249	1,249	1,249	1,249	1,249	1,249
	Total	**1,374**	**1,374**	**1,374**	**1,374**	**1,374**	**1,374**
REGION TOTAL		**33,387**	**33,382**	**33,390**	**33,394**	**33,392**	**33,402**

Table 3.20 North East Texas Regional Irrigation Water Supply by Basin (ac-ft/yr)

Basin	2020	2030	2040	2050	2060	2070
CYPRESS	1,517	1,517	1,517	1,517	1,517	1,517
NECHES	457	439	437	436	434	432
RED RIVER	15,549	15,549	15,549	15,549	15,549	15,549
SABINE	2,348	2,348	2,348	2,348	2,348	2,348
SULPHUR	13,504	13,517	13,527	13,532	13,532	13,544
TRINITY	12	12	12	12	12	12
TOTAL	**33,387**	**33,382**	**33,390**	**33,394**	**33,392**	**33,402**

3.4.5 Regional Steam Electric Supply

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

County	Basin	2020	2030	2040	2050	2060	2070
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						

County	Basin	2020	2030	2040	2050	2060	2070
	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	4,257	4,445	4,827	5,292	5,860	6,247
	Total	**4,257**	**4,445**	**4,827**	**5,292**	**5,860**	**6,247**
MORRIS	Cypress	820	820	820	820	820	820
	Sulphur						
	Total	**820**	**820**	**820**	**820**	**820**	**820**
RAINS	Sabine						
	Total						
RED RIVER	Red						
	Sulphur						
	Total						
SMITH	Sabine						
	Total						
TITUS	Cypress	31,865	31,065	30,165	29,365	29,117	28,848
	Sulphur						
	Total	**31,865**	**31,065**	**30,165**	**29,365**	**29,117**	**28,848**
UPSHUR	Cypress						
	Sabine						
	Total						
VAN ZANDT	Neches						
	Sabine						
	Trinity						
	Total						
WOOD	Cypress						
	Sabine						
	Total						
REGION TOTAL		**75,026**	**74,414**	**73,896**	**73,561**	**73,881**	**73,999**

Table 3.22 North East Texas Regional Steam Electric Water Supply by Basin (ac-ft/yr)

Basin	2020	2030	2040	2050	2060	2070
CYPRESS	36,942	36,330	35,812	35,477	35,797	35,915
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	**75,026**	**74,414**	**73,896**	**73,561**	**73,881**	**73,999**

3.4.6 Regional Mining Supply

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

County	Basin	2020	2030	2040	2050	2060	2070
BOWIE	Red						
	Sulphur						
	Total						
CAMP	Cypress	23	23	23	23	23	23
	Total	**23**	**23**	**23**	**23**	**23**	**23**
CASS	Cypress	839	862	884	904	926	952
	Sulphur						
	Total	**839**	**862**	**884**	**904**	**926**	**952**
DELTA	Sulphur						
	Total						
FRANKLIN	Cypress						
	Sulphur	1,040	1,016	994	974	954	954
	Total	**1,040**	**1,016**	**994**	**974**	**954**	**954**
GREGG	Cypress	14	22	22	17	13	9
	Sabine	249	392	388	306	223	165
	Total	**263**	**414**	**410**	**323**	**236**	**174**
HARRISON	Cypress	291	300	308	317	324	334
	Sabine	501	510	520	529	537	546
	Total	**792**	**810**	**828**	**846**	**861**	**880**
HOPKINS	Cypress	24	26	25	27	28	28
	Sabine	249	260	267	274	283	291
	Sulphur	531	555	570	584	602	619
	Total	**804**	**841**	**862**	**885**	**913**	**938**
HUNT	Sabine	49	48	46	45	41	36
	Sulphur	5	5	6	6	9	13

County	Basin	2020	2030	2040	2050	2060	2070
	Trinity	1	1	1	1	1	1
	Total	**55**	**54**	**53**	**52**	**51**	**50**
LAMAR	Red						
	Sulphur						
	Total						
MARION	Cypress	116	119	122	124	126	128
	Total	**116**	**119**	**122**	**124**	**126**	**128**
MORRIS	Cypress						
	Sulphur						
	Total						
RAINS	Sabine						
	Total						
RED RIVER	Red						
	Sulphur	4	4	3	3	3	3
	Total	**4**	**4**	**3**	**3**	**3**	**3**
SMITH	Sabine	448	465	494	561	622	697
	Total	**448**	**465**	**494**	**561**	**622**	**697**
TITUS	Cypress	4,199	4,424	4,648	4,873	4,655	4,191
	Sulphur	361	383	406	429	453	475
	Total	**4,560**	**4,807**	**5,054**	**5,302**	**5,108**	**4,666**
UPSHUR	Cypress	299	573	608	480	355	263
	Sabine	185	258	268	234	200	175
	Total	**484**	**831**	**876**	**714**	**555**	**438**
VAN ZANDT	Neches	1,296	1,307	1,317	1,328	1,338	1,349
	Sabine	1,942	2,103	2,262	2,425	2,524	2,683
	Trinity	78	83	93	103	112	122
	Total	**3,316**	**3,493**	**3,672**	**3,856**	**3,974**	**4,154**
WOOD	Cypress	25	25	28	31	32	35
	Sabine	284	288	289	290	292	293
	Total	**309**	**313**	**317**	**321**	**324**	**328**
REGION TOTAL		**13,053**	**14,052**	**14,592**	**14,888**	**14,676**	**14,385**

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

Basin	2020	2030	2040	2050	2060	2070
CYPRESS	5,830	6,374	6,668	6,796	6,482	5,963
NECHES	1,296	1,307	1,317	1,328	1,338	1,349
RED RIVER						
SABINE	3,907	4,324	4,534	4,664	4,722	4,886
SULPHUR	1,941	1,963	1,979	1,996	2,021	2,064
TRINITY	79	84	94	104	113	123
TOTAL	**13,053**	**14,052**	**14,592**	**14,888**	**14,676**	**14,385**

3.4.7 Regional Livestock Supply

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

County	Basin	2020	2030	2040	2050	2060	2070
BOWIE	Red	435	435	395	339	290	271
	Sulphur	721	721	655	561	481	449
	Total	**1,156**	**1,156**	**1,050**	**900**	**771**	**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	355	357	357	357
	Total	**839**	**839**	**839**	**841**	**841**	**841**
DELTA	Sulphur	279	291	291	291	291	291
	Total	**279**	**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	559	614	670	729	769	799
	Sabine	405	425	447	469	492	514
	Total	**964**	**1,039**	**1,117**	**1,198**	**1,261**	**1,313**
HOPKINS	Cypress	179	180	184	184	188	190
	Sabine	1,856	1,877	1,923	1,926	1,976	1,998
	Sulphur	2,819	2,797	2,747	2,744	2,691	2,668
	Total	**4,854**	**4,854**	**4,854**	**4,854**	**4,855**	**4,856**
HUNT	Sabine	812	812	812	812	812	812
	Sulphur	300	300	300	300	300	300

County	Basin	2020	2030	2040	2050	2060	2070
	Trinity	34	34	34	34	35	35
	Total	**1,146**	**1,146**	**1,146**	**1,146**	**1,147**	**1,147**
LAMAR	Red						
	Sulphur	1,624	1,624	1,624	1,624	1,624	1,624
	Total	**1,624**	**1,624**	**1,624**	**1,624**	**1,624**	**1,624**
MARION	Cypress	411	411	411	411	411	411
	Total	**411**	**411**	**411**	**411**	**411**	**411**
MORRIS	Cypress	326	326	326	326	326	326
	Sulphur	300	300	300	300	300	300
	Total	**626**	**626**	**626**	**626**	**626**	**626**
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	514	514	514	514	514	514
	Total	**514**	**514**	**514**	**514**	**514**	**514**
TITUS	Cypress	433	433	433	433	428	428
	Sulphur	575	575	575	575	535	514
	Total	**1,008**	**1,008**	**1,008**	**1,008**	**963**	**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	1,167	1,167	1,167	1,167	1,167	1,167
	Sabine	1,124	1,124	1,124	1,124	1,119	1,119
	Trinity	637	637	637	637	637	637
	Total	**2,928**	**2,928**	**2,928**	**2,928**	**2,923**	**2,923**
WOOD	Cypress	555	555	555	555	555	555
	Sabine	1,643	1,643	1,643	1,643	1,643	1,643
	Total	**2,198**	**2,198**	**2,198**	**2,198**	**2,198**	**2,198**
REGION TOTAL		**24,304**	**24,391**	**24,363**	**24,296**	**24,182**	**24,163**

Table 3.26 North East Texas Regional Livestock Water Supply by Basin (ac-ft/yr)

Basin	2020	2030	2040	2050	2060	2070
CYPRESS	5,493	5,549	5,609	5,668	5,707	5,739
NECHES	1,167	1,167	1,167	1,167	1,167	1,167
RED RIVER	1,013	1,013	973	917	868	849
SABINE	7,417	7,458	7,526	7,551	7,619	7,663
SULPHUR	8,543	8,533	8,417	8,322	8,149	8,073
TRINITY	671	671	671	671	672	672
TOTAL	**24,304**	**24,391**	**24,363**	**24,296**	**24,182**	**24,163**

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 3.27 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 3.27 Major Water Provider Water Supplies

Major Water Provider	Source Region	Source Basin	Supply Available ac-ft/yr					
			2020	2030	2040	2050	2060	2070
CASH SUD	C	Trinity	935	1,077	1,075	1,074	1,079	1,082
	D	Sabine	1,864	1,805	1,869	2,318	3,466	5,716
CHEROKEE WATER COMPANY	I	Sabine	31,456	31,309	31,162	31,015	30,867	30,720
CITY OF COMMERCE	D	Sabine	1,629	6,025	5,975	5,531	3,917	3,884
	D	Sulphur	322	322	322	322	322	322
CITY OF EMORY	D	Sabine	1,218	1,267	1,272	1,276	1,280	1,283
FRANKLIN COUNTY WD	D	Cypress	9,031	8,649	8,266	7,960	7,577	7,271
CITY OF GREENVILLE	D	Sabine	13,718	23,783	23,615	23,448	23,300	23,111
LAMAR COUNTY WSD	D	Red	11,556	11,604	11,650	11,683	11,748	11,758
CITY OF LONGVIEW	D	Cypress	20,000	20,000	20,000	20,000	20,000	20,000
	D	Sabine	29,526	39,568	39,376	39,192	38,996	38,797
	I	Sabine	16,000	16,000	16,000	16,000	16,000	16,000

Major Water Provider	Source Region	Source Basin	Supply Available ac-ft/yr					
			2020	2030	2040	2050	2060	2070
CITY OF MARSHALL	D	Cypress	16,171	16,171	16,171	16,171	16,171	16,171
CITY OF MOUNT PLEASANT	D	Cypress	23,573	23,455	23,338	23,244	23,127	23,033
NORTHEAST TEXAS MWD	D	Cypress	207,535	207,433	203,331	201,229	198,226	195,424
CITY OF PARIS	D	Red	58,778	58,780	58,779	58,779	58,780	58,751
SABINE RIVER AUTHORITY*	D	Sabine	300,851	299,061	297,247	295,513	293,662	291,789
SULPHUR RIVER MWD	D	Sulphur	14,347	14,265	14,183	14,103	14,021	13,940
CITY OF SULPHUR SPRINGS	D	Sulphur	23,456	23,378	23,301	23,225	23,148	23,071
RIVERBEND WATER RESOURCES DISTRICT / CITY OF TEXARKANA	D	Sulphur	122,630	122,623	122,616	122,615	122,615	122,615
	D	Red	0	0	0	0	0	0
TITUS COUNTY FWD #1	D	Cypress	28,900	28,900	28,900	28,900	28,900	28,900

**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 2021 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 2016 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 persons. 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 2021 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 demands. 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.

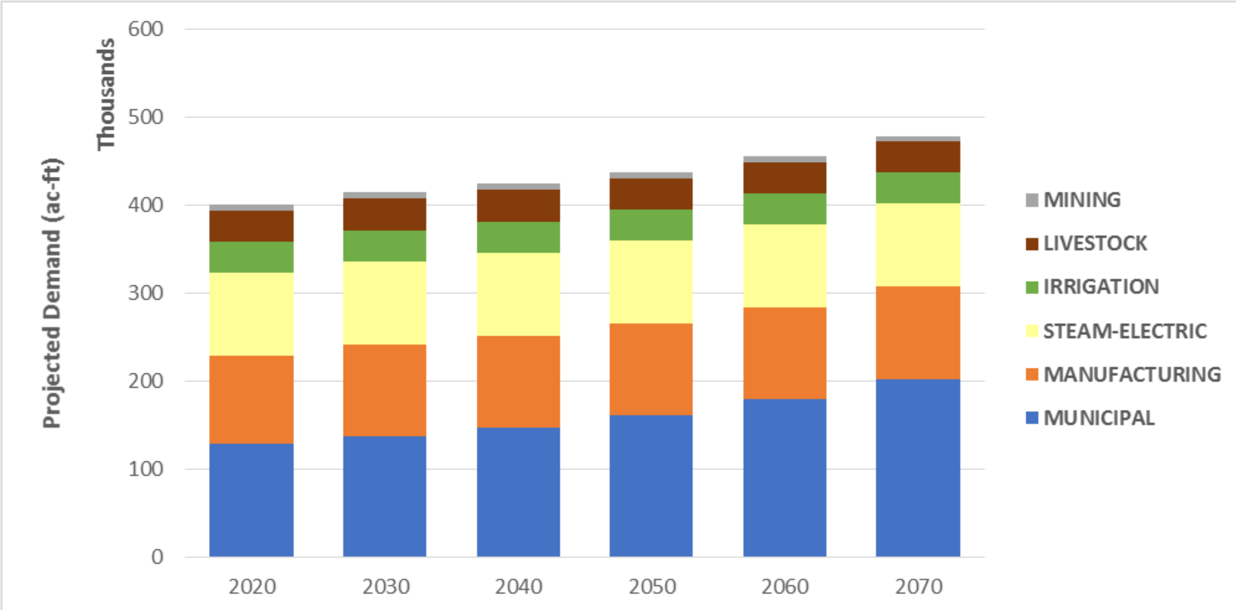

Figure 4.1 Projected Demands of the Six Water User Groups within Region D

Required reports from DB22 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 4.59 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 2021 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 in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
BURNS REDBANK WSC	201	199	196	194	193	193	A
CENTRAL BOWIE COUNTY WSC	619	639	708	784	869	962	A
DE KALB	295	292	289	291	294	298	A
HOOKS	281	278	276	271	269	269	A
IRRIGATION	4,134	4,134	4,134	4,134	4,134	4,134	A
LIVESTOCK	669	669	607	521	446	416	A
MACEDONIA EYLAU MUD 1	588	598	601	601	601	601	A
MANUFACTURING	1,579	2,014	2,014	2,014	2,014	2,014	A
MAUD	211	226	241	238	237	237	A
NASH	392	458	523	589	589	589	A
NEW BOSTON	1,390	1,399	1,385	1,381	1,379	1,379	A
REDWATER	440	487	535	588	616	616	A
RIVERBEND WATER RESOURCES DISTRICT	523	536	539	537	537	537	A
TEXARKANA	7,145	7,282	7,459	7,706	8,028	8,380	A
WAKE VILLAGE	699	750	802	861	932	931	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 in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
LIVESTOCK	3,962	3,962	3,962	3,962	3,962	3,962	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 in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
HOLLY SPRINGS WSC	47	43	39	38	38	38	EI
LIVESTOCK	1,818	1,818	1,818	1,816	1,816	1,816	A
COUNTY-OTHER	449	357	269	212	208	208	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 in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
LIVESTOCK	262	250	250	250	250	250	A
NORTH HUNT SUD	6	9	11	13	15	15	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 in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
LIVESTOCK	1,804	1,804	1,804	1,804	1,804	1,804	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 in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
MINING	11	19	19	14	10	6	EI
STARRVILLE-FRIENDSHIP WSC	0	0	0	0	1	11	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 in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
HARLETON WSC	47	56	69	96	131	174	EI
IRRIGATION	532	532	532	532	532	532	A
LEIGH WSC	0	0	21	60	105	159	A
MINING	1,706	1,267	912	566	227	0	A
NORTH HARRISON WSC	0	0	0	0	15	32	A
PANOLA-BETHANY WSC	0	49	112	208	273	332	A
SCOTTSVILLE	31	44	58	82	109	141	A
WASKOM	96	114	136	173	220	275	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 in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
BRINKER WSC	0	0	0	12	47	83	EI
CASH SUD	0	0	2	2	3	10	EI
CUMBY	13	29	44	58	77	88	A
IRRIGATION	4,627	4,627	4,627	4,627	4,627	4,627	A
LIVESTOCK	1,068	1,090	1,140	1,143	1,196	1,219	A
MARTIN SPRINGS WSC	0	0	0	0	0	29	A
MILLER GROVE WSC	7	14	20	25	34	44	A
MINING	227	283	360	444	533	639	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 in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
ABLES SPRINGS WSC	0	14	28	55	98	163	REGION C
B H P WSC	0	60	103	177	288	445	A
BLACKLAND WSC	0	2	2	3	3	4	REGION C
CADDO BASIN SUD	5	172	314	560	945	1,503	A
CADDO MILLS	0	1	36	68	108	254	EI
CASH SUD	0	365	963	1,278	1,264	611	EI
CELESTE	29	52	86	136	209	316	A
COUNTY-OTHER	0	0	166	703	1,817	3,834	A
GREENVILLE	3,239	4,626	6,531	9,183	12,913	18,266	A
HICKORY CREEK SUD	85	250	485	820	1,303	2,010	A
IRRIGATION	230	230	230	230	230	230	A
JOSEPHINE	0	11	24	48	60	68	REGION C
LIVESTOCK	2	2	2	2	1	1	A
MINING	73	64	35	19	7	0	A
NORTH HUNT SUD	72	139	232	363	553	831	A
POETRY WSC	0	48	83	143	237	364	EI
ROYSE CITY	1	8	15	24	40	62	REGION C
WOLFE CITY	0	0	0	52	149	293	A

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 in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
COUNTY-OTHER	204	204	212	224	234	244	EI
IRRIGATION	1,468	1,468	1,468	1,468	1,468	1,468	A
LIVESTOCK	617	617	617	617	617	617	A

4.1.11 Marion County

The Carrizo-Wilcox Aquifer and Lake O' The Pines supply most of the water demand in Marion County. The following table, Table 4.11, is a summary of identified water supply shortages in Marion County.

Table 4.11 Water Supply Shortages in Marion County

Marion County	Total Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
HARLETON WSC	15	18	22	31	42	56	EI
MINING	373	645	590	471	352	265	EI

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 4.12, is a summary of identified water supply shortages in Morris County.

Table 4.12 Water Supply Shortages in Morris County

Morris County	Total Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
HOLLY SPRINGS WSC	26	24	21	20	20	20	EI
LIVESTOCK	979	979	979	979	979	979	A

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 4.13 is a summary of identified water supply shortages in Rains County.

Table 4.13 Water Supply Shortages in Rains County

Rains County	Total Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
CASH SUD	0	0	12	16	17	57	EI
MILLER GROVE WSC	1	2	3	4	6	8	A

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 4.14 presents a summary of identified water supply shortages in Red River County.

Table 4.14 Water Supply Shortages in Red River County

Red River County	Total Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
CLARKSVILLE	237	231	222	221	219	219	A
IRRIGATION	2,154	2,154	2,154	2,154	2,154	2,154	A
LIVESTOCK	184	184	184	184	184	184	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 4.15.

Table 4.15 Water Supply Shortages in Smith County

Smith County	Total Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
CRYSTAL SYSTEMS TEXAS	0	0	0	95	292	525	A
LINDALE	45	226	422	591	842	1,137	A
SMITH COUNTY MUD 1	0	0	13	178	375	609	A
STAR MOUNTAIN WSC	20	39	61	87	116	148	A
STARRVILLE-FRIENDSHIP WSC	0	0	0	0	2	26	A
WINONA	0	0	0	20	48	81	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 4.16.

Table 4.16 Water Supply Shortages in Titus County

Titus County	Total Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
LIVESTOCK	1,939	1,939	1,939	1,939	1,984	2,005	A
MANUFACTURING	0	1,418	1,295	1,305	1,564	1,694	E
STEAM ELECTRIC POWER	30,066	30,866	31,766	32,566	32,814	33,083	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 4.17.

Table 4.17 Water Supply Shortages in Upshur County

Upshur County	Total Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
GILMER	0	0	11	75	142	206	A
LIVESTOCK	140	140	140	140	140	140	A
MANUFACTURING	63	70	70	70	70	70	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 4.18, is a summary of identified water supply shortages in Van Zandt County.

Table 4.18 Water Supply Shortages in Van Zandt County

Van Zandt County	Total Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
ABLES SPRINGS WSC	1	1	1	1	2	2	REGION C
EDOM WSC	11	18	23	32	42	55	A
IRRIGATION	43	61	63	64	66	68	A
LITTLE HOPE MOORE WSC	0	0	0	3	11	17	A
MABANK	17	22	26	44	73	114	REGION C
MANUFACTURING	242	493	493	493	504	504	A
R P M WSC	0	25	58	93	124	152	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 4.19.

Table 4.19 Water Supply Shortages in Wood County

Wood County	Total Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
LIVESTOCK	1,098	1,098	1,098	1,098	1,098	1,098	A
MANUFACTURING	1,030	1,583	1,583	1,583	1,583	1,583	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 4.20 and Table 4.21 detail the shortages in the basin.

Table 4.20 Water Shortages due to Expirations and Insufficient Contract Amounts – Red River Basin

Insufficient Contract	Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
COUNTY-OTHER	120	121	124	127	129	131	EI

Table 4.21 Actual Water Shortages – Red River Basin

Actual Shortage	Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
BURNS REDBANK WSC	201	199	196	194	193	193	A
CENTRAL BOWIE COUNTY WSC	88	91	101	112	124	137	A
DE KALB	45	44	44	44	45	45	A
HOOKS	281	278	276	271	269	269	A
IRRIGATION	1,140	1,140	1,140	1,140	1,140	1,140	A
LIVESTOCK	1,053	1,053	1,030	997	969	957	A
NEW BOSTON	409	411	407	406	405	405	A
RIVERBEND WATER RESOURCES DISTRICT	90	92	92	92	92	92	A
TEXARKANA	843	859	880	909	947	989	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 4.22 and

Table 4.23 detail the shortages in the basin.

Table 4.22 Water Shortages due to Expiration and Insufficient Contract Amounts – Sulphur River Basin

Insufficient Contract	Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
BRINKER WSC	0	0	0	12	47	83	EI
CASH SUD	0	0	5	8	11	48	EI
COUNTY-OTHER	84	83	88	97	105	113	EI
MINING	149	186	236	293	352	422	EI

Table 4.23 Actual Water Shortages – Sulphur River Basin

Actual Shortage	Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
CENTRAL BOWIE COUNTY WSC	531	548	607	672	745	825	A
CLARKSVILLE	237	231	222	221	219	219	A
COUNTY-OTHER	167	142	135	210	272	385	A
CUMBY	0	2	3	4	6	7	A
DE KALB	250	248	245	247	249	253	A
HICKORY CREEK SUD	36	91	172	285	451	692	A
IRRIGATION	11,322	11,322	11,322	11,322	11,322	11,322	A
LIVESTOCK	5,275	5,285	5,296	5,244	5,290	5,316	A
MACEDONIA EYLAU MUD 1	588	598	601	601	601	601	A
MANUFACTURING	1,579	2,014	2,014	2,014	2,014	2,014	A
MARTIN SPRINGS WSC	0	0	0	0	0	2	A
MAUD	211	226	241	238	237	237	A
MINING	30	27	18	13	7	0	A
NASH	392	458	523	589	589	589	A
NEW BOSTON	981	988	978	975	974	974	A
NORTH HUNT SUD	78	148	243	376	568	846	A
REDWATER	440	487	535	588	616	616	A
RIVERBEND WATER RESOURCES DISTRICT	433	444	447	445	445	445	A
TEXARKANA	6,302	6,423	6,579	6,797	7,081	7,391	A
WAKE VILLAGE	699	750	802	861	932	931	A
WOLFE CITY	0	0	0	52	149	293	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 4.24 and Table 4.25 detail the shortages in the basin.

Table 4.24 Water Shortages due to Expiration and Insufficient Contract Amounts – Cypress Creek Basin

Insufficient Contract	Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
HARLETON WSC	62	74	91	127	173	230	EI
HOLLY SPRINGS WSC	73	67	60	58	58	58	EI
MANUFACTURING	0	1,418	1,295	1,305	1,564	1,694	E
MINING	380	653	602	484	367	284	EI
STEAM ELECTRIC POWER	30,066	30,866	31,766	32,566	32,814	33,083	EI

Table 4.25 Actual Water Shortages – Cypress Creek Basin

Actual Shortage	Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
COUNTY-OTHER	282	215	150	109	106	106	A
GILMER	0	0	11	75	142	206	A
IRRIGATION	384	384	384	384	384	384	A
LEIGH WSC	0	0	17	49	86	130	A
LIVESTOCK	7,038	7,038	7,038	7,038	7,043	7,043	A
MANUFACTURING	63	70	70	70	70	70	A
MINING	234	137	58	0	0	0	A
NORTH HARRISON WSC	0	0	0	0	15	32	A
PANOLA-BETHANY WSC	0	3	9	19	25	31	A
SCOTTSVILLE	10	14	19	27	36	46	A
WASKOM	96	114	136	173	220	275	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 4.26 details the shortages in the basin.

Table 4.26 Actual Water Shortages – Neches River Basin

Actual Shortage	Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
EDOM WSC	11	18	23	32	42	55	A
IRRIGATION	43	61	63	64	66	68	A
LITTLE HOPE MOORE WSC	0	0	0	1	3	5	A
R P M WSC	0	25	58	93	124	152	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 4.27 and Table 4.28 detail the shortages in the basin.

Table 4.27 Water Shortages due to Expiration and Insufficient Contract Amounts – Sabine River Basin

Insufficient Contract	Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
CADDO MILLS	0	1	36	68	108	254	EI
CASH SUD	0	361	1,004	1,338	1,335	647	EI
MINING	82	108	131	152	176	204	EI
POETRY WSC	0	48	83	143	237	364	EI

Table 4.28 Actual Water Shortages – Sabine River Basin

Actual Shortage	Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
ABLES SPRINGS WSC	1	15	29	56	100	165	REGION C
B H P WSC	0	60	103	177	288	445	A
BLACKLAND WSC	0	2	2	3	3	4	REGION C
CADDO BASIN SUD	5	172	314	560	945	1,503	A
CELESTE	29	52	86	136	209	316	A
COUNTY-OTHER	0	0	142	551	1,571	3,426	A
CRYSTAL SYSTEMS TEXAS	0	0	0	95	292	525	A
CUMBY	13	27	41	54	71	81	A
GREENVILLE	3,239	4,626	6,531	9,183	12,913	18,266	A
HICKORY CREEK SUD	32	114	228	393	629	977	A
IRRIGATION	299	299	299	299	299	299	A
JOSEPHINE	0	11	24	48	60	68	REGION C
LEIGH WSC	0	0	4	11	19	29	A

Actual Shortage	Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
LINDALE	45	226	422	591	842	1,137	A
LITTLE HOPE MOORE WSC	0	0	0	2	8	12	A
LIVESTOCK	1,174	1,174	1,174	1,174	1,174	1,174	A
MANUFACTURING	1,272	2,075	2,075	2,075	2,086	2,086	A
MARTIN SPRINGS WSC	0	0	0	0	0	27	A
MILLER GROVE WSC	8	16	23	29	40	52	A
MINING	1,513	1,165	870	591	322	126	A
PANOLA-BETHANY WSC	0	46	103	189	248	301	A
ROYSE CITY	1	8	15	24	40	62	REGION C
SCOTTSVILLE	21	30	39	55	73	95	A
SMITH COUNTY MUD 1	0	0	13	178	375	609	A
STAR MOUNTAIN WSC	20	39	61	87	116	148	A
STARRVILLE-FRIENDSHIP WSC	0	0	0	0	3	37	A
WINONA	0	0	0	20	48	81	A

4.2.6 Trinity River Basin

The Trinity Basin includes portions of Hunt and Van Zandt Counties. Actual shortages have been identified and are presented in Table 4.29.

Table 4.29 Actual Water Shortages – Trinity River Basin

Actual Shortage	Water Shortage in ac-ft/yr						Shortage Type
	2020	2030	2040	2050	2060	2070	
COUNTY-OTHER	0	0	8	45	76	125	A
HICKORY CREEK SUD	17	45	85	142	223	341	A
LIVESTOCK	2	2	2	2	1	1	A
MABANK	17	22	26	44	73	114	REGION C
MANUFACTURING	0	1	1	1	1	1	A
MINING	2	2	1	1	0	0	A

4.3 Summary of Needs – Major Water Providers

The following section presents the supply/demand analysis for the 18 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 2021 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	569	648	753	835	1,013	1,269
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	0	0	0	0	0	0
COUNTY-OTHER, UPSHUR	WUG Seller	IRR	0	0	0	0	0	0
EMORY	WUG Seller	MUN	536	527	526	526	525	525
FARMERSVILLE	WUG Seller	MUN	1	22	41	73	120	187
FRANKLIN COUNTY WD	MWP	MUN	469	851	1,235	1,540	1,923	2,229
GLADEWATER	WUG Seller	MUN	0	0	0	0	0	0
GOLDEN WSC	WUG Seller	MAN	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
		MINING	0	0	0	0	0	0
		MUN	0	0	0	0	0	0
		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
LONGVIEW	WUG Seller	MAN	2,420	2,420	2,420	2,420	2,420	2,420
		MUN	4,040	4,040	4,040	4,040	4,040	4,040
		POWER	0	0	0	0	0	0
MARSHALL	WUG Seller	MAN	0	0	0	0	0	0
		MUN	0	0	0	0	0	0

Name	WWP/ WUG Seller	Use	2020	2030	2040	2050	2060	2070
MOUNT PLEASANT	WUG Seller	MAN	0	0	0	0	0	0
		MUN	0	0	0	0	0	0
NORTH TEXAS MWD	MWP	MUN	13	477	832	1,372	1,977	2,703
NORTHEAST TEXAS MWD	MWP	MAN	0	0	0	0	0	0
		MINING	246	547	724	828	921	1,664
		MUN	30,656	30,656	30,656	30,656	30,656	30,656
		POWER	0	0	0	0	0	0
PARIS	WUG Seller	MAN	0	0	0	0	0	0
		MUN	1,886	1,838	1,792	1,759	1,694	1,684
		POWER	0	0	0	0	0	0
POINT	WUG Seller	MAN	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	WUG Seller	MAN	33,604	59,928	66,509	74,735	82,961	100,813
		MUN	12,410	12,633	12,893	13,192	13,584	13,941
ROYSE CITY	WUG Seller	MUN	0	72	125	209	333	505
SABINE RIVER AUTHORITY	MWP	IRR	0	18	20	21	23	25
		MAN	0	343	376	408	443	478
		MUN	49,598	18,452	18,680	19,197	19,822	17,015
SULPHUR RIVER MWD	MWP	MUN	0	0	0	0	0	0
SULPHUR SPRINGS	WUG Seller	LIV	0	0	0	0	0	0
		MAN	0	0	0	0	0	0
		MINING	0	0	0	0	0	0
		MUN	0	0	0	0	0	0
TERRELL	WUG Seller	MUN	-2	66	115	200	330	510
TEXARKANA	WUG Seller	MUN	57,370	57,377	57,384	57,385	57,385	57,385
TITUS COUNTY FWD #1	MWP	MUN	11,100	11,100	11,100	11,100	11,100	11,100
		POWER	0	0	0	0	0	0
TRI SUD	WUG Seller	MINING	0	0	0	0	0	0
TYLER	WUG Seller	MUN	0	0	0	0	0	0
WHITE OAK	WUG Seller	MUN	0	0	0	0	0	0
TOTAL			**205,571**	**202,670**	**210,876**	**221,151**	**231,925**	**249,804**

4.3.1 Cash SUD

Cash SUD is a public water supply located primarily in Hunt County. The special utility district sells water to the City of Lone Oak and the City of Quinlan. In addition to meeting the needs of its retail customers, Cash SUD supplies water to consumers in Hunt, Hopkins, Rains and Rockwall counties. 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 4.31.

Table 4.31 Water Supplies and Demands for Cash SUD

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
FORK LAKE/RESERVOIR	109	0	0	0	0	3,325
INDIRECT REUSE - NTMWD/ LAKE LAVON	177	234	297	322	291	268
INDIRECT REUSE - NTMWD/EAST FORK WETLANDS TO LAKE LAVON	347	407	432	450	406	374
NORTH TEXAS MWD LAKE/RESERVOIR SYSTEM	411	436	346	302	382	440
TAWAKONI LAKE/RESERVOIR	1,755	1,805	1,869	2,318	3,466	2,391
TOTAL	**2,799**	**2,882**	**2,944**	**3,392**	**4,545**	**6,798**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
COUNTY-OTHER, HUNT	223	374	604	790	1,200	1,908
QUINLAN	134	133	134	140	154	174
SELF SUPPLIED:						
CASH SUD	2,353	2,736	3,215	3,808	4,537	5,411
TOTAL	**2,710**	**3,243**	**3,953**	**4,738**	**5,891**	**7,493**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**89**	**-361**	**-1,009**	**-1,346**	**-1,346**	**-695**

Hunt County-Other, which obtains supply from Cash SUD, is projected to have increasing shortages starting in 2040, as presented in Table 4.32.

Table 4.32 Cash SUD Customer Entity Shortages

Needs (ac-ft/yr)	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, HUNT	0	0	166	703	1,817	3,834
TOTAL	**0**	**0**	**166**	**703**	**1,817**	**3,834**

4.3.2 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 4.33.

Table 4.33 Water Supplies and Demands for Cherokee Water Company

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
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)	2020	2030	2040	2050	2060	2070
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)	2020	2030	2040	2050	2060	2070
TOTAL	**13,456**	**13,309**	**13,162**	**13,015**	**12,867**	**12,626**

4.3.3 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. The city also has a contract with the Sulphur River Municipal Water District (SRMWD) for 16,000 ac-ft/yr, which has been leased to the Upper Trinity for 50 years. Commerce supplies North Hunt SUD, rural areas in Delta and Hunt Counties, and Manufacturing in Hunt County. In addition, Commerce Water District serves its own municipal needs. Available supplies, demands, and needs are shown in Table 4.34.

Table 4.34 Water Supplies and Demands for Commerce

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
NACATOCH AQUIFER	196	196	196	196	196	196
NACATOCH AQUIFER	126	126	126	126	126	126
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)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
COUNTY-OTHER, DELTA	74	74	74	74	74	74
COUNTY-OTHER, HUNT	0	0	0	0	0	0
GAFFORD CHAPEL WSC	3	3	3	3	3	3
MANUFACTURING, HUNT	55	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	1,427	1,555	1,749	2,039	2,473	3,108
TOTAL	**1,707**	**1,847**	**2,041**	**2,331**	**2,765**	**3,400**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**244**	**4,500**	**4,256**	**3,522**	**1,474**	**806**

Customers of the City of Commerce are projected to have shortages beginning in 2020. Table 4.35 presents the City of Commerce customer WUGs with projected shortages.

Table 4.35 City of Commerce Customer Entity Shortages

Needs (ac-ft/yr)	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, HUNT	0	0	166	703	1,817	3,834
NORTH HUNT SUD	89	165	266	405	603	888
TOTAL	**89**	**165**	**432**	**1,108**	**2,420**	**4,722**

4.3.4 City of Emory

The City of Emory supplies East Tawakoni and rural portions of Rains County. 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 4.36.

Table 4.36 Water Supplies and Demands for City of Emory

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
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)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
EAST TAWAKONI	237	246	247	247	248	248
SOUTH RAINS SUD	190	192	188	187	187	188
SELF SUPPLIED:						
EMORY	791	829	837	842	845	847
TOTAL	**1,218**	**1,267**	**1,272**	**1,276**	**1,280**	**1,283**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

4.3.5 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 4.37.

Table 4.37 Water Supplies and Demands for Franklin County Water District

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CYPRESS SPRINGS LAKE/RESERVOIR	9,031	8,649	8,266	7,960	7,577	7,271
TOTAL	**9,031**	**8,649**	**8,266**	**7,960**	**7,577**	**7,271**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
CYPRESS SPRINGS SUD	4,278	4,097	3,915	3,770	3,589	3,444
MOUNT VERNON	2,852	2,731	2,610	2,514	2,393	2,296
WINNSBORO	1,901	1,821	1,740	1,676	1,595	1,531
TOTAL	**9,031**	**8,649**	**8,265**	**7,960**	**7,577**	**7,271**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**0**	**0**	**1**	**0**	**0**	**0**

4.3.6 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 4.38, LCWSD has a water supply surplus.

Table 4.38 Water Supplies and Demands for Lamar County Water Supply District

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
PAT MAYSE LAKE/RESERVOIR	11,556	11,604	11,650	11,683	11,748	11,758
TOTAL	**11,556**	**11,604**	**11,650**	**11,683**	**11,748**	**11,758**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
410 WSC	224	218	213	212	211	211
BLOSSOM	216	230	245	245	245	245
COUNTY-OTHER, LAMAR	274	280	285	283	281	279
COUNTY-OTHER, RED RIVER	253	250	247	247	247	247
MANUFACTURING, LAMAR	858	900	941	976	1,042	1,077
RED RIVER COUNTY WSC	184	184	184	184	184	184
RENO (Lamar)	628	699	754	814	873	935
SELF SUPPLIED:						
LAMAR COUNTY WSD	2,216	2,238	2,252	2,280	2,316	2,349
TOTAL	**4,853**	**4,999**	**5,121**	**5,241**	**5,399**	**5,527**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**6,703**	**6,605**	**6,529**	**6,442**	**6,349**	**6,231**

While LCWSD does not have any projected water supply shortages, Lamar County-Other customers are projected to have shortages beginning in 2020, as shown in Table 4.39.

Table 4.39 LCWSD Customer Entity Shortages

Needs (ac-ft/yr)	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, LAMAR	204	204	212	224	234	244
TOTAL	**204**	**204**	**212**	**224**	**234**	**244**

4.3.7 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 4.40.

Table 4.40 Water Supplies and Demands for Northeast Texas Municipal Water District

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
BOB SANDLIN LAKE/RESERVOIR	7,655	8,153	7,851	7,849	7,146	6,344
ELLISON CREEK LAKE/RESERVOIR	22,180	22,180	22,180	22,180	22,180	22,180
MONTICELLO LAKE/RESERVOIR	5,000	4,400	3,800	3,300	2,700	2,200
O' THE PINES LAKE/RESERVOIR	169,700	169,900	167,000	165,700	164,300	163,000
WELSH LAKE/RESERVOIR	3,000	2,800	2,500	2,200	1,900	1,700
TOTAL	**207,535**	**207,433**	**203,331**	**201,229**	**198,226**	**195,424**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
COUNTY-OTHER, CASS	302	302	302	302	302	302
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	100	100	100	100	100	100
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
MINING, TITUS	1,398	1,228	1,185	1,227	1,295	728
ORE CITY	1,504	1,504	1,504	1,504	1,504	1,504
PITTSBURG	1,344	1,344	1,344	1,344	1,344	1,344
STEAM ELECTRIC POWER, HARRISON	18,000	18,000	18,000	18,000	18,000	18,000
STEAM ELECTRIC POWER, MARION	6,668	6,668	6,668	6,668	6,668	6,668

SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
STEAM ELECTRIC POWER, TITUS	21,862	21,062	20,162	19,362	18,539	18,300
TRYON ROAD SUD	1,822	1,822	1,822	1,822	1,822	1,822
TOTAL	**133,659**	**132,689**	**131,746**	**130,988**	**130,233**	**129,427**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**73,876**	**74,744**	**71,585**	**70,241**	**67,993**	**65,997**

While NETMWD does not have any projected water supply shortages, several NETMWD customers are projected to have shortages beginning in 2020, predominantly from currently projected needs for steam electric power generation as shown in Table 4.41.

Table 4.41 NETMWD Customer Entity Shortages

Needs (ac-ft/yr)	2020	2030	2040	2050	2060	2070
COUNTY-OTHER, CASS	449	357	269	212	208	208
HARLETON WSC	62	74	91	127	173	230
STEAM ELECTRIC POWER, TITUS	30,066	30,866	31,766	32,566	32,814	33,083
TOTAL	**30,577**	**31,297**	**32,126**	**32,905**	**33,195**	**33,521**

4.3.8 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 4.42.

Table 4.42 Water Supplies and Demands for the Sabine River Authority

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
FORK LAKE/RESERVOIR	167,908	166,118	164,304	162,570	160,719	158,846
TAWAKONI LAKE/RESERVOIR	229,352	227,475	225,577	223,686	221,764	219,849
TOTAL	**397,260**	**393,593**	**389,881**	**386,256**	**382,483**	**378,695**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
BRIGHT STAR SALEM SUD	354	758	750	742	734	725
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
COMMERCE	1,629	6,025	5,975	5,531	3,917	3,884
EDGEWOOD	272	285	295	307	318	329
EMORY	1,218	1,267	1,272	1,276	1,280	1,283
GREENVILLE	10,297	20,362	20,194	20,027	19,879	19,690
IRRIGATION, VAN ZANDT	184	166	164	163	161	159
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
MACBEE SUD	516	572	621	673	724	779

SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
MANUFACTURING, HARRISON	3,500	3,157	3,124	3,092	3,057	3,022
POINT	376	391	392	393	395	395
QUITMAN	316	1,010	1,000	989	978	967
SOUTH TAWAKONI WSC	438	472	498	530	562	590
WEST TAWAKONI	276	804	797	738	784	777
TOTAL	**31,889**	**61,820**	**61,570**	**61,349**	**60,907**	**63,686**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**365,371**	**331,773**	**328,311**	**324,907**	**321,576**	**315,009**

The SRA's Region D customers with projected water shortages are presented in Table 4.43. Shortages presented for Greenville are not due to supply limitations, but rather WTP capacity limitations.

Table 4.43 Sabine River Authority Region D Customer Entity Shortages

Needs (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CASH SUD	0	361	1,009	1,346	1,346	695
GREENVILLE	3,239	4,626	6,531	9,183	12,913	18,266
IRRIGATION, VAN ZANDT	43	61	63	64	66	68
TOTAL	**3,282**	**5,048**	**7,603**	**10,593**	**14,325**	**19,029**

4.3.9 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 4.44.

Table 4.44 Water Supplies and Demands for the SRMWD

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	14,347	14,265	14,183	14,103	14,021	13,940
TOTAL	**14,347**	**14,265**	**14,183**	**14,103**	**14,021**	**13,940**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
SULPHUR SPRINGS	13,548	13,470	13,393	13,317	13,240	13,163
TOTAL	**13,548**	**13,470**	**13,393**	**13,317**	**13,240**	**13,163**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**799**	**795**	**790**	**786**	**781**	**777**

4.3.10 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 4.45.

Table 4.45 Water Supplies and Demands for Titus County Fresh Water Supply District

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
BOB SANDLIN LAKE/RESERVOIR	28,900	28,900	28,900	28,900	28,900	28,900
TOTAL	**28,900**	**28,900**	**28,900**	**28,900**	**28,900**	**28,900**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
MOUNT PLEASANT	18,900	18,900	18,900	18,900	18,900	18,900
STEAM ELECTRIC POWER, TITUS	10,000	10,000	10,000	10,000	10,000	10,000
TOTAL	**28,900**	**28,900**	**28,900**	**28,900**	**28,900**	**28,900**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

TCFWSD's identified projected customer shortage is presented in Table 4.46.

Table 4.46 TCFWSD Customer Entity Shortages

Needs (ac-ft/yr)	2020	2030	2040	2050	2060	2070
STEAM ELECTRIC POWER, TITUS	30,066	30,866	31,766	32,566	32,814	33,083
TOTAL	**30,066**	**30,866**	**31,766**	**32,566**	**32,814**	**33,083**

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. As shown in Table 4.47, Greenville has a projected water supply deficit beginning in 2020.

Table 4.47 Water Supplies and Demands for the City of Greenville

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
GREENVILLE CITY LAKE/RESERVOIR	3,421	3,421	3,421	3,421	3,421	3,421
TAWAKONI LAKE/RESERVOIR	10,297	20,362	20,194	20,027	19,879	19,690
TOTAL	**13,718**	**23,783**	**23,615**	**23,448**	**23,300**	**23,111**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
CADDO MILLS	178	186	201	242	309	319
COUNTY-OTHER, HUNT	925	900	862	807	726	607
MANUFACTURING, HUNT	797	965	1,146	1,319	1,438	1,624
MINING, HUNT	19	20	23	24	29	30
SHADY GROVE WSC	139	164	202	257	338	457
STEAM ELECTRIC POWER, HUNT	373	373	373	373	373	373

SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
SELF SUPPLIED:						
GREENVILLE	9,271	10,481	12,187	14,624	18,163	23,319
TOTAL	**11,702**	**13,089**	**14,994**	**17,646**	**21,376**	**26,729**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**2,016**	**10,694**	**8,621**	**5,802**	**1,924**	**-3,618**

Several customers of City of Greenville are projected to have shortages beginning in 2020. Table 4.48 presents the City of Greenville customer WUGs with projected shortages.

Table 4.48 City of Greenville Customer Entity Shortages

Needs (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CADDO MILLS	0	1	36	68	108	254
COUNTY-OTHER, HUNT	0	0	166	703	1,817	3,834
MINING, HUNT	73	64	35	19	7	0
TOTAL	**73**	**65**	**237**	**790**	**1,932**	**4,088**

4.3.12 City of Marshall

This water provider, located in Harrison County, supplies water to several water supply corporations including Cypress Valley WSC, Talley WSC, Gill WSC, and Leigh WSC, 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 4.49.

Table 4.49 Water Supplies and Demands for the City of Marshall

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CYPRESS RUN-OF-RIVER	7,171	7,171	7,171	7,171	7,171	7,171
O' THE PINES LAKE/RESERVOIR	9,000	9,000	9,000	9,000	9,000	9,000
TOTAL	**16,171**	**16,171**	**16,171**	**16,171**	**16,171**	**16,171**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
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	4,994	5,232	5,499	5,959	6,500	7,148
TOTAL	**7,417**	**7,655**	**7,922**	**8,382**	**8,923**	**9,571**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**8,754**	**8,516**	**8,249**	**7,789**	**7,248**	**6,600**

Customers of the City of Marshall are not projected to have shortages during the planning period.

4.3.13 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 4.50 shows Longview is projected to have a supply surplus throughout the planning period.

Table 4.50 Water Supplies and Demands for the City of Longview

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
BIG SANDY CREEK LAKE/RESERVOIR	2,685	2,685	2,685	2,685	2,685	2,685
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	12,637	12,637	12,637	12,637	12,637	12,637
SABINE RUN-OF-RIVER	43	43	43	43	43	43
TOTAL	**65,526**	**75,568**	**75,376**	**75,192**	**74,996**	**74,797**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
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	1,094	1,094	1,094	1,094	1,094
MANUFACTURING, HARRISON	5,924	5,924	5,924	5,924	5,924	5,924
STEAM ELECTRIC POWER, HARRISON	6,161	6,161	6,161	6,161	6,161	6,161
WHITE OAK	2,685	2,685	2,685	2,685	2,685	2,685
SELF SUPPLIED:						
LONGVIEW	24,268	26,122	28,353	31,051	34,232	37,865
TOTAL	**44,573**	**46,429**	**48,660**	**51,358**	**54,539**	**58,172**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**20,953**	**29,139**	**26,716**	**23,834**	**20,457**	**16,625**

4.3.14 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. The city is projected to have a surplus of 13,910 ac-ft/yr in 2020, reducing to a surplus of 9,392 ac-ft/yr by 2070, as shown in Table 4.51.

Table 4.51 Water Supplies and Demands for the City of Mount Pleasant

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
BOB SANDLIN LAKE/RESERVOIR	18,900	18,900	18,900	18,900	18,900	18,900
CYPRESS RUN-OF-RIVER - WATER RIGHT 4567 4568 4569 4570 4572	404	404	404	404	404	404
CYPRESS SPRINGS LAKE/RESERVOIR	2,769	2,651	2,534	2,440	2,323	2,229
TANKERSLEY LAKE/RESERVOIR	1,500	1,500	1,500	1,500	1,500	1,500
TOTAL	**23,573**	**23,455**	**23,338**	**23,244**	**23,127**	**23,033**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
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	3,890	4,302	4,745	5,260	5,828	6,433
TOTAL	**9,663**	**10,329**	**11,021**	**11,770**	**12,727**	**13,641**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**13,910**	**13,126**	**12,317**	**11,474**	**10,400**	**9,392**

Table 4.52 presents the City of Mount Pleasant customer WUGs with projected shortages. Manufacturing customers of the City of Mount Pleasant are projected to have shortages beginning in 2030.

Table 4.52 City of Mount Pleasant Customer Entity Shortages

Needs (ac-ft/yr)	2020	2030	2040	2050	2060	2070
MANUFACTURING, TITUS	0	1,418	1,295	1,305	1,564	1,694
TOTAL	**0**	**1,418**	**1,295**	**1,305**	**1,564**	**1,694**

4.3.15 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 a surplus of 30,111 ac-ft/yr in 2020, slightly reducing to a surplus of 28,523 ac-ft/yr by 2070, as shown in Table 4.53.

Table 4.53 Water Supplies and Demands for the City of Paris

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CROOK LAKE/RESERVOIR	7,290	7,290	7,290	7,290	7,290	7,290
PAT MAYSE LAKE/RESERVOIR	51,488	51,490	51,489	51,489	51,490	51,461
TOTAL	**58,778**	**58,780**	**58,779**	**58,779**	**58,780**	**58,751**

SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
LAMAR COUNTY WSD	11,556	11,604	11,650	11,683	11,748	11,758
MANUFACTURING, LAMAR	5,091	5,340	5,580	5,787	6,183	6,386
STEAM ELECTRIC POWER, LAMAR	8,961	8,961	8,961	8,961	8,961	8,961
SELF SUPPLIED:						
PARIS	3,059	3,042	3,017	3,033	3,079	3,123
TOTAL	**28,667**	**28,947**	**29,208**	**29,464**	**29,971**	**30,228**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**30,111**	**29,833**	**29,571**	**29,315**	**28,809**	**28,523**

4.3.16 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 15,132 ac-ft/yr in 2020. By 2070, the surplus decreases to 12,977 ac-ft/yr. Available supplies and demands are shown in Table 4.54.

Table 4.54 Water Supplies and Demands for the City of Sulphur Springs

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CHAPMAN/COOPER LAKE/RESERVOIR NON-SYSTEM PORTION	13,548	13,470	13,393	13,317	13,240	13,163
SULPHUR RUN-OF-RIVER - WATER RIGHT 4812 4813 4814 5150	108	108	108	108	108	108
SULPHUR SPRINGS LAKE/RESERVOIR	9,800	9,800	9,800	9,800	9,800	9,800
TOTAL	**23,456**	**23,378**	**23,301**	**23,225**	**23,148**	**23,071**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
BRASHEAR WSC	148	155	163	170	181	192
BRINKER WSC	77	77	77	77	77	77
COUNTY-OTHER, HOPKINS	76	83	79	24	0	0
GAFFORD CHAPEL WSC	109	111	115	121	128	135
LIVESTOCK, HOPKINS	1,474	1,551	1,720	1,730	1,914	1,996
MANUFACTURING, HOPKINS	1,741	1,830	1,915	1,987	2,126	2,275
MANUFACTURING, HUNT	50	50	50	50	50	50
MARTIN SPRINGS WSC	223	223	223	223	223	223
MINING, HOPKINS	200	220	240	261	285	310
MINING, TITUS	80	80	80	80	80	80
NORTH HOPKINS WSC	921	921	921	921	921	921
SHADY GROVE NO 2 WSC	107	112	118	123	131	138
SELF SUPPLIED:						
SULPHUR SPRINGS	3,118	3,199	3,278	3,403	3,547	3,697
TOTAL	**8,324**	**8,612**	**8,979**	**9,170**	**9,663**	**10,094**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
TOTAL	**15,132**	**14,766**	**14,322**	**14,055**	**13,485**	**12,977**

Customers of the City of Sulphur Springs are projected to have shortages beginning in 2020. Table 4.55 presents the City of Sulphur Springs customer WUGs with projected shortages.

Table 4.55 City of Sulphur Springs Customer Entity Shortages

Needs (ac-ft/yr)	2020	2030	2040	2050	2060	2070
BRINKER WSC	0	0	0	12	47	83
LIVESTOCK, HOPKINS	1,068	1,090	1,140	1,143	1,196	1,219
MARTIN SPRINGS WSC	0	0	0	0	0	29
MINING, HOPKINS	227	283	360	444	533	639
TOTAL	**1,295**	**1,373**	**1,500**	**1,599**	**1,776**	**1,970**

4.3.17 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 2021 Region D Plan that only Texas sources and supplies are available for use by entities within Region D. Therefore, supply and demands in Table 4.46 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 supplies beginning in 2020, which is shown in Table 4.56. 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 4.56 Water Supplies and Demands for the Riverbend WRD/City of Texarkana

SUPPLIES (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CANEY CREEK LAKE/RESERVOIR	0	0	0	0	0	0
ELLIOT CREEK LAKE/RESERVOIR	0	0	0	0	0	0
WRIGHT PATMAN LAKE/RESERVOIR® - GPI INTAKE	122,630	122,623	122,616	122,615	122,615	122,615
WRIGHT PATMAN LAKE/RESERVOIR® - NBR INTAKE	0	0	0	0	0	0
TOTAL	**122,630**	**122,623**	**122,616**	**122,615**	**122,615**	**122,615**
SALE/TRANSFER (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CONTRACTUAL:						
CENTRAL BOWIE COUNTY WSC	0	0	0	0	0	0
COUNTY-OTHER, BOWIE	0	0	0	0	0	0
COUNTY-OTHER, RED RIVER	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	120,000	120,000	120,000	120,000	120,000	120,000
MAUD	0	0	0	0	0	0
NASH	0	0	0	0	0	0
NEW BOSTON	0	0	0	0	0	0
RED RIVER COUNTY WSC	0	0	0	0	0	0
REDWATER	0	0	0	0	0	0
TEXARKANA	0	0	0	0	0	0
WAKE VILLAGE	0	0	0	0	0	0
ATLANTA	2,328	2,328	2,328	2,328	2,328	2,328
COUNTY-OTHER, CASS	44	44	44	44	44	44
QUEEN CITY	258	251	244	243	243	243
BURNS REDBANK WSC	0	0	0	0	0	0
SELF SUPPLIED:						
RIVERBEND WATER RESOURCES DISTRICT	523	536	539	537	537	537
TOTAL	**123,153**	**123,159**	**123,155**	**123,152**	**123,152**	**123,152**
SURPLUS/NEEDS (ac-ft/yr)	2020	2030	2040	2050	2060	2070
GPI Intake	0	0	0	0	0	0
NBR Intake	-523	-536	-539	-537	-537	-537
TOTAL	**-523**	**-536**	**-539**	**-537**	**-537**	**-537**

Notes:

(1) Supply allocated for Cass County Manufacturing is established by contract as 120,000 ac-ft/yr, and the WUG has the existing legal and physical capability to make reservoir releases within this amount.

(2) Supply availability from Lake Wright Patman must reflect two separate raw water supply systems, each providing to separate WUGs. As such, resultant calculations of surplus and need are presented for each of these systems herein.

Member entities and customers of Riverbend WRD/City of Texarkana are projected to have shortages beginning in 2020. Table 4.57 presents the WUGs with projected shortages.

Table 4.57 Riverbend Water Resources District/City of Texarkana Customer Entity Shortages

Needs (ac-ft/yr)	2020	2030	2040	2050	2060	2070
CENTRAL BOWIE COUNTY WSC	619	639	708	784	869	962
DE KALB	295	292	289	291	294	298
HOOKS	281	278	276	271	269	269
MACEDONIA EYLAU MUD 1	588	598	601	601	601	601
MANUFACTURING, BOWIE	1,579	2,014	2,014	2,014	2,014	2,014
MAUD	211	226	241	238	237	237
NASH	392	458	523	589	589	589
NEW BOSTON	1,390	1,399	1,385	1,381	1,379	1,379
REDWATER	440	487	535	588	616	616
TEXARKANA	7,145	7,282	7,459	7,706	8,028	8,380
WAKE VILLAGE	699	750	802	861	932	931
BURNS REDBANK WSC	201	199	196	194	193	193
COUNTY-OTHER, CASS	449	357	269	212	208	208
TOTAL	**14,289**	**14,979**	**15,298**	**15,730**	**16,229**	**16,677**

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 4.58.

Table 4.58 Secondary Needs for Major Water Providers in the North East Texas Region

MWP	Total Secondary Water Need in ac-ft/yr					
	2020	2030	2040	2050	2060	2070
CASH SUD	0	0	166	703	1,817	3,834
CHEROKEE WATER COMPANY	0	0	0	0	0	0
COMMERCE	78	148	409	1,079	2,385	4,680
EMORY	0	0	0	0	0	0
FRANKLIN COUNTY WD	0	0	0	0	0	0
GREENVILLE	73	65	237	790	1,932	4,088
LAMAR COUNTY WSD	204	204	212	224	234	244
LONGVIEW	0	0	0	0	0	0
MARSHALL	0	0	0	0	0	0
MOUNT PLEASANT	0	1,003	880	890	1,149	1,279
NORTHEAST TEXAS MWD	30,577	31,297	32,126	32,905	33,195	33,521
PARIS	0	0	0	0	0	0
RIVERBEND WATER RESOURCES DISTRICT	13,478	14,219	14,629	15,120	15,624	16,072
SABINE RIVER AUTHORITY	43	566	2,430	4,419	6,670	9,271

MWP	Total Secondary Water Need in ac-ft/yr					
	2020	2030	2040	2050	2060	2070
SULPHUR RIVER MWD	0	0	0	0	0	0
SULPHUR SPRINGS	1,295	1,373	1,500	1,599	1,776	1,970
TITUS COUNTY FWD #1	30,066	30,866	31,766	32,566	32,814	33,083

4.5 Water Surpluses in the North East Texas Region

Table 4.59 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 4.59 Water Surpluses in the North East Texas Region by County

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2020	2030	2040	2050	2060	2070
BOWIE	County-Other	1,917	2,284	2,827	2,767	2,735	2,735
BOWIE	Irrigation	922	922	922	922	922	922
BOWIE	Manufacturing	3	2	2	2	2	2
TOTAL BOWIE COUNTY		**2,842**	**3,208**	**3,751**	**3,691**	**3,659**	**3,659**
CAMP	Bi County WSC	489	386	307	204	102	1
CAMP	County-Other	259	283	301	321	339	358
CAMP	Manufacturing	67	50	50	50	50	50
CAMP	Mining	11	12	13	14	15	16
CAMP	Pittsburg	845	826	813	786	755	722
TOTAL CAMP COUNTY		**1,671**	**1,557**	**1,484**	**1,375**	**1,261**	**1,147**
CASS	E M C WSC	10	10	10	10	10	10
CASS	Eastern Cass WSC	455	461	466	469	470	470
CASS	Hughes Springs	284	295	305	307	308	308
CASS	Linden	143	152	159	160	161	161
CASS	Manufacturing	51	50	48	47	47	46
CASS	Mims WSC	114	114	114	114	114	114
CASS	Mining	800	804	824	859	896	932
CASS	Queen City	11	18	25	26	26	26
CASS	Western Cass WSC	865	874	882	884	885	885
TOTAL CASS COUNTY		**2,733**	**2,778**	**2,833**	**2,876**	**2,917**	**2,952**
DELTA	Cooper	534	540	549	550	551	551
DELTA	County-Other	112	101	102	102	102	102
DELTA	Irrigation	6,767	6,780	6,790	6,795	6,795	6,807
TOTAL DELTA COUNTY		**7,413**	**7,421**	**7,441**	**7,447**	**7,448**	**7,460**

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2020	2030	2040	2050	2060	2070
FRANKLIN	County-Other	99	99	112	110	108	106
FRANKLIN	Cypress Springs SUD	2,845	2,708	2,562	2,443	2,287	2,157
FRANKLIN	Irrigation	211	211	211	211	211	211
FRANKLIN	Manufacturing	2	0	0	0	0	0
FRANKLIN	Mining	1,035	1,011	990	970	951	952
FRANKLIN	Mount Vernon	2,448	2,314	2,188	2,083	1,953	1,847
FRANKLIN	Winnsboro	245	228	213	198	181	167
TOTAL FRANKLIN COUNTY		**6,885**	**6,571**	**6,276**	**6,015**	**5,691**	**5,440**
GREGG	Clarksville City	145	140	133	124	112	98
GREGG	County-Other	725	1,287	1,378	1,500	1,676	1,603
GREGG	Cross Roads SUD	51	51	50	50	51	52
GREGG	Elderville WSC	445	412	376	337	294	231
GREGG	Gladewater	251	209	161	100	24	0
GREGG	Glenwood WSC	5	4	4	3	2	1
GREGG	Irrigation	152	152	152	152	152	152
GREGG	Kilgore	223	2,986	2,589	2,107	1,595	1,533
GREGG	Liberty City WSC	371	348	315	269	210	142
GREGG	Livestock	5	5	5	5	5	5
GREGG	Longview	18,525	25,558	23,413	20,806	17,729	14,208
GREGG	Manufacturing	339	57	57	57	57	57
GREGG	Starrville-Friendship WSC	26	21	15	8	0	0
GREGG	Steam Electric Power	1,302	1,302	1,302	1,302	1,302	1,302
GREGG	Tryon Road SUD	1,264	1,220	1,164	1,090	988	871
GREGG	West Gregg SUD	214	201	181	153	116	70
GREGG	White Oak	1,248	1,154	1,037	892	719	519
TOTAL GREGG COUNTY		**25,291**	**35,107**	**32,332**	**28,955**	**25,032**	**20,844**
HARRISON	Blocker Crossroads WSC	79	76	72	62	49	33
HARRISON	County-Other	2,312	2,411	2,478	2,514	2,556	2,517
HARRISON	Diana SUD	63	62	61	59	56	52
HARRISON	Gill WSC	130	126	119	102	83	59
HARRISON	Gum Springs WSC	2,597	2,580	2,554	2,496	2,420	2,326
HARRISON	Hallsville	269	245	217	169	111	41
HARRISON	Leigh WSC	24	2	0	0	0	0
HARRISON	Livestock	328	370	415	462	488	498
HARRISON	Longview	617	571	518	459	390	313
HARRISON	Manufacturing	83,636	80,089	80,056	80,024	79,989	79,954
HARRISON	Marshall	8,754	8,516	8,249	7,789	7,248	6,600

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2020	2030	2040	2050	2060	2070
HARRISON	Mining	0	0	0	20	95	154
HARRISON	North Harrison WSC	20	16	11	0	0	0
HARRISON	Panola-Bethany WSC	1	0	0	0	0	0
HARRISON	Steam Electric Power	5,396	5,396	5,396	5,396	5,396	5,396
HARRISON	Talley WSC	100	100	97	88	78	66
HARRISON	Tryon Road SUD	27	21	15	5	2	0
HARRISON	West Harrison WSC	232	229	224	214	201	186
TOTAL HARRISON COUNTY		**104,585**	**100,810**	**100,482**	**99,859**	**99,162**	**98,195**
HOPKINS	Brinker WSC	76	47	21	0	0	0
HOPKINS	Cash SUD	3	1	0	0	0	0
HOPKINS	Cornersville WSC	94	89	85	79	73	66
HOPKINS	County-Other	1,165	1,186	1,202	1,129	1,113	1,107
HOPKINS	Cypress Springs SUD	423	390	360	333	307	282
HOPKINS	Gafford Chapel WSC	55	55	55	55	55	55
HOPKINS	Irrigation	2	2	2	2	2	2
HOPKINS	Jones WSC	15	18	20	23	24	27
HOPKINS	Lake Fork WSC	33	33	32	31	31	32
HOPKINS	Livestock	424	446	496	499	553	577
HOPKINS	Manufacturing	797	862	947	1,019	1,158	1,307
HOPKINS	Martin Springs WSC	244	189	137	90	27	0
HOPKINS	North Hopkins WSC	447	427	407	367	323	276
HOPKINS	Shirley WSC	110	103	96	92	81	75
HOPKINS	Sulphur Springs	1,884	1,803	1,724	1,599	1,455	1,305
TOTAL HOPKINS COUNTY		**5,772**	**5,651**	**5,584**	**5,318**	**5,202**	**5,111**
HUNT	Caddo Mills	26	0	0	0	0	0
HUNT	Cash SUD	45	0	0	0	0	0
HUNT	Commerce	244	3,275	3,104	2,454	465	214
HUNT	County-Other	862	449	0	0	0	0
HUNT	Frognot WSC	3	3	2	1	1	0
HUNT	Livestock	53	53	53	53	53	53
HUNT	Manufacturing	547	610	791	964	1,083	1,269
HUNT	Mining	0	0	0	0	0	3
HUNT	Poetry WSC	1	0	0	0	0	0
HUNT	Texas A&M University Commerce	0	4	6	7	8	8
HUNT	West Leonard WSC	7	6	7	7	4	0
HUNT	West Tawakoni	0	495	437	302	235	63

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2020	2030	2040	2050	2060	2070
HUNT	Wolfe City	91	61	17	0	0	0
TOTAL HUNT COUNTY		**1,879**	**4,956**	**4,417**	**3,788**	**1,849**	**1,610**
LAMAR	Blossom	80	96	114	114	112	110
LAMAR	Lamar County WSD	6,675	6,558	6,463	6,375	6,281	6,163
LAMAR	Livestock	772	772	772	772	772	772
LAMAR	Manufacturing	935	1,115	1,396	1,638	2,100	2,338
LAMAR	Paris	24,837	24,559	24,297	24,041	23,535	23,249
LAMAR	Reno (Lamar)	80	143	192	244	294	347
LAMAR	Steam Electric Power	3,450	3,450	3,450	3,450	3,450	3,450
TOTAL LAMAR COUNTY		**36,829**	**36,693**	**36,684**	**36,634**	**36,544**	**36,429**
MARION	County-Other	1,658	1,663	1,669	1,677	1,686	1,696
MARION	Diana SUD	18	19	20	21	21	21
MARION	E M C WSC	81	81	81	81	81	81
MARION	Irrigation	309	309	309	309	309	309
MARION	Jefferson	1,231	1,242	1,251	1,256	1,257	1,257
MARION	Kellyville-Berea WSC	41	47	52	54	54	54
MARION	Livestock	223	223	223	223	223	223
MARION	Mims WSC	654	654	654	654	654	654
MARION	Steam Electric Power	0	188	570	1,035	1,603	1,990
TOTAL MARION COUNTY		**4,215**	**4,426**	**4,829**	**5,310**	**5,888**	**6,285**
MORRIS	Bi County WSC	11	13	14	12	9	7
MORRIS	County-Other	188	195	198	187	178	169
MORRIS	Daingerfield	1,117	1,122	1,123	1,114	1,105	1,094
MORRIS	Hughes Springs	1	1	1	1	1	1
MORRIS	Irrigation	59	59	59	59	59	59
MORRIS	Lone Star	558	563	566	563	560	556
MORRIS	Manufacturing	96,168	90,737	85,421	86,677	95,551	89,325
MORRIS	Naples	70	73	76	73	70	67
MORRIS	Omaha	77	79	79	76	71	66
MORRIS	Steam Electric Power	770	770	770	770	770	770
TOTAL MORRIS COUNTY		**99,019**	**93,612**	**88,307**	**89,532**	**98,374**	**92,114**
RAINS	Bright Star Salem SUD	495	900	899	891	883	873
RAINS	County-Other	16	0	0	0	0	0
RAINS	Emory	319	337	346	345	345	348
RAINS	Golden WSC	5	5	5	5	5	5
RAINS	Irrigation	146	146	146	146	146	146
RAINS	Livestock	78	78	78	78	78	78

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2020	2030	2040	2050	2060	2070
RAINS	Shirley WSC	51	48	45	43	38	35
RAINS	South Rains SUD	90	90	90	90	90	90
TOTAL RAINS COUNTY		**1,200**	**1,604**	**1,609**	**1,598**	**1,585**	**1,575**
RED RIVER	Bogata	387	394	397	398	398	398
RED RIVER	County-Other	0	50	96	112	122	153
RED RIVER	Irrigation	810	810	810	810	810	810
RED RIVER	Livestock	179	179	179	179	179	179
RED RIVER	Manufacturing	8,524	8,524	8,517	8,517	8,517	8,517
RED RIVER	Red River County WSC	173	187	184	176	171	154
TOTAL RED RIVER COUNTY		**10,073**	**10,144**	**10,183**	**10,192**	**10,197**	**10,211**
SMITH	County-Other	23	23	23	23	23	23
SMITH	Crystal Systems Texas	389	240	81	0	0	0
SMITH	Liberty City WSC	10	9	8	6	3	0
SMITH	Lindale Rural WSC	479	435	376	336	239	123
SMITH	Mining	161	156	153	167	184	200
SMITH	Pine Ridge WSC	123	111	100	83	65	45
SMITH	Sand Flat WSC	303	291	265	236	205	172
SMITH	Smith County MUD 1	246	126	0	0	0	0
SMITH	Starrville-Friendship WSC	63	52	37	19	0	0
SMITH	Tyler	7	7	7	9	10	12
SMITH	West Gregg SUD	56	49	41	29	15	0
SMITH	Winona	36	20	3	0	0	0
TOTAL SMITH COUNTY		**1,896**	**1,519**	**1,094**	**908**	**744**	**575**
TITUS	Bi County WSC	42	39	35	31	26	21
TITUS	County-Other	1,099	426	407	382	299	202
TITUS	Cypress Springs SUD	110	113	120	125	126	130
TITUS	Irrigation	415	415	415	415	415	415
TITUS	Manufacturing	1,329	0	0	0	0	0
TITUS	Mining	2,916	3,032	3,145	3,247	2,892	2,274
TITUS	Mount Pleasant	13,910	13,126	12,317	11,474	10,400	9,392
TOTAL TITUS COUNTY		**19,821**	**17,151**	**16,439**	**15,674**	**14,158**	**12,434**
UPSHUR	Bi County WSC	112	97	82	62	42	21
UPSHUR	Big Sandy	72	62	52	41	27	15
UPSHUR	County-Other	1,173	1,219	1,293	1,256	1,239	1,224
UPSHUR	Diana SUD	700	687	675	656	634	611
UPSHUR	East Mountain Water System	120	110	101	89	75	62
UPSHUR	Fouke WSC	3	3	3	3	3	3

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2020	2030	2040	2050	2060	2070
UPSHUR	Gilmer	103	42	0	0	0	0
UPSHUR	Gladewater	153	126	94	56	12	4
UPSHUR	Glenwood WSC	64	55	46	32	16	1
UPSHUR	Irrigation	543	543	543	543	543	543
UPSHUR	Mining	105	105	105	105	105	105
UPSHUR	Ore City	1,563	1,558	1,552	1,545	1,536	1,528
UPSHUR	Pritchett WSC	341	324	308	280	244	208
UPSHUR	Sharon WSC	216	214	213	205	197	189
UPSHUR	Union Grove WSC	219	215	205	194	185	176
TOTAL UPSHUR COUNTY		**5,487**	**5,360**	**5,272**	**5,067**	**4,858**	**4,690**
VAN ZANDT	Ben Wheeler WSC	201	190	183	174	164	154
VAN ZANDT	Bethel Ash WSC	98	96	90	76	64	50
VAN ZANDT	Canton	646	575	522	463	367	321
VAN ZANDT	County-Other	2,109	2,201	2,089	2,115	2,378	2,213
VAN ZANDT	Edgewood	160	160	160	160	160	160
VAN ZANDT	Fruitvale WSC	180	167	156	142	126	112
VAN ZANDT	Golden WSC	44	46	48	50	49	49
VAN ZANDT	Grand Saline	258	257	258	253	211	203
VAN ZANDT	Little Hope Moore WSC	18	10	5	0	0	0
VAN ZANDT	Livestock	1,039	1,039	1,039	1,039	1,034	1,034
VAN ZANDT	Macbee SUD	89	78	78	78	78	78
VAN ZANDT	Mining	3,016	3,174	3,314	3,460	3,544	3,684
VAN ZANDT	Myrtle Springs WSC	79	74	70	62	55	49
VAN ZANDT	Pine Ridge WSC	5	5	4	4	3	2
VAN ZANDT	Pruitt Sandflat WSC	172	164	157	149	141	133

COUNTY	WUG	Total Water Supply Surplus in ac-ft/yr					
		2020	2030	2040	2050	2060	2070
VAN ZANDT	R P M WSC	14	0	0	0	0	0
VAN ZANDT	Van	629	601	579	554	530	509
VAN ZANDT	Wills Point	120	986	983	658	435	422
TOTAL VAN ZANDT COUNTY		**8,877**	**9,823**	**9,735**	**9,437**	**9,339**	**9,173**
WOOD	Algonquin Water Resources Of Texas	266	255	242	229	214	199
WOOD	Bright Star Salem SUD	192	195	201	198	197	196
WOOD	Cornersville WSC	25	22	21	20	19	17
WOOD	County-Other	4,125	4,175	4,191	4,201	4,218	4,239
WOOD	Cypress Springs SUD	176	164	156	147	136	129
WOOD	Fouke WSC	228	222	226	219	212	206
WOOD	Golden WSC	167	167	170	167	163	160
WOOD	Hawkins	713	705	705	698	694	691
WOOD	Irrigation	885	885	885	885	885	885
WOOD	Jones WSC	425	425	431	426	420	411
WOOD	Lake Fork WSC	446	446	452	451	448	443
WOOD	Livestock	72	72	72	72	72	72
WOOD	Mineola	500	490	497	487	479	472
WOOD	Mining	284	288	294	300	304	309
WOOD	New Hope SUD	37	34	37	33	30	27
WOOD	Pritchett WSC	1	1	1	1	1	1
WOOD	Quitman	0	691	683	668	654	641
WOOD	Ramey WSC	362	367	375	371	368	366
WOOD	Sharon WSC	323	330	342	336	334	332
WOOD	Shirley WSC	9	8	8	8	7	6
WOOD	Winnsboro	969	894	830	770	698	642
TOTAL WOOD COUNTY		**10,205**	**10,836**	**10,819**	**10,687**	**10,553**	**10,444**

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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 to 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 2021 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 2021 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 Board at its January 16, 2020, meeting.

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 – WTP Expansion (15 MGD; 2030).
5. City of Greenville, Hunt County – New WTP (15 MGD; 2070).
6. City of Wolfe City, Hunt County – Greenville Tie-In Pipeline (2050).
7. Irrigation, Lamar County – Pat Mayse Raw Water Pipeline (2020).
8. 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). 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, moderate population growth is expected to continue through the 50 year planning period, with population increasing from approximately 762,000, 2010 Census, to over 1.3 million in 2070. With population growth and continued urbanization, increases in municipal water demands are projected through the planning period. 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	2020	2030	2040	2050	2060	2070
Population	**831,469**	**907,531**	**988,859**	**1,089,197**	**1,211,979**	**1,370,438**
Water Demand (ac-ft)						
Municipal	129,308	137,442	147,334	161,229	179,350	202,860
Manufacturing	99,795	104,975	104,975	104,975	104,975	104,975
Irrigation	35,354	35,354	35,354	35,354	35,354	35,354
Steam Electric	94,174	94,174	94,174	94,174	94,174	94,174
Mining	7,115	7,748	7,670	7,280	6,914	6,795
Livestock	35,673	35,706	35,571	35,369	35,202	35,163
TOTAL WATER DEMAND (AC-FT)	**401,419**	**415,399**	**425,078**	**438,381**	**455,969**	**479,321**

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. In past rounds of water planning, manufacturing was consistently projected to be the dominant water use in the region. For the purposes of the 2021 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. 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 32 percent of water demand at present and 42 percent of water demand in 2070.

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 1.40 million ac-ft/yr. This represents more than 78 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 674,000 ac-ft/yr.

In addition to the availability of surface water in the region, approximately 313,000 ac-ft/yr, or 17 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 28 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 78 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 118,811 acre-ft/yr by the year 2070.

Manufacturing shortages have been identified in Bowie, 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, Hopkins, Hunt, and Marion Counties. Shortages in meeting irrigation demands are projected for Bowie, Harrison, Hopkins, Hunt, Lamar, Red River, and Van Zandt Counties. Shortages in meeting livestock demands are projected for Bowie, Camp, Cass, Delta, Franklin, Hopkins, Hunt, Lamar, Morris, Red River, Titus, Upshur, and Wood 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 in February, 2018. 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.
- 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. A flow chart outlining this process is presented in Figure 5.1.

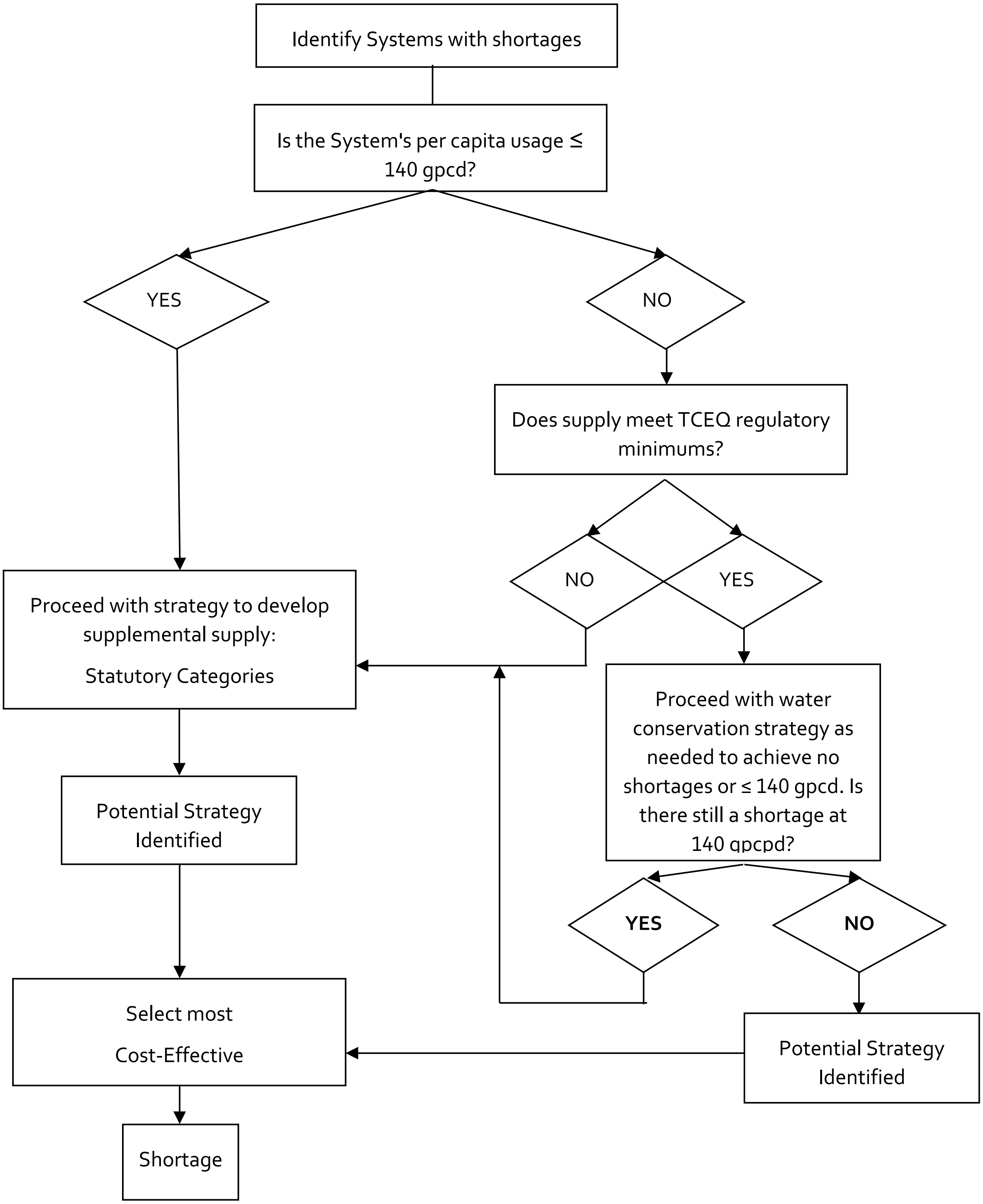

Figure 5.1 Region D Water Conservation Strategy Decision Tree

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 acre-feet per year or more for municipal, industrial, and other non-irrigation uses;
- Those authorized to appropriate 10,000 acre-feet per year 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.

[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.

The planning group has developed a model Water Conservation Plan, presented within this subchapter, for use by holders of 1,000 acre-feet 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.
- 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 one municipal WUG with projected needs in the region, the City of Greenville. The identification of an advanced water conservation strategy for the City of Greenville is based on the baseline per capita usage of 156 gpcd reported by TWDB to the NETRWPG for the City of Greenville in comparison to the base reported per-capita amounts of approximately 277 gpcd from 2011 employed for developing the demand projections. Five- and Ten- Year goals for the City are 149 gpcd and 147 gpcd, respectively.

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 B H P WSC, Caddo Basin SUD, Cash SUD, and Poetry WSC, 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 2021 Region C, Region I, and Region D Plans.

Table 5.2 Advanced Water Conservation Savings for Selected Municipal Entities

Entity (County)		2020	2030	2040	2050	2060	2070
B H P WSC (HUNT)	Goal (gpcd)	Conservation Goals Established by Region C					
	Savings (ac-ft/yr)	0	1	1	1	2	3
CADDO BASIN SUD (HUNT)	Goal (gpcd)	Conservation Goals Established by Region C					
	Savings (ac-ft/yr)	2	4	4	7	12	18
CASH SUD (HUNT)	Goal (gpcd)	Conservation Goals Established by Region C					
	Savings (ac-ft/yr)	5	8	10	11	14	18
GREENVILLE	Goal (gpcd)	156	156	156	156	156	156
	Savings (ac-ft/yr)	4,051	4,486	5,140	6,124	7,593	9,741
POETRY WSC	Goal (gpcd)	Conservation Goals Established by Region C					
	Savings (ac-ft/yr)	1	2	1	3	4	7
	TOTAL	**4,059**	**4,500**	**5,155**	**6,146**	**7,625**	**9,787**

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, Titus, and Van Zandt 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					
	2020	2030	2040	2050	2060	2070
BOWIE						
Total Demand	1,611	2,047	2,047	2,047	2,047	2,047
Water Conservation Savings	161	204	204	204	204	204
TITUS						
Total Demand	4,063	4,155	4,155	4,155	4,155	4,155
Water Conservation Savings	0	415	415	415	415	415
VAN ZANDT						
Total Demand	506	757	757	757	757	757
Water Conservation Savings	0	75	75	75	75	75
TOTAL	**161**	**694**	**694**	**694**	**694**	**694**

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 decline from 23 percent to 20 percent of the demand 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.

No conservation strategies are recommended for Steam-Electric Power Generation WUGs in the 2021 Region D Plan.

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 2021 Region D Plan. Irrigation demand is projected to decline from 9 percent to 7 percent of the demand over the planning period. Livestock and mining comprise a total of 11 percent to 9 percent 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.

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.

Environmental Issue	Evaluation Result
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

Measures		$ Per Acre-Foot
	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
	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 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. 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 acre-feet 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 an 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, 2009. 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: NETRWPG, c/o Mr. Walt Sears, Northeast Texas Municipal Water District, P.O. Box 955, Hughes Springs, Texas 75656.

> ***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 a drought condition 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.

<u>Stage 1 – Mild Water Shortage</u>

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:
   1. Wash down of any sidewalks, walkways, driveways, parking lots, or other hard-surfaced areas;
   2. Wash down of buildings or structures for purposes other than immediate fire protection;
   3. Use of water for dust control;
   4. Flushing gutters or permitting water to run or accumulate in any gutter or street; and,
   5. Failure to repair a controllable leak(s) within a reasonable period after having been given notice directing the repair of such leak(s).

<u>Stage 2 – Moderate Water Shortage</u>

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:
    1. Wash down of any sidewalks, walkways, driveways, parking lots, or other hard-surfaced areas;
    2. Wash down of buildings or structures for purposes other than immediate fire protection;
    3. Use of water for dust control;
    4. Flushing gutters or permitting water to run or accumulate in any gutter or street;
    5. 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, a 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 is one recommended reuse strategy 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).

5.2.7 Groundwater

This strategy includes 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 2020 – 2070 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 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, in order 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. Threates 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. Threates 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 not support the provision of drought management measures as an explicit WMS in the 2021 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. 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 acre-feet per year. Some are temporary. Small applications to the TCEQ of this nature are consistent with the 2021 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 are considered consistent with the regional water plan even though not specifically recommended in the regional water plan.

The NETRWPG has identified a total of 78 Water User Groups with shortages during the 2020 – 2070 planning period which will require strategies in this plan. A total of 111 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. 29 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 will be partially resolved with the implementation of Advanced Water Conservation measures. 60 shortages will be resolved with additional groundwater supplies, by far the most common recommended water management strategy. There are three (3) instances 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 are two instances of recommended use of domestic livestock local supplies, and one (1) instance of recommended indirect reuse. There are 8 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 29 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 (15 occurrences in the 2021 Plan) is to increase an existing contract. Fourteen (14) entities require a renewal of their contract. There is one WUG, Titus County Manufacturing, which requires a renewal of contract(s) along with an increase in the contracted amount. Two entities, the City of Celeste and Wolfe Cityare 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 29 recommended contractual strategies in the 2021 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 49 entities in the North East Texas Region for which 60 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 Development of Additional Supply

There are 80 recommended strategies that necessitate the development of additional supply beyond contractual mechanisms. There are 60 recommended strategies based on the development of additional groundwater supply. There are 8 strategies based on the development or enhancement of use from surface water supplies and infrastructure for 6 entities. Advanced water conservation has been recommended for 8 entities, while there are 3 instances of recommendations 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 63 percent of the total supply required in 2020, and 86 percent of the total supply required in 2070. 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	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source				Total Capital Cost ($)
		2020	2030	2040	2050	2060	2070				Ground-water	Surface Water	County	Basin	
BOWIE	Burns Redbank WSC	-201	-199	-196	-194	-193	-193	Renew Existing Contract	Riverbend WMS	City Of Hooks		Wright Patman Lake /Reservoir	Reservoir	Sulphur	-
		201	199	196	194	193	193								
BOWIE	Central Bowie County WSC	-619	-639	-708	-784	-869	-962	Renew Existing Contract	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	-
		619	639	708	784	869	962								
BOWIE	De Kalb	-295	-292	-289	-291	-294	-298	Renew Existing Contract	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	-
		295	292	289	291	294	298								
BOWIE	Hooks	-281	-278	-276	-271	-269	-269	Renew Existing Contract	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	-
		281	278	276	271	269	269								
BOWIE	Macedonia Eylau MUD 1	-588	-598	-601	-601	-601	-601	Renew Existing Contract	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	-
		588	598	601	601	601	601								
BOWIE	Manufacturing Bowie	-1,579	-2,014	-2,014	-2,014	-2,014	-2,014	Renew Existing Contract	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	
		789	59,724	66,305	74,531	82,757	100,609								
BOWIE	Maud	-211	-226	-241	-238	-237	-237	Renew Existing Contract	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	-
		211	226	241	238	237	237								
BOWIE	Nash	-392	-458	-523	-589	-589	-589	Renew Existing Contract	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	-
		392	458	523	589	589	589								
BOWIE	New Boston	-1,390	-1,399	-1,385	-1,381	-1,379	-1,379	Renew Existing Contract	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	-
		1,390	1,399	1,385	1,381	1,379	1,379								
BOWIE	Redwater	-440	-487	-535	-588	-616	-616	Renew Existing Contract	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	-
		440	487	535	588	616	616								
BOWIE	Texarkana	-7,145	-7,282	-7,459	-7,706	-8,028	-8,380	Renew Existing Contract	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	-
		7,145	7,282	7,459	7,706	8,028	8,380								
BOWIE	Wake Village	-699	-750	-802	-861	-932	-931	Renew Existing Contract	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	-
		699	750	802	861	932	931								
CASS	Atlanta	0	0	0	0	0	0	Renew Existing Contract	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	-
		0	1,075	1,135	1,209	1,206	1,206								
CASS	County-Other, Cass	-449	-357	-269	-212	-208	-208	Renew Existing Contract	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	
		0	44	44	44	44	44								
CASS	Holly Springs WSC	-73	-67	-60	-58	-58	-58	Increase Contract		NETMWD		Lake O' The Pines /Reservoir	Reservoir	Cypress	
		80	80	80	80	80	80								

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County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (If Applicable)	Supply Source				Total Capital Cost ($)
		2020	2030	2040	2050	2060	2070				Ground-water	Surface Water	County	Basin	
HARRISON, MARION	Harleton WSC	-62	-74	-91	-127	-173	-230	Increase Contract		NETMWD		Lake O' The Pines /Reservoir	Reservoir	Cypress	
		62	74	91	127	173	230								
HOPKINS	Brinker WSC	0	0	0	-12	-47	-83	Increase Contract		Sulphur Springs		Sulphur Springs Lake /Reservoir	Reservoir	Sulphur	
		0	0	0	12	47	83								
HOPKINS	Martin Springs WSC	0	0	0	0	0	-29	Increase Contract		Sulphur Springs		Chapman /Cooper Lake / Reservoir Non-System Portion	Reservoir	Sulphur	-
		0	0	0	0	0	29								
HUNT	B H P WSC	0	-72	-125	-209	-333	-505	Increase Contract	Region C NTMWD WMS	NTMWD		NTMWD System	Reservoirs	Trinity	-
		0	71	124	208	331	502								
HUNT	Caddo Basin SUD	-7	-220	-406	-722	-1,202	-1,866	Increase Contract	Region C NTMWD WMS	NTMWD		NTMWD System	Reservoirs	Trinity	-
		5	216	402	715	1,190	1,848								
HUNT	Caddo Mills	0	-1	-36	-68	-108	-254	Increase Contract	Greenville WMSPS	Greenville		Tawakoni, Greenville City Lake, Sulphur Springs Lake /Reservoir, Chapman /Cooper Reservoir	Reservoirs	Sulphur, Sabine	-
		0	1	36	68	108	254								
HUNT	Cash SUD	89	-361	-1,009	-1,346	-1,346	-695	Increase Contract	Region C NTMWD WMS	NTMWD		NTMWD System	Reservoirs	Trinity	-
		332	688	1,025	1,353	1,352	1,343								
HUNT	County-Other, Hunt	862	449	-166	-703	-1,817	-3,834	Increase Contract	Greenville WMSPS	Greenville		Tawakoni, Greenville City Lake	Reservoirs	Sabine, Sulphur	
		0	0	166	703	1,817	3,834								
HUNT	Poetry WSC	2	-66	-115	-200	-330	-510	Increase Contract	Region C Terrell Increase Contract & Region C NTMWD WMS	Terrell		NTMWD System	Reservoirs	Trinity	-
		0	64	114	197	326	503								
LAMAR	County-Other, Lamar	-204	-204	-212	-224	-234	-244	Increase Contract		Lamar County WSD		Pat Mayse Lake /Reservoir	Reservoir	Red	-
		204	204	212	224	234	244								
TITUS	Manufacturing Titus	0	-1,418	-1,295	-1,305	-1,564	-1,694	Renew And Increase Contract		Mount Pleasant		Bob Sandlin Lake /Reservoir	Reservoir	Cypress	-
		0	1,003	880	890	1,149	1,279								
TITUS	Steam-Electric Power Generation Titus	-30,066	-30,866	-31,766	-32,566	-32,814	-33,083	Increase Contract		NETMWD		Bob Sandlin Lake /Reservoir, Lake O' The Pines /Reservoir	Reservoirs	Cypress	-
		30,066	30,866	31,766	32,566	32,814	33,083								
VAN ZANDT	Manufacturing Van Zandt	-242	-493	-493	-493	-504	-504	Increase Contract		Grand Saline					-
		0	0	0	0	0	72								
VAN ZANDT	Manufacturing Van Zandt	0	0	0	62	191	214	Increase Contract		Golden WSC					-

Table 5.12 Recommended Groundwater Strategies

County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (if applicable)	Supply Source				Total Capital Cost ($)
		2020	2030	2040	2050	2060	2070				Groundwater	Surface Water	County	Basin	
BOWIE	Irrigation Bowie	-4,134 4,134	-4,134 4,134	-4,134 4,134	-4,134 4,134	-4,134 4,134	-4,134 4,134	Drill New Wells			Carrizo-Wilcox Aquifer		Bowie	Sulphur	$10,597,000
BOWIE	Livestock Bowie	-252 252	-252 252	-229 229	-196 196	-168 168	-156 156	Drill New Wells			Nacatoch Aquifer		Bowie	Red	$1,630,000
BOWIE	Livestock Bowie	-417 417	-417 417	-378 378	-325 325	-278 278	-260 260	Drill New Wells			Carrizo-Wilcox Aquifer		Bowie	Sulphur	$2,423,000
CAMP	Livestock Camp	-3,962 3,962	-3,962 3,962	-3,962 3,962	-3,962 3,962	-3,962 3,962	-3,962 3,962	Drill New Wells			Queen City Aquifer		Camp	Cypress	$4,322,500
CASS	County-Other, Cass	-449 323	-357 323	-269 323	-212 323	-208 323	-208 323	Drill New Wells			Carrizo-Wilcox Aquifer		Cass	Cypress	$1,973,000
CASS	County-Other, Cass	216	216	216	216	216	216	Drill New Wells			Carrizo-Wilcox Aquifer		Cass	Sulphur	$1,324,000
CASS	Livestock Cass	-1,818 968	-1,818 968	-1,818 968	-1,816 968	-1,816 968	-1,816 968	Drill New Wells			Queen City Aquifer		Cass	Cypress	$1,037,000
CASS	Livestock Cass	966	966	966	966	966	966	Drill New Wells			Queen City Aquifer		Cass	Sulphur	$1,037,000
DELTA	Livestock Delta	-262 262	-250 250	-250 250	-250 250	-250 250	-250 250	Drill New Wells			Nacatoch Aquifer		Delta	Sulphur	$1,929,000
FRANKLIN	Livestock Franklin	-1,804 805	-1,804 805	-1,804 805	-1,804 805	-1,804 805	-1,804 805	Drill New Wells			Carrizo-Wilcox Aquifer		Franklin	Cypress	$865,000
FRANKLIN	Livestock Franklin	1,129	1,129	1,129	1,129	1,129	1,129	Drill New Wells			Carrizo-Wilcox Aquifer		Franklin	Sulphur	$1,211,000
GREGG	Mining Gregg	-11 27	-19 27	-19 27	-14 27	-10 27	-6 27	Drill New Wells			Carrizo-Wilcox Aquifer		Gregg	Sabine	$117,000
HARRISON	Irrigation Harrison	-532 484	-532 484	-532 484	-532 484	-532 484	-532 484	Drill New Wells			Queen City Aquifer		Harrison	Cypress	$577,000
HARRISON	Irrigation Harrison	161	161	161	161	161	161	Drill New Wells			Queen City Aquifer		Harrison	Sabine	$193,000
HARRISON	Leigh WSC	0 0	0 0	-21 54	-60 108	-105 108	-159 162	Drill New Wells			Queen City Aquifer		Harrison	Cypress	$1,973,000
HARRISON	Mining Harrison	-1,566 332	-1,127 332	-772 332	-426 332	-87 332	0 332	Drill New Wells			Queen City Aquifer		Harrison	Cypress	$384,000
HARRISON	Mining Harrison	1,452	1,452	1,452	1,452	1,452	1,452	Drill New Wells			Queen City Aquifer		Harrison	Sabine	$1,555,000
HARRISON	North Harrison WSC	0 0	0 0	0 0	0 0	-15 54	-32 54	Drill New Wells			Queen City Aquifer		Harrison	Cypress	$612,000
HARRISON	Panola-Bethany WSC	11 0	-31 54	-98 108	-200 216	-269 270	-332 324	Drill New Wells			Queen City Aquifer		Harrison	Sabine	$2,399,000

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County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (if applicable)	Supply Source				Total Capital Cost ($)
		2020	2030	2040	2050	2060	2070				Groundwater	Surface Water	County	Basin	
HARRISON	Scottsville	-31	-44	-58	-82	-109	-141	Drill New Wells			Queen City Aquifer		Harrison	Cypress	$1,429,000
		54	54	108	108	162	162								
HARRISON	Waskom	-96	-114	-136	-173	-220	-275	Drill New Wells			Queen City Aquifer		Harrison	Cypress	$2,399,000
		108	162	162	216	270	324								
HOPKINS	Cumby	-13	-29	-44	-58	-77	-88	Drill New Wells			Nacatoch Aquifer		Hopkins	Sabine	$938,000
		13	29	44	58	77	88								
HOPKINS	Irrigation Hopkins	-4,627	-4,627	-4,627	-4,627	-4,627	-4,627	Drill New Wells			Carrizo-Wilcox Aquifer		Hopkins	Sabine	$2,814,000
		0	0	111	387	575	931								
HOPKINS	Irrigation Hopkins	4,627	4,627	4,516	4,240	4,052	3,696	Drill New Wells			Carrizo-Wilcox Aquifer		Hopkins	Sulphur	$10,927,000
HOPKINS	Livestock Hopkins	-1,068	-1,090	-1,140	-1,143	-1,196	-1,219	Drill New Wells			Carrizo-Wilcox Aquifer		Hopkins	Sulphur	$6,314,000
		1,068	1,090	1,140	1,143	1,196	1,219								
HOPKINS	Miller Grove WSC	-8	-16	-23	-29	-40	-52	Drill New Wells			Carrizo-Wilcox Aquifer		Hopkins	Sulphur	$886,000
		8	16	23	29	40	52								
HOPKINS	Mining Hopkins	-227	-283	-360	-444	-533	-639	Drill New Wells			Carrizo-Wilcox Aquifer		Hopkins	Sulphur	$3,376,000
		227	283	360	444	533	639								
HUNT	Celeste	-29	-52	-86	-136	-209	-316	Drill New Wells			Woodbine Aquifer		Hunt	Trinity	$1,686,000
		29	52	86	136	209	229								
HUNT	Irrigation Hunt	-230	-230	-230	-230	-230	-230	Drill New Wells			Nacatoch Aquifer		Hunt	Sabine	$1,249,000
		230	230	230	230	230	230								
HUNT	Livestock Hunt	-2	-2	-2	-2	-1	-1	Drill New Wells			Trinity Aquifer		Hunt	Sabine	$407,000
		2	2	2	2	2	2								
HUNT	Mining Hunt	-73	-64	-35	-19	-7	0	Drill New Wells			Trinity Aquifer		Hunt	Sabine	$766,000
		73	64	35	19	7	0								
HUNT	North Hunt SUD	-89	-165	-266	-405	-603	-888	Drill New Wells			Nacatoch Aquifer		Hunt	Sabine	$10,998,000
		89	165	266	405	603	888								
MARION	Mining Marion	-373	-645	-590	-471	-352	-265	Drill New Wells			Queen City Aquifer		Marion	Cypress	$767,000
		432	645	654	654	654	654								
MORRIS	Livestock Morris	-979	-979	-979	-979	-979	-979	Drill New Wells			Queen City Aquifer		Morris	Sulphur	$539,000
		483	483	483	483	483	483								
MORRIS	Livestock Morris	644	644	644	644	644	644	Drill New Wells			Queen City Aquifer		Morris	Cypress	$767,000
RED RIVER	Clarksville	-237	-231	-222	-221	-219	-219	Drill New Wells And Ro Treatment			Blossom Aquifer		Red River	Sulphur	$10,537,000
		388	388	388	388	388	388								
RED RIVER	Irrigation Red River	-2,154	-2,154	-2,154	-2,154	-2,154	-2,154	Drill New Wells			Nacatoch Aquifer		Red River	Sulphur	$6,551,000
		2,057	2,057	2,057	2,057	2,057	2,057								
RED RIVER	Livestock Red River	-184	-184	-184	-184	-184	-184	Drill New Wells			Blossom Aquifer		Red River	Red	$425,000
		10	11	10	11	10	11								

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County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (if applicable)	Supply Source				Total Capital Cost ($)
		2020	2030	2040	2050	2060	2070				Groundwater	Surface Water	County	Basin	
RED RIVER	Livestock Red River	174	173	174	173	174	173	Drill New Wells			Trinity Aquifer		Red River	Sulphur	$1,436,000
SMITH	Crystal Systems Texas	0	0	-78	-192	-456	-816	Drill New Wells			Carrizo-Wilcox Aquifer		Smith	Sabine	$2,531,000
		0	0	135	135	269	538								
SMITH	Crystal Systems Texas	0	0	134	134	269	538	Drill New Wells			Carrizo-Wilcox Aquifer		Smith	Neches	$2,531,000
SMITH	Lindale	-70	-362	-681	-975	-1,377	-1,833	Drill New Wells			Carrizo-Wilcox Aquifer		Smith	Sabine	$7,592,000
		322	644	966	1,288	1,610	1,932								
SMITH	Smith County Mud 1	0	0	-13	-178	-375	-609	Drill New Wells			Queen City Aquifer		Smith	Sabine	$3,948,000
		0	0	108	216	432	648								
SMITH	Star Mountain WSC	-20	-39	-61	-87	-116	-148	Drill New Wells			Queen City Aquifer		Smith	Sabine	$1,521,000
		108	108	108	108	216	216								
SMITH	Starrville-Friendship WSC	0	0	0	0	-3	-37	Drill New Wells			Carrizo-Wilcox Aquifer		Smith	Sabine	$761,000
		0	0	0	0	108	108								
SMITH	Winona	0	0	0	-20	-48	-81	Drill New Wells			Carrizo-Wilcox Aquifer		Smith	Sabine	$761,000
		0	0	0	108	108	108								
TITUS	Livestock Titus	-1,939	-1,939	-1,939	-1,939	-1,984	-2,005	Drill New Wells			Carrizo-Wilcox Aquifer		Titus	Cypress	$2,253,000
		275	334	379	425	517	560								
TITUS	Livestock Titus	1,664	1,605	1,560	1,514	1,467	1,445	Drill New Wells			Carrizo-Wilcox Aquifer		Titus	Sulphur	$5,215,000
UPSHUR	Gilmer	0	0	-11	-75	-142	-206	Drill New Wells			Carrizo-Wilcox Aquifer		Upshur	Cypress	$801,000
		0	0	216	216	216	216								
UPSHUR	Livestock Upshur	-140	-140	-140	-140	-140	-140	Drill New Wells			Queen City Aquifer		Upshur	Cypress	$172,000
		161	161	161	161	161	161								
UPSHUR	Livestock Upshur	161	161	161	161	161	161	Drill New Wells			Queen City Aquifer		Upshur	Sabine	$172,000
UPSHUR	Manufacturing Upshur	-63	-70	-70	-70	-70	-70	Drill New Wells			Carrizo-Wilcox Aquifer		Upshur	Cypress	$172,000
		161	161	161	161	161	161								
VAN ZANDT	Canton	0	0	0	0	0	0	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Sabine	$716,000
		100	100	100	100	100	100								
VAN ZANDT	Edom WSC	-13	-21	-27	-37	-49	-64	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Neches	$1,088,000
		13	21	27	37	49	64								
VAN ZANDT	Irrigation Van Zandt	-43	-61	-63	-64	-66	-68	Drill New Wells			Queen City Aquifer		Van Zandt	Neches	$825,000
		43	61	63	64	66	68								
VAN ZANDT	Little Hope Moore WSC	0	0	0	-3	-11	-17	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Neches	$371,000
		0	0	0	3	11	17								
VAN ZANDT	Manufacturing Van Zandt	-242	-493	-493	-493	-504	-504	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Trinity	$2,852,000
		242	504	504	356	238	143								
VAN ZANDT	R P M WSC	0	-34	-79	-131	-175	-217	Drill New Wells			Carrizo-Wilcox Aquifer		Van Zandt	Neches	$3,469,000
		0	34	79	131	175	217								

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County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (if applicable)	Supply Source				Total Capital Cost ($)
		2020	2030	2040	2050	2060	2070				Groundwater	Surface Water	County	Basin	
WOOD	Livestock Wood	-1,098	-1,098	-1,098	-1,098	-1,098	-1,098	Drill New Wells			Queen City Aquifer		Wood	Sabine	$1,210,000
		1,129	1,129	1,129	1,129	1,129	1,129								
WOOD	Manufacturing Wood	-1,030	-1,583	-1,583	-1,583	-1,583	-1,583	Drill New Wells			Queen City Aquifer		Wood	Sabine	$1,210,000
		1,129	1,610	1,610	1,610	1,610	1,610								

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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 ($)
		2020	2030	2040	2050	2060	2070				Groundwater	Surface Water	County	Basin	
BOWIE	Riverbend Water Resources District	-523	-536	-539	-537	-537	-537	Riverbend WMS				Wright Patman Lake /Reservoir	Reservoir	Sulphur	$350,917,000
		13,810	73,099	80,081	88,793	97,520	115,820								
BOWIE	Riverbend Water Resources District	0	1370	1423	1496	1493	1493	New 2.5 MGD Package WTP And Transmission Line	Riverbend WMS			Wright Patman Lake /Reservoir	Reservoir	Sulphur	$22,807,000
HUNT	Celeste	-29	-52	-86	-136	-209	-316	Treated Pipeline And New Contract	Greenville WMSPS	Greenville		Tawakoni Lake /Reservoir, Chapman /Cooper Lake / Reservoir Non-System Portion, And Greenville Lake /Reservoir	Reservoirs	Sabine, Sulphur	$3,342,000
		0	0	0	0	0	87								
HUNT	Greenville	-3,239	-4,626	-6,531	-9,183	-12,913	-18,266	WTP Expansion (15 MGD)	Advanced Conservation			Tawakoni Lake /Reservoir And Greenville Lake /Reservoir	Reservoirs	Sabine	$43,955,000
		0	9,335	9,335	9,335	9,335	9,335								
HUNT	Greenville	0	0	0	0	0	9,335	New WTP (15 MGD)	Advanced Conservation			Tawakoni Lake /Reservoir, Chapman /Cooper Lake / Reservoir Non-System Portion, And Greenville Lake /Reservoir	Reservoirs	Sabine, Sulphur	$81,786,000
HUNT	Wolfe City	0	0	0	-54	-157	-308	Greenville Tie-In Pipeline	Greenville WMSPS	Greenville		Tawakoni Lake /Reservoir, Chapman /Cooper Lake / Reservoir Non-System Portion, And Greenville Lake /Reservoir	Hunt	Sabine, Sulphur	$7,124,000
		0	0	0	54	157	308								
LAMAR	Irrigation Lamar	-1,468	-1,468	-1,468	-1,468	-1,468	-1,468	Pat Mayse Raw Water Pipeline		Paris		Pat Mayse Lake /Reservoir	Reservoir	Red	$12,021,000
		1,468	1,468	1,468	1,468	1,468	1,468								
LAMAR	Livestock Lamar	-617	-617	-617	-617	-617	-617	Livestock Water Pipeline		Lamar County WSD		Pat Mayse Lake /Reservoir	Lamar	Red	$14,574,000
		617	617	617	617	617	617								
		237	231	222	221	219	219								

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Table 5.14 Other Recommended Strategies

County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (if applicable)	Supply Source				Total Capital Cost ($)
		2020	2030	2040	2050	2060	2070				Ground-water	Surface Water	County	Basin	
MORRIS	Livestock Morris	-979	-979	-979	-979	-979	-979	Livestock Local Supply				Local Supply	Morris	Sulphur	-
		60	60	60	60	60	60								
VAN ZANDT	Canton	0	0	0	0	0	0	Indirect Reuse				Indirect Reuse	Van Zandt	Sabine	$8,381,000
		323	323	323	323	323	323								
WOOD	Livestock Wood	-1132	-1132	-1132	-1132	-1132	-1132	Livestock Local Supply				Local Supply	Wood	Sabine	-
		34	34	34	34	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. Central Bowie County WSC.
14. The Red River Redevelopment Authority.
15. TexAmericas Center.

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, 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 2021 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 Wright Patman. 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 2021 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 2020 – 2070 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 (2020) – Based on the contractual demands identified herein, this WMSP is planned to occur by 2020, 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. The official TCEQ WAM for the Sulphur River Basin was applied to reflect this new diversion, backed by the permitted storage of Lake Wright Patman. Refilling of the reservoir due to the junior diversion was modeled subject to environmental flow constraints. As there is no Senate Bill 3 environmental flow standard adopted for the Sulphur River Basin, consensus planning criteria were employed in this modeling. It was determined that sufficient supply exists in the originally permitted full storage at the original priority date for Lake Wright Patman to meet the increased diversion amount. 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 (2020) – In order to meet the contracted and projected demands for the District, development of this WMSP by 2020 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 2021 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 2021 planning process is a maximum firm supply of 117,313 ac-ft/yr. The total project cost is $356.4 million, with an annual cost up to $35.5 million and a unit cost of $307 per ac-ft. during debt service ($0.94/1,000 gal.) and $129 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 2021 Region D Plan. However, this timing results in a projected Bowie County manufacturing unmet need by 2020 of 629 ac-ft/yr.

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 $22.8 million, with an annual cost of $2.7 million and a unit cost of $1,812 per ac-ft during debt service ($5.56/1,000 gal.) and $739 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 2021 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 of the member entities of Riverbend Water Resources District. As noted previously and reiterated here, this 2021 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 1,576 in 2020 and 1,634 in the year 2070. 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 in 2020 due to 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.

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 7,529 in 2020 and 12,101 in the year 2070. The WSC has a contract for water supply with the City of Texarkana, Texas from Lake Wright Patman. The WSC is projected to have a shortage in 2030 due to 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.

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 1,711 in 2020 and 1,827 in the year 2070. 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 2020 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 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.

Recommendations

It is recommended that the City of DeKalb continue its surface water purchase from Texarkana contingent upon Texarkana/Riverbend strategies.

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 3,049 in 2020 and 3,303 in the year 2070. 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 2020 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 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.

Recommendations

It is recommended that the City of Hooks continue its surface water purchase from Texarkana contingent upon Texarkana/Riverbend strategies.

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 10,373 ac-ft/yr in 2020 through 2070. 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 4,134 ac-ft/yr in the Sulphur basin and a surplus of 922 ac-ft/yr in the Red River basin, projected to occur in 2020 through 2070.

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.

5.3.4.7 Bowie County Livestock

Description/Discussion of Needs

The Livestock WUG in Bowie County has a demand that is projected to be 1,825 ac-ft/yr in 2020 decreasing to 1,136 ac-ft/yr in 2070. The Livestock WUG in Bowie County is projected to be supplied by groundwater supplies from the Carrizo-Wilcox Aquifer, Nacatoch Aquifer and livestock local supply. The current round of planning has identified a deficit of 417 ac-ft/yr in the Sulphur basin and 252 ac-ft/yr in the Red River basin, projected to occur in 2020 and decrease to 260 and 156 ac-ft/yr by 2070.

Evaluated Strategies

Five alternative strategies were considered to meet the Bowie County Livestock WUG's projected water supply shortages. Advanced water conservation for livestock practices were 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 from the Carrizo-Wilcox and Nacatoch aquifers has been identified as a potential source of water for livestock 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 Livestock WUG to meet projected demands during the planning period is to drill new ground water wells in the Carrizo-Wilcox and Nacatoch Aquifers in Bowie County. This strategy estimates five (5) new wells at a rated capacity of 75 gpm in the Carrizo-Wilcox Aquifer and four (4) new wells at a rated capacity of 75 gpm in the Nacatoch Aquifer in Bowie County. A well operating at an average of 75 gpm is capable of delivering 121 ac-ft per year per well.

5.3.4.8 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 8,742 in 2020 and 8,939 in the year 2070. The MUD has a contract for water supply with the City of Texarkana for 552 ac-ft/yr that expires in 2019. The MUD is projected to have a deficit of 588 ac-ft in 2020 and increasing to a deficit of 601 ac-ft by 2070.

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.

5.3.4.9 Bowie County Manufacturing

Description/Discussion of Needs

The Manufacturing WUG in Bowie County has a demand that is projected to be 1,611 ac-ft/yr in 2020 increasing to 2,047 ac-ft/yr in 2070. Manufacturing demands identified via contract between the Riverbend WRD and TexAmericas Center range from 33,604 ac-ft/yr in 2020 to 100,813 ac-ft/yr in 2070. 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 2020 deficit of 1,579 ac-ft/yr in the Sulphur River Basin with a surplus of 3 ac-ft/yr in the Red River Basin. This deficit in the Sulphur River Basin is projected to increase to 2,014 ac-ft/yr by 2070, whereas the projected surplus in the Red River Basin decreases slightly to 2 ac-ft/yr by 2070. 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. This contractual need ranges from 33,604 ac-ft/yr in 2020 to 100,813 ac-ft/yr in 2070.

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, for the purposes of the 2021 Region D Plan there remains a projected unmet manufacturing need in 2020 of 631 ac-ft/yr.

5.3.4.10 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 1,358 in 2020 and 1,642 in the year 2070. 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 2020 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.

5.3.4.11 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 4,070 in 2020 and 6,111 in the year 2070. 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 2020 due to constraints in supply availability 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 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.

Recommendations

It is recommended that the City of Nash continue its surface water purchase from Texarkana contingent upon Riverbend WRD's recommended strategies.

5.3.4.12 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 5,960 in 2020 and 6,180 in the year 2070. The city has a contract for water supply with the City of Texarkana for 1,680 ac-ft/yr that expires in 2016, with a one year auto renewal. 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 2020 due to constraints in supply availability and aging of Texarkana's Water Treatment Plant.

Evaluated Strategies

There were four 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.

Recommendations

It is recommended that the City of New Boston continue its surface water purchase from Texarkana contingent upon Riverbend WRD's recommended strategies.

5.3.4.13 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 3,749 in 2020 and 5,429 in the year 2070. 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 2020 due to constraints in water supply and aging of the 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 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.

Recommendations

It is recommended that the City of Redwater continue its surface water purchase from Texarkana contingent upon Riverbend WRD's recommended strategies. Development of infrastructure necessary to provide water to the City's customers is to be considered consistent with this recommended strategy.

5.3.4.14 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 2021 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 38,007 people in 2020, increasing to 47,102 by 2070. 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 7,145 ac-ft/yr in 2020 increasing to 8,380 ac-ft/yr in 2070, 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.

At present, considerable discussions are underway between all of the member cities of Riverbend Water Resources District. As noted previously and reiterated here, this 2021 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.

5.3.4.15 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 6,150 in 2020 and 8,950 in the year 2070. 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 2020 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.

5.3.5 Camp County

5.3.5.1 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 The City of Atlanta

Description/Discussion of Needs

The City of Atlanta provides water service in Cass County. The City's population is projected to be 5,877 in 2020 and 7,427 in the year 2070. The City has a contract for water supply with the City of Texarkana from Lake Wright Patman. The City is expected to have shortages due to constraints on water supply and aging of Texarkana's existing Water Treatment Plant located at the Graphics Packaging International (GPI) facility as identified in the Riverbend WRD's Regional Water Master Plan.

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 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 was not selected because the City is planning on continuing to purchase surface water from the City of Texarkana. Voluntary reallocation of manufacturing supply was identified in order to account for the fact that the City'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 Wright Patman Reservoir. Thus, a renewal contract with Texarkana/Riverbend has been considered herein.

Recommendations

It is recommended that the City of Atlanta 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.

5.3.6.2 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.

5.3.6.3 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 107 ac-ft/yr in 2020 to 97 ac-ft/yr in 2070. Holly Springs WSC in Cass County has a current water supply from Hughes Springs thru NETMWD and Lake O' Pines. The total rated available supply from this sources is 60 ac-ft/yr in 2020 thru 2070. Holly Springs WSC in Cass County is projected to have a water supply deficit of 47 ac-ft/yr in 2020 and decreasing to 38 ac-ft/yr in 2070.

In Morris County, Cypress, it has a demand that is projected to be decreasing from 58 ac-ft/yr in 2020 to 53 ac-ft/yr in 2070. Holly Springs WSC in Morris County has a current water supply from Hughes Springs thru NETMWD and Lake O' Pines. The total rated available supply from this source is 32 ac-ft/yr in 2020 thru 2070. Holly Springs WSC in Morris County is projected to have a water supply deficit of 26 ac-ft/yr in 2020 and decreasing to 20 ac-ft/yr in 2070.

Evaluated Strategies

Three alternative strategies were considered to meet the Holly Springs WSC Cass County water supply shortages. Advanced conservation and water reuse was not determined to be feasible because it is a rural system. Surface water alternatives include increasing their contract with the City of Hughes Springs thru NETMWD and Lake O' Pines.

Recommendations

The recommended strategy for the Holly Springs WSC to meet their projected deficit of 72 ac-ft/yr in 2020 would be to increase their contract with City of Hughes Springs thru NETMWD and Lake O' Pines. The recommended supply source will be the 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 thru Hughes Springs and NETMWD for the planning period.

5.3.6.4 Cass County Livestock

Description/Discussion of Needs

The Livestock WUG in Cass County is a split entity and has a demand that is projected to be a constant 2,657 ac-ft/yr from 2020 to 2070. Livestock in Cass County, Cypress has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer, Queen City Aquifer, Local Supplies, and surface water from a Cypress Run -of-River Water Right. The total rated available supply from these sources is 484 ac-ft/yr in 2020 thru 2070. Livestock in Cass County, Cypress is projected to have a water supply deficit of 865 ac-ft/yr in 2020 thru 2070.

Livestock in Cass County, Sulphur 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 355 ac-ft/yr in 2020 to 357 ac-ft/yr in 2070. Livestock in Cass County, Sulphur is projected to have a water supply deficit of 953 ac-ft/yr in 2020 and reducing to a deficit of 951 ac-ft/yr in 2070.

Evaluated Strategies

Three alternative strategies were considered to meet the Cass 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 utilized where currently available but increase in permit amounts are not available. Construction of new wells accessing groundwater from the Queen City Aquifer was identified as a potentially feasible strategy.

Recommendations

The recommended strategy for the Cass County, Livestock, Cypress to meet their projected deficit of 865 ac-ft/yr in 2020 thru 2070 would be to construct sixteen water wells prior to 2020. The recommended supply source will be the Queen City Aquifer in Cass County. One well with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr. Six new wells will be needed to provide the 865 ac-ft/yr needed. The Queen Aquifer in Cass County is projected to have a more than ample supply availability to meet the needs of the Livestock in Cass County for the planning period.

The recommended strategy for the Cass County, Livestock, Sulphur to meet their projected deficit of 953 ac-ft/yr in 2020 reducing to 951 ac-ft/yr in 2070 would be to construct six water wells prior to 2020. The recommended supply source will be the Queen City Aquifer in Cass County. One well with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr. Six new wells will be needed to provide the 953 ac-ft/yr needed. The Queen Aquifer in Cass County is projected to have a more than ample supply availability to meet the needs of the Livestock in Cass 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.

5.3.6.5 Queen City

Description/Discussion of Needs

The City of Queen City provides water service in Cass County. The City's population is projected to be 1,701 in 2020 and 1,714 in the year 2070. 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 2020 – 2070 planning period. However, the City's full demands have been considered in evaluation of strategies for the purposes of the 2021 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. 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. 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.

Recommendations

As the City of Queen City's groundwater supplies are sufficient to meet projected future demands for the City, no additional WMS is recommended.

5.3.7 Delta County

5.3.7.1 Delta County Livestock

Description/Discussion of Needs

The Livestock WUG in Delta County has a demand that is projected to remain constant at 541 ac-ft/yr over the 2020 – 2070 planning period. The Livestock WUG in Delta County is supplied by groundwater from the Nacatoch and Trinity Aquifers and livestock local supplies from the Sulphur basin. A deficit of 262 ac-ft/yr is projected to occur in 2020 decreasing to 250 ac-ft/yr by 2030 that remains throughout the planning period.

Evaluated Strategies

Three alternative strategies were considered to meet the projected shortages for Delta 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 was not determined to be feasible as no centralized supply is available. Groundwater from the Nacatoch aquifer has been identified as a potential source of water.

Recommendations

The recommended strategies for the Delta County Livestock to meet their projected deficit of 262 ac-ft/yr is to construct four (4) additional water wells with a rated capacity of 75 gpm in the Nacatoch aquifer. A well operating at an average of 75 gpm is capable of delivering 121 ac-ft per year per well with a well in reserve.

5.3.8 Franklin County

5.3.8.1 Franklin County Livestock

Description/Discussion of Needs

The Livestock WUG in Franklin County is a split entity and has a demand that is projected to be a constant 2,850 ac-ft/yr from 2020 to 2070. Livestock in Franklin 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 425 ac-ft/yr in 2020 thru 2070. Livestock in Franklin County, Cypress is projected to have a water supply deficit of 714 ac-ft/yr in 2020 thru 2070.

Livestock in Franklin County, Sulphur 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 621 ac-ft/yr in 2020 thru 2070. Livestock in Franklin County, Sulphur is projected to have a water supply deficit of 1,090 ac-ft/yr in 2020 thru 2070.

Evaluated Strategies

Three alternative strategies were considered to meet the Franklin 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 livestock demands. New wells in the Carrizo-Wilcox Aquifer were also identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the Franklin County, Livestock, Cypress to meet their projected deficit of 865 ac-ft/yr in 2020 thru 2070 would be to construct five water wells prior to 2020. The recommended supply source will be the Carrizo Aquifer in Franklin County. One well with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr. Five new wells will be needed to provide the 714 ac-ft/yr needed. The Carrizo Aquifer in Franklin County is projected to have a more than ample supply availability to meet the needs of the Livestock in Franklin County for the planning period.

The recommended strategy for the Franklin County, Livestock, Sulphur to meet their projected deficit of 1,090 ac-ft/yr in 2020 thru 2070 would be to construct seven water wells prior to 2020. The recommended supply source will be the Carrizo Aquifer in Franklin County. One well with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr. Seven new wells will be needed to provide the 1,090 ac-ft/yr needed. The Carrizo Aquifer in Franklin County is projected to have a more than ample supply availability to meet the needs of the Livestock in Franklin 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.

5.3.9 Gregg County

5.3.9.1 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 701 ac-ft/yr from 2020 to 2070. 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 35 ac-ft/yr for the Cypress split. Irrigation in Harrison County is projected to have a water supply deficit of 384 ac-ft/yr in 2020 and staying even to a deficit of 384 ac-ft/yr in 2070 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 134 ac-ft/yr for the Sabine split. Irrigation in Harrison County is projected to have a water supply deficit of 148 ac-ft/yr in 2020 thru 2070 for the Sabine split.

Evaluated Strategies

Three alternative strategies were considered to meet the Harrison County Irrigation water supply shortages. Advanced conservation and water reuse was not determined to be feasible 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 384 ac-ft/yr in 2020 through 2070 would be to construct three water wells prior to 2020 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 acre-feet each or 484 ac-ft/yr.

The recommended strategy for the Harrison County Irrigation, Sabine Basin, to meet their projected deficit of 148 ac-ft/yr in 2020 from 2070 would be to construct one water well prior to 2020. 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 Leigh WSC

Description/Discussion of Needs

The Leigh WSC system is located in northeastern Harrison County. In 2018, the system had 1974 residential connections. The population is projected to increase from 1,852 persons in 2020 to 2,801 persons in 2070. The System is included as a W.U.G. in Harrison County. The system's current water supply consists of eight water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 809 GPM, or 435 ac-ft/yr. The system is bounded on the north by Caddo Lake WSC, on the east by the State of Louisiana, on the south by Waskom Rural WSC, and on the west by the City of Marshall and North Harrison WSC. The System does have a water conservation plan. The System is projected to have a water supply surplus of 24 ac-ft/yr in 2020 decreasing to a deficit of 21 ac-ft/yr in 2040 continuing in a decline to 159 ac-ft/yr in 2070.

Evaluated Strategies

Four alternative strategies were considered to meet the Leigh 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. 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. Wells in the Queen City Aquifer in the Cypress Basin were identified as a potentially feasible strategy for this WUG.

Recommendations

The recommended strategy for Leigh WSC to meet their projected deficit of 21 ac-ft/yr in 2040 and 159 ac-ft/yr in 2070 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 Queen City Aquifer in Harrison County Cypress. Three wells with rated capacity of 100 gpm each would provide approximately 54 acre-feet each. The Queen City Aquifer in Harrison County Cypress is projected to have a more than ample supply availability to meet the needs of Leigh WSC for the planning period. During the planning period three wells will be drilled in the Queen City formation of the Cypress River Basin.

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 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 decreasing from 2,462 ac-ft/yr in 2020 to 855 ac-ft/yr in 2070. 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 320 ac-ft/yr in 2020 increasing to 363 ac-ft/yr in 2070. Mining in Harrison County is projected to have a water supply deficit of 205 ac-ft/yr in 2020 and increasing to a surplus of 183 ac-ft/yr in 2070 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 612 ac-ft/yr in 2020 increasing to 657 ac-ft/yr in 2070. Mining in Harrison County is projected to have a water supply deficit of 1,361 ac-ft/yr in 2020 decreasing to a deficit of 18 ac-ft/yr in 2070 for the Sabine split.

Evaluated Strategies

Four alternative strategies were considered to meet the Harrison County Mining 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 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 205 ac-ft/yr in 2020 and 29 ac-ft/yr in 2040 would be to construct two additional water wells similar to their existing wells just prior to each decade as the deficits occur to 2040. 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 acre-feet each or 332 ac-ft/yr.

The recommended strategy for the Harrison County Mining, Sabine Basin, to meet their projected deficit of 1,361 ac-ft/yr in 2020 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 acre-feet 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.

5.3.10.5 North Harrison WSC

Description/Discussion of Needs

The North Harrison WSC is located in north central Harrison County and serves the community of Woodlawn and an area immediately north of the City of Marshall. In 2018, the system had 505 residential connections. The population is projected to increase from 1,374 persons in 2020 to 2,078 persons in 2070. The City is included as a W.U.G. 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 300 GPM, or 161 ac-ft/yr. The system is bounded on the north by Harleton WSC, on the east by Leigh WSC, on the south by the City of Marshall, and on the west by the Cypress Valley WSC. The WSC does not have a water conservation plan. North Harrison WSC is projected to have a water supply surplus of 20 ac-ft/yr in 2020 decreasing to a deficit of 32 ac-ft/yr in 2070.

Evaluated Strategies

Four alternative strategies were considered to meet the North Harrison 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 (Cypress Creek Basin) were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the North Harrison WSC to meet their projected deficit of 15 ac-ft/yr in 2060 and 32 ac-ft/yr in 2070 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. One well with rated capacity of 100 gpm each would provide approximately 54 acre-feet. The Queen City Aquifer in Harrison County Cypress is projected to have a more than ample supply availability to meet the needs of the North Harrison 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.

5.3.10.6 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 acre-feet 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.

5.3.10.7 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 1,141 persons in 2020 to 1,727 persons in 2070. 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 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 31 ac-ft/yr in 2020 increasing to a deficit of 141 ac-ft/yr in 2070.

Evaluated Strategies

Four alternative strategies were considered to meet the City of Waskom 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 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 31 ac-ft/yr in 2020 and 141 ac-ft/yr in 2070 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. Three wells with rated capacity of 100 gpm each would provide approximately 54 acre-feet each or 162 ac-ft/yr. The Queen City Aquifer in Harrison County is projected to have a more than ample supply availability to meet the needs of the City of Waskom 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.

5.3.10.8 The City of Waskom

Description/Discussion of Needs

The City of Waskom is located in southeastern Harrison County and serves the incorporated city limits and an area immediately north, east, and south of the City of Waskom. In 2018, the system had 1,526 residential connections. The population is projected to increase from 2,924 persons in 2020 to 4,424 persons in 2070. The City is included as a W.U.G. in Harrison County. The system's current water supply consists of nine water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 631 GPM, or 339 ac-ft/yr. The system is bounded on the east, south, and west by the Waskom Rural Water WSC #1. The City does not have a water conservation plan. The City of Waskom is projected to have a water supply deficit of 96 ac-ft/yr in 2020 increasing to a deficit of 275 ac-ft/yr in 2070.

Evaluated Strategies

Four alternative strategies were considered to meet the City of Waskom 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 City 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 City and surface water treatment is not economically feasible for a system of this size. Groundwater wells in the Queen City Aquifer (Cypress Creek Basin) were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the City of Waskom to meet their projected deficit of 96 ac-ft/yr in 2020 and 275 ac-ft/yr in 2070 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. Six wells with rated capacity of 100 gpm each would provide approximately 54 acre-feet each or 324 ac-ft/yr. The Queen City Aquifer in Harrison County Cypress is projected to have a more than ample supply availability to meet the needs of the City of Waskom 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 2050. The WUG population is projected to be 2,369 by 2020 and increases to 4,198 by 2070. 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 12 ac-ft in 2050, increasing to a deficit of 83 ac-ft by 2070.

Evaluated Strategies

Five alternative strategies 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. 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 regionalization strategy is the Wood County Pipeline. 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 prior to 2050.

5.3.11.2 The City of Cumby

Description/Discussion of Needs

The City of Cumby provides water service in Hopkins County. It is projected that the users in the WUG will have a shortage in 2020. The WUG population is projected to be 1,044 by 2020 and increases to 1,755 by 2070. The City of Cumby utilizes groundwater from the Nacatoch aquifer through 4 wells with a combined production capacity of 223 gpm. The City of Cumby is projected to have a deficit of 13 ac-ft in 2020 and increasing to a deficit of 88 ac-ft by 2070.

Evaluated Strategies

There were five alternative strategies 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. Reuse is not a feasible option because water supply is mainly used for public consumption. The system is not presently large enough to treat surface water in a cost-effective manner. Additional groundwater from the Nacatoch Aquifer has been considered as a potential water management strategy. A potential regionalization strategy considered is the Wood County Pipeline where in the city could construct an eleven (11) mile long 8-inch diameter waterline that ties into a branch of the Wood County Pipeline near Sulphur Springs.

Recommendations

The recommended strategy for the City of Cumby to meet their projected deficit of 13 ac-ft/yr in 2020 and 88 ac-ft/yr in 2070 would be to construct two additional water wells similar to their existing wells just prior to the decade as the deficits occur. The recommended supply source will be the Nacatoch Aquifer in Hopkins County, Sabine River Basin. A well operating at an average of 85 gpm is capable of delivering 46 ac-ft per year per well. The Nacatoch Aquifer in Hopkins County, Sabine River Basin, is projected to have sufficient supply availability to meet the needs of the City of Cumby for the planning period.

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 4,769 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 4,627 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 and Nacatoch aquifers has been identified as a potential source of water for irrigation in Hopkins County. The construction of a pipeline to convey raw surface water from Sulphur Springs Lake purchased via the City of Sulphur Springs was also considered as a potential alternative to meet projected demands. A potential regionalization strategy that was considered is the Wood County Pipeline which the WUG could tie-in to a branch of the Wood County Pipeline routed toward Sulphur Springs, Tx.

Recommendations

The recommended strategies for the Hopkins County Irrigation to meet their projected deficit of 4,227 ac-ft/yr would be to construct by 2020 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 portion of the aquifer is projected to have sufficient source availability to meet the remaining Hopkins County Irrigation needs over the remainder of the 2020-2070 planning period.

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 5,498 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 1,068 ac-ft/yr is projected to occur in 2020 increasing to 1,219 ac-ft/yr by 2070 in the Sulphur basin. In both the

Cypress and Sabine basins a surplus of 424 ac-ft/yr is projected by 2020 increasing to 577 ac-ft/yr by 2070.

Evaluated Strategies

Eight 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 Carrizo-Wilcox and Nacatoch aquifers 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. Increasing the existing contract with the City of Sulphur Springs was also considered as a potential alternative to meet projected demands. A potential regionalization strategy that was considered is the Wood County Pipeline which the WUG could tie-in to a branch of the Wood County Pipeline routed toward Sulphur Springs, Tx.

Recommendations

The recommended strategy for the Hopkins County Livestock to meet their projected deficit of 1,219 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.

5.3.11.5 Martin Springs WSC

Description/Discussion of Needs

Martin Springs WSC provides water service in Hopkins County. It is projected that the users in the WUG will have a shortage in 2070. The WUG population is projected to be 3,502 by 2020 and increases to 6,214 by 2070. Martin Springs WSC utilizes groundwater from the Carrizo-Wilcox aquifer and has a contract with the City of Sulphur Springs for surface water supply from Lake Chapman. Martin Springs WSC is projected to have a deficit of 29 ac-ft in 2070.

Evaluated Strategies

Six 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. 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 for Martin Springs WSC in Hopkins County. A potential regionalization strategy that was considered is the Wood County Pipeline. Increasing the existing contract with Sulphur Springs was identified and considered as a potentially feasible strategy.

Recommendations

The recommended strategy for Martin Springs WSC to meet their projected deficit of 29 ac-ft/yr in 2070 is to increase the existing contract supply from Sulphur Springs for water from their portion of Lake Chapman.

5.3.11.6 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 2020. The WUG population is projected to be 1,451 by 2020 and increases to 1,896 by 2070. Miller Grove WSC utilizes groundwater from the Carrizo-Wilcox aquifer. Miller Grove WSC is projected to have a deficit of 8 ac-ft by 2020 increasing to 52 ac-ft by 2070.

Evaluated Strategies

Five 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. 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. Purchase of surface water from Chapman Lake under contract from Sulphur Springs was also considered. A potential regionalization strategy that was considered is the Wood County Pipeline.

Recommendations

The recommended strategy for Miller Grove WSC to meet their projected deficit of 8 ac-ft/yr in 2020 and 52 ac-ft/yr in 2070 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 acre-feet 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.

5.3.11.7 Hopkins County Mining

Description/Discussion of Needs

Mining in Hopkins County has a demand that is projected to increase from 1,031 ac-ft/yr in 2020 to 1,577 ac-ft/yr in 2070. This WUG is projected to be supplied by groundwater from Nacatoch Aquifer and a nominal amount of surface water purchased from Sulphur Springs for potable use. A deficit of 227 ac-ft/yr is projected to occur in 2020 and increase to 639 ac-ft/yr by 2070.

Evaluated Strategies

Advanced water conservation for mining practices was not determined to be feasible, as present operations of the facilities are not available. The use of reuse water from nearby municipalities was not feasible as it would not be effective to deliver reuse water to the mining locations. Since the projected demands for mining in Hopkins County are primarily due to overburden dewatering, it was assumed that projected needs would likely be met by additional groundwater pumping. Increasing the existing contract from Sulphur Springs could provide additional supply. Additionally, the Wood County Pipeline regional strategy was evaluated as a feasible supply source.

Recommendations

The recommended strategy for the Hopkins County Mining to meet their projected deficit of up to 639 ac-ft/yr would be to construct seven (7) 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 Mining over the planning period.

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 5,233 people in 2020 and 18,110 by the year 2070. 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 60 ac-ft/yr in 2030 increasing to a deficit of 505ac-ft/yr by 2070.

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 indicates that conservation is a potential strategy for that portion of the WSC within the Region C planning area, thus conservation amounts identified by the Region C Planning Group have been incorporated herein for this WUG. The NETRWPG has considered the conservation efforts of this WUG, and has assumed for the purposes of this plan that the WUG will ascribe to any required conservation efforts that may be applied by a wholesale water provider of either existing supply or supply from a future water management strategy. Reuse is not a feasible option because water supply is mainly used for public consumption. Potentially feasible strategies include increase of the existing contract with NTMWD. Another potentially feasible strategy is the Wood County Pipeline which could supply groundwater from Wood County. 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 implement Advanced Water Conservation up to the amounts identified herein over the 2020-2070 planning period (consistent with identified recommendations for conservation for this WUG from the 2021 Region C Plan), and 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 10,115 in 2020 and 43,698 by the year 2070. The SUD purchases treated water from North Texas MWD and Farmersville. The SUD is projected to have a shortage beginning in 2020 based on the availability of current firm supplies from North Texas MWD. The SUD is projected to have a deficit of 8 ac-ft in 2020 increasing to a deficit of 1,866 ac-ft by 2070.

Evaluated Strategies

Seven 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. Another potentially feasible strategy is the Wood County Pipeline which could supply groundwater from Wood County.

Recommendations

The recommended strategy for Caddo Basin SUD is to implement Advanced Water Conservation up to the amounts identified herein over the 2020-2070 planning period (consistent with preliminarily identified recommendations for conservation for this WUG for the 2021 Region C Plan), and to increase the existing contract with the NTMWD. This strategy is contingent upon Region C recommended strategies for the NTMWD.

5.3.12.3 Caddo Mills

Description/Discussion of Needs

The City of Caddo Mills provides water service in Hunt County. This City's population was 1,338 in 2010 and is projected to increase to 1,710 by 2020 and 7,147 by 2070. The City purchases treated water from the City of Greenville and is projected to have a shortage beginning in 2030 based on the availability of current supplies to Greenville. Caddo Mills is projected to have a deficit of 1 ac-ft in 2030 increasing to a deficit of 254 ac-ft by 2070.

Evaluated Strategies

Four alternative strategies were considered to meet the City of Caddo Mills 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 City does not have a demand for non-potable water. Groundwater was considered, although the City has previously indicated that it plans to meet its future needs from water purchase from the City of Greenville. Another potentially feasible strategy is the Wood County Pipeline which could supply groundwater from Wood County.

Recommendations

The recommended strategy for the City of Caddo Mills to meet their projected deficit of 1 ac-ft/yr in 2030 and 254 ac-ft/yr in 2070 is to increase the volume of treated surface water purchased from the City of Greenville, contingent upon Greenville strategies.

5.3.12.4 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. 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 20,491 people in 2020 and 50,195 people by the year 2070. Cash SUD is projected to have a supply deficit of 361 ac-ft/yr by 2030 increasing to 1,346 ac-ft/yr by 2050.

Evaluated Strategies

Cash SUD has a contract with NTMWD for 1.0 MGD (1,020 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. Another potentially feasible strategy is the Wood County Pipeline which could supply groundwater from Wood County.

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 2016 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.

5.3.12.5 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 1,012 people in 2020 and 3,658 people by the year 2070. 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 29 ac-ft/yr in 2020 increasing to 316 ac-ft/yr by 2070.

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 of 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 2060, 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. Another potentially feasible strategy is the Wood County Pipeline which could supply groundwater from Wood County.

Recommendations

The recommended strategy for the City of Celeste to meet their projected deficit of 29 ac-ft/yr in 2020 and 316 ac-ft/yr in 2070 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. Three wells with rated capacity of 150 gpm each would provide approximately 81 acre-feet each. 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 2060.

To meet the remaining 2070 needs, it is recommended that the City of Celeste contract with the City of Greenville for treated water supply of up to 87 ac-ft/yr by 2070, 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.

5.3.12.6 Hunt County-Other

Description/Discussion of Needs

The County-Other WUG in Hunt County comprises all or portions of Campbell WSC, Jacobia WSC, City of Lone Oak, Maloy WSC, and Aqua Texas within Hunt County. The WUG population is projected to be 6,342 in 2020 and 58,270 by the year 2070. The WUG is supplied by groundwater from the Nacatoch, Trinity, and Woodbine Aquifers and purchases surface water from Cash SUD, City of Cooper, and City of Greenville. In Hunt County, the County-Other WUG is projected to have a deficit of 20 ac-ft in 2020 increasing to 283 ac-ft by 2070 within the Sulphur River Basin. Within the Sabine River Basin a deficit of 65 ac-ft is projected by 2040 increasing to 3,426 ac-ft by 2070. In the Trinity River Basin a deficit of 2 ac-ft is projected by 2030 increasing to 125 ac-ft by 2070.

Evaluated Strategies

Multiple alternative strategies were considered to meet the WUG's 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 is not a feasible option because water supply is mainly used for public consumption. Groundwater was identified as a potential source of water for Hunt County-Other, but the Nacatoch aquifer does not have sufficient availability to cover all shortages. Various sources of treated surface water are available to the entities in the County-Other WUG based on proximity and availability. Potential sources for contracted surface water include the City of Greenville, City of Commerce, Combined Consumers SUD, and City of West Tawakoni. Another potentially feasible strategy is the Wood County Pipeline which could supply groundwater from Wood County.

Recommendations

Increasing the existing water supply contracts with the City of Greenville to purchase treated surface water is recommended to provide sufficient supply to meet the demands of the County-Other WUG through 2070. Increasing contracted supply with the City of Greenville is recommended, contingent upon the City of Greenville's recommended WMSs.

5.3.12.7 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 29,871 in 2020 increasing to 77,705 by the year 2070. 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. The City of Greenville sells water to the City of Caddo Mills, Shady Grove WSC and entities within Hunt County-Other, Manufacturing, Mining and Steam Electric WUGs in Hunt County. The City of Greenville is projected to have a deficit of -314 ac-ft in 2020 increasing to -11,816 ac-ft by 2070. When incorporating projected treated water demands of existing and potential customers, the projected deficit increases from -3,279 ac-ft in 2020 to 25,041 ac-ft in 2070.

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 277 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.

Because of the uncertainty in steam-electric power generation water demand, for the purposes of the 2021 Plan, Steam Electric demands have not been included in the strategy for the City of Greenville. Depending on the actual demand, the City may need to construct a pipeline to other water resources earlier than the 2070 planning horizon.

Another potentially feasible strategy is the Wood County Pipeline which could supply groundwater from Wood County.

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 277 gpcd to 156 gpcd. Also by 2030, the existing 13 MGD water treatment plant should be expanded by 15 MGD. This will allow the provision of additional treated supply up to 9,335 ac-ft/yr. By 2070, 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.

5.3.12.8 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 from four wells in the Woodbine Aquifer in Hunt County, having a total rated capacity of 1402 gpm, or 754 ac-ft/yr. The projected water groundwater availability limits this supply to approximately 349 ac-ft/yr 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 4,673 people in 2020 and 26,582 people by the year 2070. In Hunt County, Hickory Creek SUD is projected to have a water supply deficit of 105 ac-ft/yr by 2020 increasing to 2,030 ac-ft/yr by 2070 In Collin and Fannin Counties the projected deficit totals 11 ac-ft in 2020 increasing to 85 ac-ft by 2070.

Evaluated Strategies

Multiple alternative strategies were considered to meet Hickory Creek SUD's water supply shortages. Advanced conservation was not selected since per capita use is less than 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. Although the MAG indicates limited supply (349 ac-ft/yr by 2020), the existing production capacity of the Hickory Creek SUD is 810 ac-ft/yr (502 gpm as noted in the TCEQ PWS database). Full use of the existing system (up to an additional 462 ac-ft/yr) 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 2040-2070 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. Another potentially feasible regional groundwater strategy evaluated herein is the Wood County Pipeline, which could supply groundwater from Wood County.

Recommendations

Communications with Hickory Creek SUD have indicated that this WUG intends to meet projected water needs through the construction of additional well(s) as needed. This WUG is not currently in the regulatory area of a Groundwater Conservation District, and thus has the legal capability to pursue such a strategy.

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 2021 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 2021 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 and conservation, 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 2021 Region D Plan.

5.3.12.9 Hunt County Irrigation

Description/Discussion of Needs

Irrigation in Hunt County has a demand that is projected to remain constant at 355 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 230 ac-ft/yr is projected to occur throughout the planning period.

Evaluated Strategies

Three alternative strategies were considered to meet the 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 230 ac-ft/yr from 2020 to 2070 would be to construct three water wells rated at 75 gpm prior to 2020. 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.

5.3.12.10 Hunt County Livestock

Description/Discussion of Needs

Livestock in Hunt County has a demand that is projected to remain constant at 1,095 ac-ft/yr for the planning period. The Livestock WUG in Hunt County is supplied by groundwater from the Trinity Aquifer and local livestock supply in the Sabine, Sulphur, and Trinity basins. A deficit of 2 ac-ft/yr is projected to occur in 2020 decreasing to 1 ac-ft/yr by 2070 in the Trinity basin. No deficits are projected for within the Sabine and Sulphur basins.

Evaluated Strategies

Three alternative strategies were considered to meet the Hunt County Irrigation WUG's water supply shortages. 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 has been identified as a potential source of water for livestock in Hunt County.

Recommendations

The recommended strategy for the Hunt County Livestock to meet their projected deficit of 2 ac-ft/yr from 2020 to 2070 would be to construct one water well prior to 2020. The recommended supply source is the Trinity Aquifer in Hunt County. The Trinity Aquifer in Hunt County, in the Sabine

River Basin, is projected to have sufficient supply availability to meet the needs of the Livestock in Hunt County for the planning period.

5.3.12.11 Hunt County Mining

Description/Discussion of Needs

Mining in Hunt County has a demand that is projected to decrease from 128 ac-ft/yr in 2020 to 47 ac-ft/yr in 2070. Mining in Hunt County is currently supplied by groundwater from the Nacatoch Aquifer and water purchased from the City of Greenville from Lake Tawakoni.

Evaluated Strategies

Twelve alternative strategies were considered to meet the Hunt County Mining water supply shortages. Advanced conservation and water reuse were not determined to be feasible because operational procedures for the existing mines are not available. Groundwater has been identified as a potential source of water for mining in Hunt County, with focus given to accessible sources with availability within MAG estimates. Surface water via contracting with the City of Sulphur Springs was also considered as a viable alternative to meet projected demands. Another potentially feasible strategy is the Wood County Pipeline.

Recommendations

The recommended strategy for the Hunt County Mining WUG to meet their projected deficit of 73 ac-ft/yr in 2020 is to construct two additional water wells similar to existing wells, with a production capacity of 75 gpm. The recommended supply source is the Trinity Aquifer in Hunt County, Sabine River Basin. The Trinity Aquifer in Hunt County, Sabine River Basin is projected to have sufficient availability to meet mining needs in Hunt County for the planning period.

5.3.12.12 North Hunt SUD

Description/Discussion of Needs

North Hunt SUD provides water service in Hunt, Fannin, and Delta counties. It is projected North Hunt SUD will have a shortage in 2020. The WUG population is projected to be 4,333 in 2020 and 16,222 by the year 2070. The SUD has a contract for water supply with the City of Commerce for 147 ac-ft/yr, a well in Hunt County with a rating of 170 gpm, and a well in Fannin County that is rated at 318 gpm. In Hunt County, the SUD is projected to have a deficit of 72 ac-ft in 2020 increasing to 831 ac-ft by 2070. The remainder of the SUD is projected to have a deficit of 17 ac-ft in 2020 increasing to 57 ac-ft by 2070.

Evaluated Strategies

Six alternative strategies were considered to meet North Hunt 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. 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. Another potentially feasible strategy is the Wood County Pipeline which could supply groundwater from Wood County.

Recommendations

The recommended strategy to 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 acre-feet 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.

5.3.12.13 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 3,212 people by 2020, and the population is expected to increase to 11,937 by the year 2070. 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 4 ac-ft/yr in 2020, up to 564 ac-ft/yr in 2070. There is a small supply that is not utilized by the WSC and could postpone supply deficits until 2030.

Evaluated Strategies

Five 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. Another potentially feasible strategy is the Wood County Pipeline which could supply groundwater from Wood County.

Recommendations

The recommended strategy for Poetry WSC to meet their projected deficit of 4 ac-ft/yr in 2020 and 534 ac-ft/yr in 2070 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. Communication with Region C indicates NTMWD WMS will be sufficient to meet the projected needs identified herein for Poetry WSC over the 2020-2070 planning period.

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 2021 Region D Plan.

5.3.12.14 The City of Wolfe City

Description/Discussion of Needs

The City of Wolfe City is located in northern Hunt County and is situated in the Sulphur River Basin. Wolfe City is bound on the west side by the Hickory Creek SUD, and the City of Commerce is located southeast of the City. The system is projected to serve 1,810 people by 2020, and the population is expected to increase to 6,547 by the year 2070. Wolfe City's current source of supply comes from two city lakes located on Turkey Creek in the South Sulphur River Basin. The City also has a 150 gpm well in the Woodbine formation, Sulphur River Basin, which has been brought back for use. Yield from the local lakes is calculated as 200 ac-ft/yr through 2070. Based on these yields, the quantity of water from the lakes will not be sufficient to meet projected demands. Wolfe City is projected to have a deficit of 54 ac-ft/yr in 2050, up to 308 ac-ft/yr in 2070.

Evaluated Strategies

Multiple strategies were considered to meet water supply needs in Wolfe City. Advanced conservation was not selected since per capita use is less than 140 gpcd. There are no significant current water needs that could be met by water reuse. The system has a number of surface water options, including connection to the City of Commerce, City of Greenville, and the proposed Ralph Hall Reservoir in Region C. Groundwater from the Woodbine Aquifer, Sulphur River Basin, was evaluated as a potentially cost effect approach for this entity. Another potentially feasible strategy is the Wood County Pipeline which could supply groundwater from Wood County.

Recommendations

The recommended strategy for the City of Wolfe City to meet their projected deficit of 54 ac-ft/yr in 2050 up to 308 ac-ft/yr in 2070 is to secure a contract with the City of Greenville by 2050 and construct a tie-in pipeline for treated supply from the City. This strategy is contingent upon the City of Greenville's recommended seller strategies.

This recommendation is made based on limited knowledge of firm yield of the Wolfe City lakes. No in-depth studies were available indicating either the current firm yield of the reservoirs, or whether dredging or similar enhancements to the storage capacity could improve the firm yield. It is recommended that the City pursue such a study. The City currently operates its own surface water treatment to treat water from the existing local lakes. The firm yields were calculated using the approved WAM, Run 3, for the Sulphur River Basin, reflecting full demand from existing water rights and no return flows.

Given the increasing costs to comply with more stringent regulations and decreasing reliability of groundwater as a future supply source due to quality issues in this region, the NETRWPG supports efforts for this WUG evaluating the consideration of purchasing treated surface water from regional water providers in the future. Further study of this system is warranted, and supported by the NETRWPG for the purposes of the 2021 Plan.

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 3,103 in 2020 and 3,508 by the year 2070. 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 204 ac-ft in 2020 and increasing to a deficit of 244 ac-ft by 2070.

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 2020-2070 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 2020-2070 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 10,126 ac-ft/yr for the planning period 2020 through 2070. A deficit of 18,312 ac-ft/yr is projected to occur in 2020, decreasing slightly to 18,302 ac-ft/yr by 2070.

Evaluated Strategies

Multiple alternative strategies were considered to meet the Lamar 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 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. Lastly, purchase of treated water from surplus supply from Lamar County WSD was identified and evaluated as a potential 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.

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 constant demand of 1,469 ac-ft/yr for 2020 through 2070. A deficit of 617 ac-ft/yr is projected to occur throughout the planning period in the Red River Basin. A surplus of 772 ac-ft/yr is projected for the Sulphur Basin throughout the planning period.

Evaluated Strategies

Multiple alternative strategies were considered to meet the Lamar County Livestock WUG's water supply shortages. 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 demands 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 2021 Region D Plan.

5.3.14 Marion County

5.3.14.1 Marion County Mining

Description/Discussion of Needs

The Mining WUG in Marion County is a split entity and has a demand that is projected to be decreasing from 489 ac-ft/yr in 2020 to 393 ac-ft/yr in 2070. Mining in Marion County has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer. The total rated available supply from these sources is 116 ac-ft/yr. Mining in Marion County is projected to have a water supply deficit of 373 ac-ft/yr in 2020 increasing to 645 in 2030 then decreasing to a deficit of 265 ac-ft/yr in 2070 for the Marion Cypress.

Evaluated Strategies

Three alternative strategies were considered to meet the Marion County Mining water supply shortages as summarized in the following table. 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 they are currently on groundwater and the demands are manageable.

Recommendations

The recommended strategy for the Marion County Mining to meet their projected deficit of 373 ac-ft/yr in 2020 and 645 ac-ft/yr in 2030 would be to construct four additional water wells similar to their existing wells just prior to each decade as the deficits occur till 2030. The recommended supply source will be the Queen City Aquifer in Marion County Cypress. Four wells with rated capacity of 100 gpm each would provide approximately 161 acre-feet each or 645 ac-ft/yr. The Queen City Aquifer in Marion County Cypress is projected to have a more than ample supply availability to meet the needs of the Mining in Marion County Cypress 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 Morris County

5.3.15.1 Morris County Livestock

Description/Discussion of Needs

The Livestock WUG in Morris County, Cypress Basin, is a split entity and has a demand that is projected to be a constant 836 ac-ft/yr from 2020 to 2070. Livestock in Morris 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 326 ac-ft/yr in 2020 thru

2070. Livestock in Morris County, Cypress is projected to have a water supply deficit of 510 ac-ft/yr in 2020 thru 2070.

The Livestock WUG in Morris County, Sulphur Basin, is a split entity and has a demand that is projected to be a constant 769 ac-ft/yr from 2020 to 2070. Livestock in Morris County, Sulphur 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 300 ac-ft/yr in 2020 thru 2070. Livestock in Morris County, Sulphur is projected to have a water supply deficit of 469 ac-ft/yr in 2020 thru 2070.

Evaluated Strategies

Five alternative strategies were considered to meet the Morris County, Livestock 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 livestock demands. Local supply was used because it is available. Groundwater wells in the Queen City Aquifer (Cypress Creek and Sulphur River basins) were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the Morris County, Livestock, Cypress to meet their projected deficit of 510 ac-ft/yr in 2020 thru 2070 would be to construct four water wells prior to 2020. The recommended supply source will be the Queen City in Morris County. One well with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr. Four new wells will be needed to provide the 510 ac-ft/yr needed.

The recommended strategy for the Morris County, Livestock, Sulphur to meet their projected deficit of 469 ac-ft/yr in 2020 thru 2070 would be to use existing Sulphur Livestock Supply of 60 ac-ft/yr and construct three water wells prior to 2020. The recommended supply source will be the Queen City in Morris County. One well with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr. Three new wells will be needed to provide the 409 ac-ft/yr needed in addition to the 60 ac-ft/yr in local supply. The Queen City Aquifer in Morris County is projected to have a more than ample supply availability to meet the needs of the Livestock in Morris 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.

5.3.16 Rains County

No projected needs were identified for WUGs located within Rains County for the purposes of the 2021 Region D Plan.

5.3.17 Red River County

5.3.17.1 The City of Clarksville

Description/Discussion of Needs

The City of Clarksville is located in Red River County. The system is projected to serve 3,315 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 237 ac-ft/yr in 2020, 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.
- Construction of a raw water pipeline tying into to Region C's proposed Marvin Nichols 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 2020 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 2021 North East Texas Regional Water Plan.

5.3.17.2 Red River County Irrigation

Description/Discussion of Needs

The Irrigation WUG in Red River County has a demand that is projected to be 3,867 ac-ft/yr in 2020 through 2070. 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 2,154 ac-ft/yr is projected to occur in 2020 through 2070 in the Sulphur Basin. In the Red River Basin, a surplus of 810 ac-ft/yr is projected for the planning period of 2020 through 2070.

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 2020 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 2,057 ac-ft/yr of projected needs for the WUG over the planning period. The Region D analysis indicates that 2,057 ac-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 2021 Region D Plan.

5.3.17.3 Red River County Livestock

Description/Discussion of Needs

The Livestock WUG in Red River County has a demand that is projected to be constant at 1,532 ac-ft/yr for the period 2020 through 2070. Livestock in Red River County is projected to be supplied by groundwater from the Blossom, Nacatoch, and Woodbine Aquifers and surface water supply from local livestock supplies in the Red and Sulphur river basins. A deficit of 184 ac-ft/yr is projected to occur in 2020 through 2070 in the Red River Basin. In the Sulphur Basin, a surplus of 179 ac-ft/yr is projected to occur in 2020 through 2070.

Evaluated Strategies

Multiple alternative strategies were considered to meet the Red River County Livestock WUG's water supply shortages. Advanced water conservation for livestock practices were 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 Red River County.

Treated surface water purchased from Lamar County WSD was considered as a potential 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 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 could require a minor amendment to add livestock as a permitted use.

Recommendations

The recommended strategy for the Red River County Livestock WUG to meet the projected deficit of 184 ac-ft/yr from 2020 – 2070 would be to construct additional water wells similar to existing wells. The recommended supply sources are the portion of the Blossom Aquifer in the Red River Basin, and the portion of the Trinity Aquifer in the Sulphur Basin, both in Red River County. One well in the Blossom Aquifer with rated capacity of 75 gpm would provide approximately 11 ac-ft/yr, while three wells in the Trinity Aquifer with a rated capacity of 75 gpm would provide a combined total of approximately 174 ac-ft/yr. These aquifers are projected to have sufficient supply availability to meet the needs of the Red River County Livestock WUG for the planning period.

5.3.18 Smith County

5.3.18.1 Crystal Systems Texas

Description/Discussion of Needs

The Crystal Systems Texas, Inc. system is located in northwestern Smith County and serves the un-incorporated area surrounding Hideaway Lake. In 2018, the system had 2050 residential connections. The population is projected to increase from 4,343 persons in 2020 to 8,881 persons in 2070. The System is included as a W.U.G. in Smith 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 3,560 GPM, or 1,914 ac-ft/yr. The system is bounded on the north and southeast by the Lindale Rural WSC and on the east by the City of Lindale. The System does have a water conservation plan. The System is projected to have a water supply surplus of 558 ac-ft/yr in 2020 decreasing to a deficit of 816 ac-ft/yr in 2070.

Evaluated Strategies

Four alternative strategies were considered to meet the Crystal System'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. 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. Wells in the Carrizo-Wilcox Aquifer (Sabine and Neches River Basins) were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for Crystal Systems to meet their projected deficit of 78 ac-ft/yr in 2040 and 816 ac-ft/yr in 2070 would be to construct four 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 Smith County. Four wells with rated capacity of 500 gpm each would provide approximately 269 acre-feet each. The Carrizo Wilcox Aquifer in Smith County is projected to have a more than ample supply availability to meet the needs of Crystal Systems for the planning period. During the planning period two wells will be drilled in the Carrizo Wilcox formation of the

Sabine River Basin while two wells will be drilled into the Carrizo Wilcox formation of the Neches River Basin.

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.

5.3.18.2 The City of Lindale

Description/Discussion of Needs

The City of Lindale is located in northern Smith County and serves the incorporated city limits and an area immediately northwest of the City of Lindale. The population is projected to increase from 5,806 persons in 2020 to 13,985 persons in 2070. The City is included as a WUG in Smith County. The system's current water supply consists of four water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 2,320 GPM, or 1,247 ac-ft/yr. The system is bounded on the west, north, and east by the Lindale Rural WSC and on the south by the City of Tyler. The City does have a water conservation plan. The City of Lindale is projected to have a water supply deficit of 70 ac-ft/yr in 2020 increasing to a deficit of 1,833 ac-ft/yr in 2070.

Evaluated Strategies

Four alternative strategies were considered to meet the City of Lindale'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 City 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 City and surface water treatment is not economically feasible for a system of this size. Groundwater wells in the Carrizo-Wilcox Aquifer in the Neches Basin were identified as a potentially feasible strategy for the City.

Recommendations

The recommended strategy for the City of Lindale to meet their projected deficit of 70 ac-ft/yr in 2020 and 1,833 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 Carrizo Wilcox Aquifer in Smith County. Six wells with rated capacity of 600 gpm each would provide approximately 322 acre-feet each. The Carrizo Wilcox Aquifer in Smith County (Neches River Basin) is projected to have a more than ample supply availability to meet the needs of the City of Lindale 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.

5.3.18.3 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 acre-feet 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.

5.3.18.4 Star Mountain WSC

Description/Discussion of Needs

The Star Mountain WSC system is located in northeastern Smith County and serves the unincorporated area of the County northeast of the City of Tyler. The WSC reported 588 connections in 2018. The population is projected to increase from 1,392 persons in 2020 to 2,269 persons in 2070. The WSC is included as a W.U.G. in Smith 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 approximately 397 GPM, or 213 ac-ft/yr. The system is bounded on the north by the Sabine River, on the west by the City of Winona, on the south by the City of Tyler and on the east by the Starrville Friendship WSC. The System does not have a water conservation plan. The System is projected to have a water supply deficiency of 20 ac-ft/yr in 2020 decreasing to a deficit of 148 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 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 Queen City Aquifer (Sabine River Basin) were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the Star Mountain WSC to meet their projected deficit of 20 ac-ft/yr in 2020 and deficit of 148 ac-ft/yr in 2070 would be to construct two 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 (Sabine River Basin). One well with rated capacity of 200 gpm each would provide approximately 108 acre-feet each. The Queen City Aquifer in Smith County (Sabine River Basin) is projected to have a more than ample supply availability to meet the needs of Star Mountain 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.

5.3.18.5 Starrville-Friendship WSC

Description/Discussion of Needs

The Starrville Friendship WSC system is located in northeastern Smith County and western Gregg County. The WSC serves the unincorporated area northeast of the City of Tyler and west of the City of Gladewater. The WSC reported 631 connections in 2018. The population is projected to increase from 2,122 persons in 2020 to 3,454 persons in 2070. The WSC is included as a split WUG in Gregg 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 626 GPM, or 337 ac-ft/yr. The system is bounded on the north by the Sabine River, on the west by the Star Mountain WSC, on the south by the Starrville WSC and on the east by the West Gregg SUD. The System does have a water conservation plan. The system is projected to have a water supply surplus of 89 ac-ft/yr in 2020 decreasing to a deficit of 37 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 gpcpd threshold set by the planning group. Water reuse was not determined to be feasible 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 Gregg County were identified as a potentially feasible strategy for the WSC.

Recommendations

The recommended strategy for the Starrville Friendship WSC to meet their projected deficit of 3 ac-ft/yr in 2060 and deficit of 37 ac-ft/yr in 2070 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. One well with rated capacity of 200 gpm would provide approximately 108 acre-feet. The Carrizo Wilcox Aquifer in Gregg County is projected to have a more than ample supply availability to meet the needs of Starrville Friendship 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.

5.3.18.6 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. In 2018, the system had 284 residential connections. The population is projected to increase from 645 persons in 2020 to 1,273 persons in 2070. 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 surplus of 36 ac-ft/yr in 2020 decreasing to a deficit of 81 ac-ft/yr in 2070.

Evaluated Strategies

Four alternative strategies were 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 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 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 surplus of 36 ac-ft/yr in 2020 and deficit of 81 ac-ft/yr in 2070 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 200 gpm each would provide approximately 108 acre-feet each. 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.

5.3.19 Titus County

5.3.19.1 Northeast Texas Municipal Water District

Description/Discussion of Needs

The Northeast Texas Municipal Water District (NETMWD) obtains water from numerous sources, listed below. This provider 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 46,668 ac-ft to three power plants owned by AEP-SWEPCO and one power plant operated by Luminant. U.S. Steel has 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, but is listed herein for the purpose of recommending seller water management strategies to utilize the District's available supplies to meet projected demands for the District's customer WUGs.

Evaluated Strategies

NETMWD is projected to have a supply surplus over the 2020 – 2070 planning period.

Recommendations

No seller strategies have been identified for NETMWD. However, discussions are presently underway at the NETMWD for the development of a water management strategy proximate to Tankersley Creek for the potential benefit of municipal and environmental uses. At present this potential strategy is being investigated for a relatively small amount of water (<1,000 ac-ft/yr), and is thus considered consistent with this Plan per the discussion in Section 5.3.

5.3.19.2 Titus County Livestock

Description/Discussion of Needs

Livestock in Titus County has a demand that is projected to be 2,947 ac-ft/yr in 2020 through 2070. Livestock in Titus County is currently supplied by groundwater from the Carrizo-Wilcox Aquifer and surface water from the Sulphur run-of-river and local supplies. A deficit of 1,939 ac-ft/yr is projected to occur in 2020 and increase to 2,005 ac-ft/yr by 2070.

Evaluated Strategies

Five alternative strategies were considered to meet the Titus County Livestock WUG's water supply shortages. 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 has been identified as a potential source of water for livestock in Titus County; however, livestock needs potentially exceed the availability of groundwater in the basin based on the modeled available groundwater estimates by 2060. Purchase of surface from NETMWD was additionally considered as a potential alternative to meet projected demands.

Recommendations

The recommended strategies for the Titus County Livestock WUG to meet projected demands starting in 2020 is to construct additional water wells as needed by decade prior to increased needs over the 2020-2070 planning period. The recommended supply source will be the Carrizo-Wilcox Aquifer in Titus County, three wells in the Cypress Basin and seven wells in the Sulphur Basin all rated at 200 gpm. The portion of the Carrizo-Wilcox Aquifer in Titus County within these basins is projected to have adequate supply availability to provide this amount of supply over the planning period.

5.3.19.3 Titus County Manufacturing

Description/Discussion of Needs

Manufacturing in Titus County has a demand that is projected to increase from 4,063 ac-ft/yr in 2020 to 4,155 ac-ft/yr by 2030 remaining constant through 2070. 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 deficit of 1,418 ac-ft/yr is projected to occur in 2030 and increase to 1,694 ac-ft/yr by 2070. The water supply contract with the City of Mount Pleasant for water from Bob Sandlin expires in 2028.

Evaluated Strategies

Multiple alternative strategies were considered to meet the Titus 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 in this planning period beyond those amounts currently reported by manufacturing entities in the county. Groundwater has been identified as 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 2070. The other recommended strategy, and most significant in terms of supply, is for the renewal and increase of the existing contract(s) with the City of Mount Pleasant for raw water supply from Bob Sandlin Reservoir.

5.3.19.4 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 61,931 ac-ft/yr for 2020 through 2070. 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 30,066 ac-ft/yr is projected to occur in 2020 and increase to 33,083 ac-ft/yr by 2070.

Evaluated Strategies

Five alternative strategies were considered to meet the Titus County Steam Electric Power WUG's water supply shortages. Advanced water conservation for steam electric power was considered in this planning effort to reduce overall demands, assuming conservation amounts based on the available literature for Business as Usual (BAU) for power generation derived from a BEG study. 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. It is assumed that reuse from the steam electric power WUG is already utilized. Groundwater has been identified as a potential source of water for steam electric power in Titus County; however, steam electric power needs significantly exceed the availability of groundwater in the basin based on the MAG estimates. While historical water levels have remained relatively stable, and the MAG values may be conservative estimates, there is not enough data available to determine whether the aquifer can sustain a yield that is 14 to16 times greater than the MAG without additional modeling. Surface water from increasing existing contracts was considered as a potential alternative to meet projected demands.

Recommendations

The recommended strategies for the Titus County Steam Electric WUG to meet projected demands starting in 2020 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.

5.3.20 Upshur County

5.3.20.1 The City of Gilmer

Description/Discussion of Needs

The City of Gilmer system is located in central Upshur County and serves the incorporated area of the City. In 2018, the City had 2529 residential connections. The population is projected to increase from 5,695 persons in 2020 to 7,673 persons in 2070. The City is included as a W.U.G. in Upshur County. The system's current water supply consists of seven water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is approximately 2280 GPM, or 1,226 ac-ft/yr. The system is bounded on the west and south by the Pritchett WSC, the east by Bi-County WSC, and the north by Sharon WSC. The System does have a water conservation plan. The System is projected to have a water supply surplus of 103 ac-ft/yr in 2020 decreasing to a deficit of 206 ac-ft/yr in 2070.

Evaluated Strategies

Four alternative strategies were 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 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 with available groundwater. Groundwater wells in the Carrizo-Wilcox Aquifer (Cypress Creek 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 2040 and deficit of 206 ac-ft/yr in 2070 would be to construct one additional water well similar to other wells within their system 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 400 gpm would provide approximately 216 acre-feet/yr. The Carrizo Wilcox Aquifer (Cypress Creek River Basin) in Upshur County is projected to have a more than ample supply availability to meet the needs of Gilmer 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.

5.3.20.2 Upshur County Livestock

Description/Discussion of Needs

The Livestock WUG in Upshur County is a split entity and has a demand that is projected to be a constant 1,222 ac-ft/yr from 2020 to 2070. Livestock in Upshur County, Cypress has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer and Local Supplies. The total rated available supply from these sources is 1,158 ac-ft/yr in 2020 thru 2070. Livestock in Upshur County, Cypress is projected to have a water supply deficit of 64 ac-ft/yr in 2020 thru 2070. Livestock in Upshur County, Sabine is projected to have a water supply deficit of 76 ac-ft/yr in 2020 thru 2070.

Evaluated Strategies

Four alternative strategies were considered to meet the Upshur County, Livestock, Cypress and Sabine 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 utilized where currently available but increase in permit amounts are not available. Groundwater wells in the Queen City Aquifer (Cypress Creek and Sabine River basins) were identified as a potentially feasible strategy for the WUG.

Recommendations

The recommended strategy for the Upshur County, Livestock, Cypress Basin to meet their projected deficit of 64 ac-ft/yr in 2020 thru 2070 would be to construct one water well prior to 2020. The recommended supply source will be the Queen City Aquifer in Upshur County. Two wells with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr. One new well will be needed to provide the 64 ac-ft/yr needed. The Queen City Aquifer in Upshur County is projected to have a more than ample supply availability to meet the needs of the Livestock in Upshur County for the planning period.

The recommended strategy for the Upshur County, Livestock, Sabine Basin to meet their projected deficit of 76 ac-ft/yr in 2020 thru 2070 would be to construct one water well prior to 2020. The recommended supply source will be the Queen City Aquifer in Upshur County. One well with rated capacity of 100 gpm each would provide approximately 161 ac-ft/yr. One new well will be needed to provide the 76 ac-ft/yr needed. The Queen City Aquifer in Upshur County is projected to have a more than ample supply availability to meet the needs of the Livestock in Upshur 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.

5.3.20.3 Upshur County Manufacturing

Description/Discussion of Needs

The Manufacturing WUG in Upshur County has a demand that is projected to be increasing from 69 ac-ft/yr in 2020 to 76 ac-ft/yr in 2070. 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 6 ac-ft/yr. Manufacturing in Upshur County is projected to have a water supply deficit of 63 ac-ft/yr in 2020 increasing to a deficit of 70 ac-ft/yr in 2070.

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 63 ac-ft/yr in 2020 and 70 ac-ft/yr in 2070 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.

5.3.21 Van Zandt County

5.3.21.1 The City of Canton

The City of Canton provides water service in Van Zandt County. The city's population is projected to be 3,981 by 2020 and increasing to 5,352 by 2070. 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 2021 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 1,810 ac-ft per year. The project is estimated to yield 1,810 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. One well with rated capacity of 180 gpm would provide approximately 100 ac-ft/yr. 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.

5.3.21.2 Edom WSC

Description/Discussion of Needs

Edom WSC provides water service in Van Zandt and Henderson Counties. The WUG population is projected to be 1,395 by 2020 and increases to 2,025 by 2070. 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 13 ac-ft/yr in 2020 and increasing to a deficit of 64 ac-ft/yr by 2070; the shortage projected to occur in Van Zandt County is 11 ac-ft/yr in 2020 increasing to 55 ac-ft/yr by 2070. The shortage in Henderson County is 2 ac-ft/yr in 2020, increasing to 9 ac-ft/yr in 2070.

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 13 ac-ft/yr in 2020 up to 64 ac-ft/yr in 2070 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 acre-feet each.

5.3.21.3 Van Zandt County Irrigation

Description/Discussion of Needs

The Irrigation WUG in Van Zandt County has a demand that is projected to remain constant at 500 ac-ft/yr for the planning period. The Irrigation WUG in Van Zandt County is currently supplied by groundwater from the Carrizo-Wilcox Aquifer and run-of-river diversions on the Sabine and Neches Rivers. A deficit of 68 ac-ft/yr is projected to occur in throughout the planning period.

Evaluated Strategies

Six alternative strategies were considered to meet the Van Zandt County Irrigation WUG's water supply shortages. Advanced water conservation for irrigation practices were not determined to be feasible in this planning effort for irrigation. 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 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 2020 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 50 gpm would provide the needed 68 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.

5.3.21.4 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 1,480 by 2020 and increases to 2,012 by 2070. 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 3 ac-ft/yr in 2050 and increasing to a deficit of 17 ac-ft/yr by 2070.

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 3 ac-ft/yr in 2050 and 17 ac-ft/yr in 2070 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 acre-feet each.

5.3.21.5 Van Zandt County Manufacturing

Description/Discussion of Needs

The Manufacturing WUG in Van Zandt County has a demand that is projected to increase from 506 ac-ft/yr in 2020 to 757 ac-ft/yr by 2030, remaining constant through 2070. Manufacturing in Van Zandt County is supplied by groundwater from the Carrizo-Wilcox Aquifer, purchased groundwater from Golden WSC and Grand Saline, and surface water from run-of-river permits on the Sabine River, a permit for diversion from Lake Tawakoni. A deficit of 208 ac-ft/yr is projected to occur in 2030, decreasing to 116 ac-ft/yr by 2070.

Evaluated Strategies

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. Another potentially feasible strategy is the Wood County Pipeline which could supply groundwater from Wood County.

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 approximately 75 ac-ft/yr (i.e. 10 percent of projected demand). Additionally, it is recommended that by 2020 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. Additional groundwater supplies will be needed via increasing existing contracts with Golden WSC by 2050 and Grand Saline by 2070.

5.3.21.6 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 2,957 by 2020 and increases to 5,530 by 2070. 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 34 ac-ft/yr in 2030 increasing to a deficit of 217 ac-ft/yr by 2070; the shortage projected to occur in Van Zandt County is 25 ac-ft/yr in 2030 increasing to 152 ac-ft/yr by 2070. The shortage in Henderson County is 7 ac-ft/yr in 2030, increasing to 48 ac-ft/yr in 2070. Shortages in Smith County range from 2 ac-ft/yr in 2030 up to 17 ac-ft/yr in 2070.

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 34 ac-ft/yr in 2030 and 217 ac-ft/yr in 2070 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 acre-feet each.

5.3.22 Wood County

5.3.22.1 Wood County Livestock

Description/Discussion of Needs

The Livestock WUG in Wood County is a split entity and has a demand that is projected to be a constant 483 ac-ft/yr from 2020 to 2070. Livestock in Wood County, Cypress has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer and Local Supplies. The total rated available supply from these sources is 449 ac-ft/yr in 2020 thru 2070. Livestock in Wood County, Cypress is projected to have a water supply deficit of 34 ac-ft/yr in 2020 thru 2070.

The Livestock WUG in Wood County Sabine is a split entity and has a demand that is projected to be a constant 2,741 ac-ft/yr from 2020 to 2070. Livestock in Wood County Sabine has a current water supply consisting of water wells from the Carrizo-Wilcox Aquifer and Local Supplies. The total rated available supply from these sources is 1,643 ac-ft/yr in 2020 thru 2070. Livestock in Wood County, Sabine is projected to have a water supply deficit of 1,098 ac-ft/yr in 2020 thru 2070.

Evaluated Strategies

Five alternative strategies were considered to meet the Wood County, Livestock, Cypress water supply shortages. Advanced conservation, water reuse, and surface water alternatives were not determined to be feasible because the livestock demands are very rural in nature. Groundwater from the Queen City Aquifer (Sabine River Basin) was identified as a potentially feasible strategy for the WUG.

Recommendations

The Wood County, Livestock, Cypress Basin WUG has a surplus of 72 ac-ft/yr in 2020 thru 2070 of existing local supply. The local supply in Wood County Cypress is projected to have a more than ample supply availability to meet the needs of the Livestock in Wood County Cypress Basin for the planning period.

The recommended strategy for the Wood County, Livestock, Sabine Basin to meet their projected deficit of 1,098 ac-ft/yr in 2020 thru 2070 would be to construct seven water wells prior to 2020. The recommended supply source will be the Queen City Aquifer in Wood County. Seven wells with rated capacity of 100 gpm each would provide approximately 1,129 ac-ft/yr. Seven new wells will be needed to provide the 1,098 ac-ft/yr needed. The Queen City Aquifer in Wood County is projected to have a more than ample supply availability to meet the needs of the Livestock in Wood County Sabine Basin 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.

5.3.22.2 Wood County Manufacturing

Description/Discussion of Needs

The Manufacturing WUG in Wood County has a demand that is projected to be increasing from 2,532 ac-ft/yr in 2020 to 3,085 ac-ft/yr in 2070. 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 1,030 ac-ft/yr in 2020 increasing to a deficit of 1,583 ac-ft/yr in 2070.

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 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 1,030 ac-ft/yr in 2030 and 1,583 ac-ft/yr in 2070 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 acre-feet each or 1,610 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 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 re-evaluation 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.

Table 5.15 WWP/MWP and WUG Seller Strategies

County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (if applicable)	Supply Source			
		2020	2030	2040	2050	2060	2070				Ground-water	Surface Water	County	Basin
BOWIE	Riverbend Water Resources District	-523	-536	-539	-537	-537	-537	Riverbend WMS				Wright Patman Lake /Reservoir	Reservoir	Sulphur
		13,810	73,099	80,081	88,793	97,520	115,820							
BOWIE	Riverbend Water Resources District	0	1,370	1,423	1,496	1,493	1,493	New 2.5 MGD Package WTP And Transmission Line	Riverbend WMS			Wright Patman Lake /Reservoir	Reservoir	Sulphur
CASS	Manufacturing Cass	0	0	0	0	0	0	Voluntary Reallocation (Atlanta)	New 2.5 MGD Package WTP And Transmission Line, Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur
		0	1,075	1,135	1,209	1,206	1,206							
CASS	Manufacturing Cass	0	44	44	44	44	44	Voluntary Reallocation (County-Other, Cass)	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur
CASS	Manufacturing Cass	0	0	0	0	0	0	Voluntary Reallocation (Queen City)	New 2.5 MGD Package WTP And Transmission Line And Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur
		0	251	244	243	243	243							
HUNT	Greenville	-3,239	-4,626	-6,531	-9,183	-12,913	-18,266	Advanced Water Conservation						
		4,051	4,486	5,140	6,124	7,593	9,741							
HUNT	Greenville	0	9,335	9,335	9,335	9,335	9,335	WTP Expansion (15 MGD)	Advanced Conservation			Tawakoni Lake /Reservoir And Greenville Lake /Reservoir	Reservoirs	Sabine
HUNT	Greenville	0	0	0	0	0	9,335	New WTP (15 MGD)	Advanced Conservation			Tawakoni Lake /Reservoir, Chapman /Cooper Lake / Reservoir Non-System Portion, And Greenville Lake /Reservoir	Reservoirs	Sabine, Sulphur
HUNT	Greenville	0	0	0	0	0	455	Voluntary Reallocation (Hunt Manufacturing)				Tawakoni Lake /Reservoir	Reservoir	Sabine

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Table 5.16 Recommended Customer Strategies by WWP/WUG Seller

Entity	Strategy	2020	2030	2040	2050	2060	2070
Golden WSC Total		**0**	**0**	**0**	**62**	**191**	**214**
Manufacturing Van Zandt	Increase Contract	0	0	0	62	191	214
Grand Saline Total		**0**	**0**	**0**	**0**	**0**	**72**
Manufacturing Van Zandt	Increase Contract	0	0	0	0	0	72
Greenville Total		**0**	**1**	**202**	**825**	**2,082**	**4,483**
Caddo Mills	Increase Contract	0	1	36	68	108	254
Celeste	Treated Pipeline And New Contract	0	0	0	0	0	87
County-Other, Hunt	Increase Contract	0	0	166	703	1,817	3,834
Wolfe City	Greenville Tie-In Pipeline	0	0	0	54	157	308
Hooks Total		**201**	**199**	**196**	**194**	**193**	**193**
Burns Redbank WSC	Renew Existing Contract	201	199	196	194	193	193
Lamar County WSD Total		**821**	**821**	**829**	**841**	**851**	**861**
County-Other, Lamar	Increase Contract	204	204	212	224	234	244
Livestock Lamar	Livestock Water Pipeline	617	617	617	617	617	617
Mount Pleasant Total		**0**	**1,003**	**880**	**890**	**1,149**	**1,279**
Manufacturing Titus	Renew And Increase Contract	0	1,003	880	890	1,149	1,279
NETMWD Total		**30,208**	**31,020**	**31,937**	**32,773**	**33,067**	**33,393**
Harleton WSC	Increase Contract	62	74	91	127	173	230
Holly Springs WSC	Increase Contract	80	80	80	80	80	80
Steam-Electric Power Generation Titus	Increase Contract	30,066	30,866	31,766	32,566	32,814	33,083
NTMWD Total		**337**	**953**	**1,526**	**2,258**	**2,853**	**3,678**
Caddo Basin SUD	Increase Contract	5	216	402	715	1,190	1,848
Cash SUD	Increase Contract	332	688	1,025	1,353	1,352	1,343
B H P WSC	Increase Contract	0	71	124	208	331	502
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
Riverbend Water Resources District Total		**12,849**	**74,371**	**81,482**	**90,347**	**99,071**	**117,371**
Atlanta	Renew Existing Contract	0	1,075	1,135	1,209	1,206	1,206

Entity	Strategy	2020	2030	2040	2050	2060	2070
Central Bowie County WSC	Renew Existing Contract	619	639	708	784	869	962
County-Other, Cass	Renew Existing Contract	0	44	44	44	44	44
De Kalb	Renew Existing Contract	295	292	289	291	294	298
Hooks	Renew Existing Contract	281	278	276	271	269	269
Macedonia Eylau MUD 1	Renew Existing Contract	588	598	601	601	601	601
Manufacturing Bowie	Renew Existing Contract	789	59,724	66,305	74,531	82,757	100,609
Manufacturing Cass	Voluntary Reallocation (Atlanta)	0	1,075	1,135	1,209	1,206	1,206
Manufacturing Cass	Voluntary Reallocation (County-Other, Cass)	0	44	44	44	44	44
Maud	Renew Existing Contract	211	226	241	238	237	237
Nash	Renew Existing Contract	392	458	523	589	589	589
New Boston	Renew Existing Contract	1,390	1,399	1,385	1,381	1,379	1,379
Redwater	Renew Existing Contract	440	487	535	588	616	616
Texarkana	Renew Existing Contract	7,145	7,282	7,459	7,706	8,028	8,380
Wake Village	Renew Existing Contract	699	750	802	861	932	931
Sulphur Springs Total		**0**	**0**	**0**	**12**	**47**	**112**
Brinker WSC	Increase Contract	0	0	0	12	47	83
Martin Springs WSC	Increase Contract	0	0	0	0	0	29
Terrell Total		**0**	**64**	**114**	**197**	**326**	**503**
Poetry WSC	Increase Contract	0	64	114	197	326	503

5.5 Unmet Needs

Three needs have been identified as remaining unmet in the North East Texas Region for the purposes of the 2021 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 for each of these unmet needs is provided below.

Table 5.17 Unmet Needs in the 2021 North East Texas Regional Water Plan

WUG	2020	2030	2040	2050	2060	2070
Bowie County Manufacturing	629	0	0	0	0	0
Hickory Creek SUD	96	273	519	866	1,366	2,095
Red River County Irrigation	97	97	97	97	97	97
TOTAL	**822**	**370**	**616**	**963**	**1,463**	**2,192**

5.5.1 Bowie County Manufacturing

Needs remaining in 2020 for Bowie County Manufacturing are projected as the presently planned timing for the Riverbend WRD's infrastructure WMSPs is to occur in approximately 2026, and for planning purposes were thus timed to occur by the 2030 decade. The planned construction and implementation of all of the Riverbend WRD's WMSs has been evaluated by Region D and is anticipated to meet both projected and contractual demands by 2030. This is consistent with the Riverbend WRD's Regional Water Master Plan.

5.5.2 Hickory Creek SUD

Communications with Hickory Creek SUD have indicated that this WUG intends to meet projected water needs through the construction of additional well(s) as needed. This WUG is not currently in the regulatory area of a Groundwater Conservation District, and thus has the legal capability to pursue such a strategy.

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 2021 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 2021 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 and conservation, 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.

Two recommendations are proffered based on the aforementioned process. These recommendations have also been included in the Recommendations portion of Chapter 8 of this 2021 Plan:

1. That the Joint Planning Process representing the coordination between GMA 8 and the NETRWPG incorporate the above information as appropriate to make adjustments to better address the identified limitations in the MAG amounts relating to actual and planned legal pumping activities; and
2. 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.

As noted in Chapter 3, 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.

5.5.3 Red River County Irrigation

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 determined to be 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 2021 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 2021 Region D Plan reflecting the likely acquisition of additional available groundwater supply beyond the MAG limitation.

A more detailed description of these analyses may be found within the Water Management Strategy section within Appendix C5-7.

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 2021 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 2021 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				Total Capital Cost ($)
		2020	2030	2040	2050	2060	2070				Groundwater	Surface Water	County	Basin	
CASS	Manufacturing Cass	0	0	0	0	0	0	Voluntary Reallocation (Queen City)	New 2.5 MGD Package WTP And Transmission Line And Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	--
		0	251	244	243	243	243								
CASS	Queen City	0	251	244	243	243	243	New Contract	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	--
HOPKINS	Brinker WSC	0	0	0	-12	-47	-83	Drill New Wells			Carrizo-Wilcox Aquifer		Hopkins	Sulphur	$ 1,405,000
		0	0	0	12	47	83								
RED RIVER	Clarksville	-237	-231	-222	-221	-219	-219	Dimple Reservoir				Dimple Reservoir	Reservoir	Red	$ 38,489,000
		303	303	303	303	303	303								
RED RIVER	Clarksville	-237	-231	-222	-221	-219	-219	Contract With Riverbend WRD And Treated Water Pipeline To DEKALB	Riverbend WMS	Riverbend Water Resources District		Wright Patman Lake /Reservoir	Reservoir	Sulphur	$ 11,702,000
		237	231	222	221	219	219								
RED RIVER	Clarksville	-237	-231	-222	-221	-219	-219	Pat Mayse Treated Water Pipeline To Deroit And Contract		Lamar County WSD		Pat Mayse Lake /Reservoir	Reservoir	Red	$ 12,255,000
		303	303	303	303	303	303								
RED RIVER	Irrigation Red River	-2,154	-2,154	-2,154	-2,154	-2,154	-2,154	Drill New Wells			Trinity Aquifer		Red River	Sulphur	$ 425,000
		97	97	97	97	97	97								
VAN ZANDT	Canton	0	0	0	0	0	0	Grand Saline Reservoir				Grand Saline Reservoir	Van Zandt	Sabine	$45,373,000
		1,810	1,810	1,810	1,810	1,810	1,810								
WOOD COUNTY PIPELINE (REGIONALIZATION)		0	0	0	0	0	0	Wood County Pipeline			Carrizo-Wilcox Aquifer		Wood	Sabine	$228,312,000
		8,643	10,091	11,547	13,550	16,691	20,830								
HOPKINS	Brinker WSC	0	0	0	-12	-47	-83	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$3,567,000
		0	0	0	12	47	83								
HOPKINS	Cumby	-13	-29	-44	-58	-77	-88	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$4,809,000
		13	29	44	58	77	88								
HOPKINS	Irrigation Hopkins	-4,627	-4,627	-4,627	-4,627	-4,627	-4,627	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$13,522,000
		4,627	4,627	4,627	4,627	4,627	4,627								
HOPKINS	Livestock Hopkins	-1,068	-1,090	-1,140	-1,143	-1,196	-1,219	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sulphur	$8,273,000
		1,068	1,090	1,140	1,143	1,196	1,219								
HOPKINS	Martin Springs WSC	0	0	0	0	0	-29	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$1,574,000
		0	0	0	0	0	29								
HOPKINS	Miller Grove WSC	-8	-16	-23	-29	-40	-52	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$1,587,000
		8	16	23	29	40	52								
HOPKINS	Mining Hopkins	-227	-283	-360	-444	-533	-639	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$5,367,000
		227	283	360	444	533	639								

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County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Strategy	Contingency	Seller (if applicable)	Supply Source				Total Capital Cost ($)
		2020	2030	2040	2050	2060	2070				Groundwater	Surface Water	County	Basin	
HUNT	B H P WSC	0	-72	-125	-209	-333	-505	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$1,038,000
		2	72	125	209	333	505								
HUNT	Caddo Basin SUD	-7	-220	-406	-722	-1,202	-1,866	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	43,860,000
		7	220	406	722	1,202	1,866								
HUNT	Caddo Mills	0	-1	-36	-68	-108	-254	Wood County Pipeline, Increase Contract	Wood County Pipeline, Greenville WMSs		Carrizo-Wilcox Aquifer		Wood	Sabine	--
		0	1	36	68	108	254								
HUNT	Cash SUD	89	-361	-1,009	-1,346	-1,346	-695	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$1,863,000
		330	394	1,009	1,346	1,346	1,346								
HUNT	Celeste	-29	-52	-86	-136	-209	-316	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$5,076,000
		29	52	86	136	209	316								
HUNT	County-Other, Hunt	862	449	-166	-703	-1,817	-3,834	Wood County Pipeline, Increase Contract	Wood County Pipeline, Greenville WMSs		Carrizo-Wilcox Aquifer		Wood	Sabine	--
		0	0	166	703	1,817	3,834								
HUNT	Greenville	-3,239	-4,626	-6,531	-9,183	-12,913	-18,266	Wood County Pipeline Tie-In	Wood County Pipeline, Greenville WMSs		Carrizo-Wilcox Aquifer		Wood	Sabine	--
		96	274	721	1,691	3,448	6,491								
HUNT	Hickory Creek SUD	-96	-273	-519	-866	-1,366	-2,095	Wood County Pipeline Tie-In	Wood County Pipeline, Greenville WMSs		Carrizo-Wilcox Aquifer		Wood	Sabine	$11,862,000
		96	273	519	866	1,366	2,095								
HUNT	Mining Hunt	-73	-64	-35	-19	-7	0	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$560,000
		73	64	35	19	7	0								
HUNT	North Hunt SUD	-89	-165	-266	-405	-603	-888	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$6,777,000
		89	165	266	405	603	888								
HUNT	Poetry WSC	2	-66	-115	-200	-330	-510	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$1,055,000
		0	66	115	200	330	510								
HUNT	Wolfe City	0	0	0	-54	-157	-308	Wood County Pipeline Tie-In	Wood County Pipeline, Greenville WMSS		Carrizo-Wilcox Aquifer		Wood	Sabine	$7,124,000
		0	0	0	54	157	308								
VAN ZANDT	Manufacturing Van Zandt	-242	-493	-493	-493	-504	-504	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	--
		242	418	418	418	429	429								
WOOD	Livestock Wood	-1,132	-1,132	-1,132	-1,132	-1,132	-1,132	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$2,479,000
		1,132	1,132	1,132	1,132	1,132	1,132								
WOOD	Manufacturing Wood	-1,030	-1,583	-1,583	-1,583	-1,583	-1,583	Wood County Pipeline Tie-In	Wood County Pipeline		Carrizo-Wilcox Aquifer		Wood	Sabine	$2,722,000
		1,030	1,583	1,583	1,583	1,583	1,583								

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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 1,701 in 2020 and 1,714 in the year 2070. 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 2020 – 2070 planning period. However, the City's full demands have been considered in evaluation of strategies for the purposes of the 2021 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 below. 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. 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 Wood County Pipeline

Refer to Section 5.6.19 below for a consolidated discussion on a proposed Wood County Pipeline regionalization alternative water management strategy identified for consideration for identified Hopkins County WUGs with projected needs (i.e., Brinker WSC, Cumby, Hopkins County Irrigation, Hopkins County Livestock, Martin Springs WSC, Miller Grove WSC, and Hopkins County Mining). Tie-in pipelines for these entities have been identified as alternative water management strategy projects contingent upon the Wood County Pipeline Strategy.

5.6.8.2 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 2050. The WUG population is projected to be 2,369 by 2020 and increases to 4,198 by 2070. 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 12 ac-ft in 2050, increasing to a deficit of 83 ac-ft by 2070.

Evaluated Strategies

Five alternative strategies 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. 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 regionalization strategy is the Wood County Pipeline where in the City could construct an 8 inch diameter pipeline that ties into a branch of the Wood County Pipeline near Sulphur Springs. 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

Two alternative water management strategies have been identified for Brinker WSC.

The first identified alternative water management strategy for Brinker WSC to meet their projected deficit of 12 ac-ft/yr in 2050 and 83 ac-ft/yr in 2070 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 acre-feet each. The Carrizo-Wilcox Aquifer is projected to have sufficient supply availability to meet the needs of Brinker WSC for the planning period.

A second alternative water management strategy for Brinker WSC identified to potentially meet their projected water needs is the Wood County Pipeline Strategy, of which an Alternative Water Management Strategy Project is for Brinker WSC to construct a tie-in to the proposed Wood County Pipeline. While this strategy is contingent upon the development of the Wood County Pipeline and Well Field, Brinker WSC could construct an 8" pipeline to tie into the proposed raw water pipeline and deliver additional water supplies for treatment and use.

5.6.9 Hunt County

5.6.9.1 Wood County Pipeline

Refer to 5.6.19 below for a consolidated discussion on a proposed Wood County Pipeline regionalization alternative water management strategy identified for consideration for identified Hunt County WUGs with projected needs (i.e., B H P WSC, Caddo Basin SUD, Caddo Mills, Cash SUD, Celeste, Hunt County-Other, Hickory Creek SUD, Hunt County Mining, North Hunt SUD, Poetry WSC, and Wolfe City). Tie-in pipelines for these entities have been identified as alternative water management strategy projects contingent upon the Wood County Pipeline Strategy.

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 3,315 people through the planning period. 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 provides water to its own customers in the Sulphur basin and is projected to have a water supply deficit of 237 ac-ft/yr in 2020, 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

The various feasible strategies considered to meet Clarksville's water supply shortages are listed in the table below. 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.
- Construction of a raw water pipeline tying into to Region C's proposed Marvin Nichols Reservoir.
- Treated Water Piepline 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 of its future water supply needs, and such a study should be considered consistent with the 2021 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 one of the following options*:

- Construct and develop Dimple Reservoir to provide a maximum 10,200 ac-ft/yr. To meet the City's projected deficit in 2020 an identified alternative strategy is for the City of Clarksville to pursue the development of Dimple Reservoir to meet the City's projected deficit in 2020. 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 demand that is projected to decrease from 5,156 ac-ft/yr in 2020 to 4,895 ac-ft/yr in 2070. 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 4,376 ac-ft/yr is projected to occur in 2020 and decrease to 4,125 ac-ft/yr by 2070.

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 97 ac-ft/yr. 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 Wood County Pipeline

Refer to 5.6.19 below for a consolidated discussion on a proposed Wood County Pipeline regionalization alternative water management strategy identified for consideration for identified Hunt County WUGs with projected needs (i.e., Van Zandt County Manufacturing). A tie-in pipeline for this entity has been identified as an alternative water management strategy project contingent upon the Wood County Pipeline Strategy.

5.6.18.2 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 3,963 by 2020 and increasing to 5,329 by 2070. 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.

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. 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 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.

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 2020 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 1,810 ac-ft/yr of supply.

5.6.19 Wood County

5.6.19.1 Wood County Pipeline

Description/Discussion of Needs

An identified potentially feasible water management strategy representing a regionalization approach is the development and construction of a well field in Wood County and transmission pipelines utilizing potentially available supply from the Carrizo-Wilcox Aquifer, Sabine River Basin. Preliminary analyses suggest approximately 35,000 ac-ft/yr of supply could be produced and used as a potential supply. The NETRWPG has identified a number of entities with projected needs over the 2020-2070 planning period that could feasibly utilize this supply, as shown in Table 5.19 below.

As part of this alternative strategy, entities identified in Table 5.19 with contingencies to the City of Greenville are anticipated to tie-in to the City of Greenville to access the additional pass-through supply made available by the strategy.

Table 5.19 Identified Region D WUGs with Projected Needs Feasibly Met by Wood County Pipeline Alternative Water Management Strategy

County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Contingency
		2020	2030	2040	2050	2060	2070	
WOOD COUNTY PIPELINE (REGIONALIZATION		**8,973**	**10,485**	**12,090**	**14,174**	**17,142**	**21,803**	
HOPKINS	Brinker WSC	0	0	0	12	47	83	
HOPKINS	Cumby	13	29	44	58	77	88	
HOPKINS	Irrigation Hopkins	4,627	4,627	4,627	4,627	4,627	4,627	
HOPKINS	Livestock Hopkins	1,068	1,090	1,140	1,143	1,196	1,219	
HOPKINS	Martin Springs WSC	0	0	0	0	0	29	
HOPKINS	Miller Grove WSC	8	16	23	29	40	52	
HOPKINS	Mining Hopkins	227	283	360	444	533	639	
HUNT	B H P WSC	2	72	125	209	333	505	
HUNT	Caddo Basin SUD	7	220	406	722	1,202	1,866	
HUNT	Caddo Mills	0	1	36	68	108	254	Greenville WTP Expansion, NEW WTP, VOL. Realloc (Hunt County-Other), And VOL. Realloc. (Hunt Manufacturing)
HUNT	Cash SUD	330	394	1,009	1,346	1,346	695	
HUNT	Celeste	29	52	86	136	209	316	

County	Entity	Projected Deficit (-) / Recommendation (ac-ft/yr) by Decade						Contingency
		2020	2030	2040	2050	2060	2070	
HUNT	County-Other, Hunt	0	0	166	703	1,817	3,834	Greenville WTP Expansion, New WTP, VOL. Realloc (Hunt County-Other), And VOL. Realloc. (Hunt Manufacturing)
HUNT	Hickory Creek SUD	96	273	519	866	1,366	2,095	Greenville WTP Expansion, New WTP, VOL. Realloc (Hunt County-Other), AND VOL. Realloc. (Hunt Manufacturing)
HUNT	Mining Hunt	73	64	35	19	7	0	
HUNT	North Hunt SUD	89	165	266	405	603	888	
HUNT	Poetry WSC	0	66	115	200	330	510	
HUNT	Wolfe City	0	0	0	54	157	308	Greenville WTP Expansion, New WTP, VOL. Realloc (Hunt County-Other), And VOL. Realloc. (Hunt Manufacturing)
HUNT	Volume Passed Through Greenville	96	274	721	1,691	3,448	6,491	
VAN ZANDT	Manufacturing Van Zandt	242	418	418	418	429	429	
WOOD	Livestock Wood	1,132	1,132	1,132	1,132	1,132	1,132	
WOOD	Manufacturing Wood	1,030	1,583	1,583	1,583	1,583	1,583	
TOTAL PROJECTED NEED		**8,973**	**10,485**	**12,090**	**14,174**	**17,142**	**21,803**	

Identified Alternative Strategy

The Wood County Well Field could provide up to 21,803 ac-ft of water per year from the Carrizo-Wilcox Aquifer by an estimated total of 22 wells with peak production capacity of 1,800 gpm. A single well with a peak capacity of 1,800 gpm could provide up to 990 ac-ft per year of water per well, with four (4) contingency wells for a total of 26 wells. The Carrizo-Wilcox Aquifer in Wood County, in the Sabine River Basin, is projected to have sufficient supply availability to meet the needs of the identified WUGs for the planning period. Water from the well field would be pumped to a 610,000 gallon ground storage tank before being pumped to Greenville in Hunt County via a 60" diameter pipeline to Emory and a 42" diameter line to Greenville. At Emory, a 30" diameter tie-in delivers water to Hopkins County and an 8" tie-in delivers water to Van Zandt County. Individual customer WUGs then have Alternative WMS projects which are contingent upon this strategy to develop tie-in pipelines to the Wood County Well Field's transmission pipeline.

Costs for the WMS have been developed at the planning level utilizing the TWDB's UCM. The project is estimated to yield 21,803 ac-ft/yr of supply to meet the current projected demands for the identified WUGs in Region D. The estimated total capital cost for the well field, collection lines, and major transmission lines to Hunt, Hopkins and Van Zandt Counties is approximately $232.7 million. The estimated annual cost is approximately $31 million, with a unit cost for the additional supply of $1,422 per ac-ft ($4.36/1,000 gal) with debt service, and $671 per ac-ft ($2.06/1,000 gal) without debt service.

Given significant present uncertainty regarding the extent of participation in this regional 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 users of this project, as well as variations in the characteristics of the project's infrastructure, should be considered consistent with this alternative water management strategy for the purposes of the 2021 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 2021 Region D Plan.

Identified Alternative Water Management Strategy Projects

Alternative Water Management Strategy Projects have been identified for the aforementioned potential WUGs with projected needs that have been identified for the purposes of the 2021 Region D Plan. For each of the identified WUGs, the identified Alternative Water Management Strategy Project would be solely voluntary, and contingent upon the development of a regionalized groundwater well field and conveyance pipeline in Wood County.

- **Brinker WSC –** As noted previously, an Alternative Water Management Strategy Project for Brinker WSC is to construct a tie-in to the proposed Wood County Pipeline. While this strategy is contingent upon the development of the Wood County Pipeline and Well Field, Brinker WSC could construct an 8" pipeline to tie into the proposed raw water pipeline and deliver additional water supplies for treatment and use.
- **City of Cumby –** An Alternative Water Management Strategy Project for the City of Cumby is to construct an eleven (11) mile long 8-inch diameter waterline that ties into a branch of the Wood County Pipeline near Sulphur Springs.
- **Hopkins County Irrigation WUG –** An Alternative Water Management Strategy Project for the Hopkins County Irrigation WUG is to construct a 24" diameter tie-in pipeline to the 30" transmission line of the Wood County Pipeline routed toward Sulphur Springs.
- **Hopkins County Livestock WUG –** An Alternative Water Management Strategy Project is to construct a 12" diameter tie-in pipeline to the 30" transmission line of the Wood County Pipeline routed toward the City of Sulphur Springs.
- **Martin Springs WSC –** An Alternative Water Management Strategy Project for Martin Springs WSC is to construct an 8" tie-in pipeline to the the Hopkins County branch of the Wood County Pipeline.

- **Miller Grove WSC –** An Alternative Water Management Strategy Project for Miller Grove WSC is to construct an 8" raw water pipeline to tie into the Hopkins County Branch of the Wood County Pipeline.
- **Hopkins County Mining WUG –** An Alternative Water Management Strategy Project for the Hopkins County Mining WUG is to construct a 12" raw water line to tie into the Hopkins County Branch of the Wood County Pipeline.
- **B H P WSC –** An Alternative Water Management Strategy Project for B H P WSC is to construct, in association with Caddo Basin SUD and Poetry WSC, a 14" raw water line to tie into the Hunt County Branch of the Wood County Pipeline proposed to end near the City of Greenville.
- **Caddo Basin SUD –** An Alternative Water Management Strategy Project for Caddo Basin SUD is to construct, in association with B H P WSC and Poetry WSC, a 14" raw water line to tie into the Hunt County Branch of the Wood County Pipeline proposed to end near the City of Greenville.
- **City of Caddo Mills –** An Alternative Water Management Strategy Project for the City of Caddo Mills is to increase the volume of treated surface water purchased from the City of Greenville via pass-through of the additional supply from this strategy to the City of Greenville.
- **Cash SUD –** An Alternative Water Management Strategy Project for Cash SUD is the construction of a 14" diameter raw water tie-in pipeline to the Hunt County Branch of the Wood County Pipeline.
- **City of Celeste –** An Alternative Water Management Strategy Project for the City of Celeste is to construct an 8" treated water pipeline from the City of Greenville's system to the City of Celeste and contracting for pass-through water supplies from the Wood County Pipeline delivered to the City of Greenville.
- **Hunt, County-Other –** An Alternative Water Management Strategy Project for the County-Other WUG in Hunt County is to increase the volume of treated surface water by contracting for pass-through water supplies purchased from the City of Greenville, contingent upon additional supplies from the Wood County Pipeline delivered to the City of Greenville.
- **City of Greenville –** The Alternative Water Management Strategy identified for the City of Greenville is the Wood County Pipeline Strategy, whereby the City would potentially serve as a delivery junction for existing and potential future customers throughout Hunt County. The identified Alternative Water Management Strategy Project is to tie into the Hunt County Branch of the Wood County Pipeline. The strategy volumes identified herein represent supplies sufficient to meet the needs of Caddo Mills, Hunt County-Other, and Wolfe City. Needs for the City of Greenville itself do not necessitate additional source availability; however, this alternative WMSP would be contingent upon the recommended seller strategies of increased WTP capacity for the City of Greenville.
- **Hickory Creek SUD –** An Alternative Water Management Strategy Project for the Hickory Creek SUD is to construct a 16" treated water pipeline to the City of Greenville's system and contracting for pass-through water supplies from the Wood County Pipeline delivered to the City of Greenville.
- **Hunt County Mining –** An Alternative Water Management Strategy Project for the Hunt County Mining WUG is to construct a 6" raw water pipeline to tie into the Wood County Pipeline. This WMSP assumes the need for a one mile long pipeline to transport water supply from the Wood County Pipeline to the use location.

- **North Hunt SUD –** An Alternative Water Management Strategy Project for the North Hunt SUD is to construct a 12" water line to tie into the Hunt County Branch of the Wood County Pipeline near the City of Greenville.
- **Poetry WSC –** An Alternative Water Management Strategy Project for the Poetry WSC is to construct, in association with B H P WSC and Caddo Basin SUD, a 14" raw water line to tie into the Hunt County Branch of the Wood County Pipeline proposed to end near the City of Greenville.
- **Wolfe City –** An Alternative Water Management Strategy Project for the City of Wolfe City is to construct a tie-in pipeline to the City of Greenville for the purchase of pass-through supplies made available from the Wood County Pipeline.
- **Van Zandt County Manufacturing –** The Alternative Water Management Strategy Project identified for the Manufacturing WUG in Van Zandt County is the acquisition of raw water from the Van Zandt County Branch of the Wood County Pipeline Strategy.
- **Wood County Livestock –** An Alternative Water Management Strategy Project for the Livestock WUG in Wood County is to construct a tie-in pipeline into the Wood County Wellfield and transmission pipeline. This alternative WMSP assumes a 2 mile long 12" diameter pipeline with a reduced unit cost of water given the proximity of the demand to the source.
- **Wood County Manufacturing –** An Alternative Water Management Strategy Project for the Manufacturing WUG in Wood County is to construct a tie-in pipeline into the Wood County Wellfield and transmission pipeline. This alternative WMSP assumes a 2 mile long 14" diameter pipeline with a reduced unit cost of water given the proximity of the demand to the source.

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 2021 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 2017 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 2021 regional water planning process that, from the information made available by Region C to Region D in late 2019, 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 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 78 Water User Groups (WUGs) with shortages which will require strategies in this plan. There have been 29 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 60 recommended strategies. Shortages for 8 entities will be partially resolved with Advanced Water Conservation strategies. There are three (3) instances 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

Contaminant	MCL (mg/L)
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 60 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 29 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	2070 Strategy Volume	% of Permitted Capacity
ATLANTA	Lake Wright Patman	123,000	1,206	1.0%
B H P WSC	NTMWD		502	
BRINKER WSC	Lake Sulphur Springs	11,550	83	0.7%
BURNS REDBANK WSC	Lake Wright Patman	123,000	193	0.2%
CADDO BASIN SUD	Lake Tawakoni	221,310	570	0.3%
CADDO BASIN SUD	Chapman Lake/Reservoir	67,673	1,278	1.9%
CADDO MILLS	Lake Tawakoni	221,310	254	0.1%
CASH SUD	NTMWD		1,343	
CENTRAL BOWIE COUNTY WSC	Lake Wright Patman	123,000	962	0.8%
COUNTY-OTHER CASS	Lake Wright Patman	123,000	44	0.0%
COUNTY-OTHER HUNT	Lake Tawakoni	221,310	3,834	1.7%
COUNTY-OTHER LAMAR	Pat Mayse Lake	59,670	244	0.4%
DE KALB	Lake Wright Patman	123,000	298	0.2%
HARLETON WSC	Lake O' The Pines	149,000	230	0.2%
HOLLY SPRINGS WSC	Lake O' The Pines	149,000	80	0.1%
HOOKS	Lake Wright Patman	123,000	269	0.2%
MACEDONIA-EYLAU MUD #1	Lake Wright Patman	123,000	601	0.5%
MANUFACTURING BOWIE	Lake Wright Patman	123,000	100,609	81.8%
MANUFACTURING TITUS	Lake Bob Sandlin	60,430	1,279	2.1%
MANUFACTURING VAN ZANDT	Groundwater		286	
MARTIN SPRINGS WSC	Chapman Lake/Reservoir	67,673	29	0.0%
MAUD	Lake Wright Patman	123,000	237	0.2%
NASH	Lake Wright Patman	123,000	589	0.5%
NEW BOSTON	Lake Wright Patman	123,000	1,379	1.1%
POETRY WSC	NTMWD		503	
REDWATER	Lake Wright Patman	123,000	616	0.5%

WUG	Reservoir	Reservoir Capacity	2070 Strategy Volume	% of Permitted Capacity
STEAM ELECTRIC TITUS	Lake Bob Sandlin	60,430	4,272	7.1%
STEAM ELECTRIC TITUS	Lake O' The Pines	149,000	28,811	19.3%
TEXARKANA	Lake Wright Patman	123,000	8,380	6.8%
WAKE VILLAGE	Lake Wright Patman	123,000	931	0.8%

There are ten 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, expansion of the City of Greenville's WTP, an eventual new WTP for Greenville, 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 2021 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	2070 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)
CELESTE	Treated Pipeline and New Contract	Lake Tawakoni	87	87	221,310	<0.01%
WOLFE CITY	Greenville Tie-In Pipeline	Lake Tawakoni	308	308	221,310	<0.01%
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 2,480 ac-ft per year. The percentage of supplies recommended for annual withdrawal represent a range of less than 0.002% – 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 City of Celeste Treated Pipeline and New Contract with City of Greenville

A recommended strategy herein for the City of Celeste is for the construction of a treated water pipeline to tie-in to the City of Greenville's water supply by 2070 for an additional 87 ac-ft/yr. This strategy is contingent upon the recommended strategies for Greenville to implement advanced water conservation goals, expansion of the City's existing WTP and construction of a new WTP. The source of supply will be the City of Greenville's existing sources, primarily Lake Tawakoni.

A planning level water quality comparison (see Table 6.7) has been performed to evaluate and characterize the similarities and differences in select water quality parameters between the City of Celeste's existing groundwater supplies from the Woodbine Aquifer and the proposed supply from the City of Greenville. Lake Tawakoni is not listed on the TCEQ 303(d) list though one of the contributing tributaries, South Fork of Sabine River is listed as impaired for bacteria above recreational use threshold. Data from the TCEQ SWQM database were utilized to assess a spectrum of water quality parameters at (or approximate to) the groundwater sources presently utilized by the City and Lake Tawakoni.

The results of this comparative analysis suggest that for planning purposes, the water quality characteristics of the parameters analyzed for Lake Tawakoni, on the average, offer improved water quality characteristics in comparison to the City's groundwater supply. The reservoir's distinctly lower average chlorides concentration suggests the City would have the capability to utilize this surface water supply. That said, concerns may exist regarding differences in treatment methodology.

The recommended pipeline is not expected to have a detrimental effect on the water quality of the reservoirs supply, given the recommended approach is for the pipeline to tie into the City of Greenville's existing system. Modifications to the City's existing treatment facilities may be warranted, and the recommended approach is contingent upon recommended strategies for the City of Greenville. No detrimental water quality effects are expected on the City of Celeste's existing supplies.

Table 6.7 Tawakoni and Chapman Water Quality Comparison to Celeste Supplies

Water Quality Group	Water Quality Parameter	Groundwater under Celeste, TX (TWDB wells 1847501, 1847502, 1847503)				Lake Tawakoni (All SWQM Stations in TCEQ Segment 0507)			
		Avg	Min	Max	Count	Avg	Min	Max	Count
Alkalinity-related	ALKALINITY, TOTAL (MG/L AS CACO3)	393.26	370	415	15	77			18
	HARDNESS, TOTAL (MG/L AS CACO3)	11.93	2	34	15	69.9			21
	PH (STANDARD UNITS)	8.20	7.6	8.5	15	7.8			415
	CARBONATE (MG/L)	8.82	0	30	15	No Data			
	BICARBONATE (MG/L)	461.96	405.15	494.24	15	No Data			
Ions-related	CALCIUM, DISSOLVED (MG/L AS CA)	2.42	2.2	2.6	3	No Data			
	MAGNESIUM, DISSOLVED (MG/L AS MG)	0.3	0.27	0.32	3	No Data			
	SODIUM, DISSOLVED (MG/L AS NA)	320	305	350	3	No Data			
	POTASSIUM MG/L	9.5	1	18	2	No Data			
	STRONTIUM MG/L	106.37	98.9	120	3	No Data			
	SULFATE (MG/L AS SO4)	165.18	123.2	182	12	8.7			36
	CHLORIDE (MG/L AS CL)	104.92	88	123	12	5.3			36
	SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	1416	1250	1530	12	180			415

Water Quality Group	Water Quality Parameter	Groundwater under Celeste, TX (TWDB wells 1847501, 1847502, 1847503)				Lake Tawakoni (All SWQM Stations in TCEQ Segment 0507)			
		Avg	Min	Max	Count	Avg	Min	Max	Count
Oxygen-Related	OXYGEN, DISSOLVED (MG/L)	No Data				7.7			415
	CARBON, TOTAL ORGANIC, NPOC (TOC), MG/L	No Data				5			36
	CHEMICAL OXYGEN DEMAND, .025N K2CR2O7 (MG/L)	No Data				No Data			
Nutrients-Related	NITRATE NITROGEN, TOTAL (MG/L AS N)	0.01	0.01	0.01	1	0.2			36
	NITROGEN, AMMONIA, TOTAL (MG/L AS N)	0.72	0.71	0.73	2				
	ORTHOPHOSPHATE PHOSPHORUS,DISS,MG/L,FLDFILT<15MIN	No Data				No Data			
	PHOSPHORUS, TOTAL, WET METHOD (MG/L AS P)	0.15	0.15	0.15	1	0.1			36
	CHLOROPHYLL-A (UG/L)	No Data				24.6			12
Solids-related	TOTAL SUSPENDED SOLIDS (MG/L)	No Data				No Data			
	TOTAL DISSOLVED SOLIDS (MG/L)	848.6	783	895	15	No Data			
Bacteria-related	E. COLI (MPN/100ML)*	No Data				No Data			
	FECAL COLIFORM,MEMBR FILTER,M-FC BROTH, #/100ML*	No Data				No Data			

Source: Texas Clean Rivers Program and TWDB Groundwater Water Quality Database.

6.1.1.2 Wolfe City Tie-In Pipeline to the City of Greenville

A recommended strategy herein for the City of Wolfe City is for the construction of a treated water pipeline to tie-in to the City of Greenville's water supply by 2050 for 54 ac-ft/yr by 2050, up to an additional 308 ac-ft/yr by 2070. This strategy is contingent upon the recommended strategies for Greenville to implement advanced water conservation goals, expansion of the City's existing WTP and construction of a new WTP. The source of supply will be the City of Greenville's existing sources, primarily Lake Tawakoni.

A planning level water quality comparison (see Table 6.8) has been performed to evaluate and characterize the similarities and differences in select water quality parameters between the City's existing surface water and groundwater supplies and the proposed supply from the City of Greenville. Wolfe City's current source of supply comes from two city lakes located on Turkey Creek in the South Sulphur River Basin. The City also has a 150 gpm well in the Woodbine formation. Lake Tawakoni is not listed on the TCEQ 303(d) list though one of the contributing tributaries, South Fork of Sabine River is listed as impaired for bacteria above recreational use threshold. Data from the TCEQ SWQM database were utilized to assess a spectrum of water quality parameters at (or approximate to) the groundwater sources presently utilized by the City and Lake Tawakoni.

The results of this comparative analysis suggest that for planning purposes, the water quality characteristics of the parameters analyzed for the reservoirs appear to, on the average, offer improved water quality characteristics in comparison to the SUD's groundwater supply. The reservoir's distinctly lower average chlorides concentration suggests the SUD would have the capability to utilize this surface water supply. That said, concerns may exist regarding differences in treatment methodology.

The recommended pipeline is not expected to have a detrimental effect on the water quality of the reservoirs supply, given the recommended approach is for the pipeline to tie into the City of Greenville's existing system. Modifications to the SUD's existing treatment facilities may be warranted, and the recommended approach is contingent upon recommended strategies for the City of Greenville.

Table 6.8 Tawakoni Water Quality Comparison to Wolfe City's Current Supplies

Water Quality Group	Water Quality Parameter	Groundwater under Wolfe City TX (TWDB wells 1839602)				Lake Tawakoni (All SWQM Stations in TCEQ Segment 0507)			
		Avg	Min	Max	Count	Avg	Min	Max	Count
Alkalinity-related	ALKALINITY, TOTAL (MG/L AS CACO3)	411	408	414	2	77			18
	HARDNESS, TOTAL (MG/L AS CACO3)	8	8	8	2	69.9			21
	PH (STANDARD UNITS)	8	8	8	2	7.8			415
	CARBONATE (MG/L)	11	10	12	2	No Data			
	BICARBONATE (MG/L)	480	478	481	2	No Data			
Ions-related	CALCIUM, DISSOLVED (MG/L AS CA)	2	2	2	2	No Data			
	MAGNESIUM, DISSOLVED (MG/L AS MG)	1	1	1	2	No Data			
	SODIUM, DISSOLVED (MG/L AS NA)	350	347	354	2	No Data			
	POTASSIUM MG/L	No Data				No Data			
	STRONTIUM MG/L	No Data				No Data			
	SULFATE (MG/L AS SO4)	216	214	218	2	8.7			36
	CHLORIDE (MG/L AS CL)	95	90	99	2	5.3			36
	SPECIFIC CONDUCTANCE,FIELD (US/CM @ 25C)	1400	1400	1400	2	180			415
Oxygen-Related	OXYGEN, DISSOLVED (MG/L)	No Data				7.7			415
	CARBON, TOTAL ORGANIC, NPOC (TOC), MG/L	No Data				5			36
	CHEMICAL OXYGEN DEMAND, .025N K2CR2O7 (MG/L)	No Data				No Data			
Nutrients-Related	NITRATE NITROGEN, DISSOLVED, CALCULATED (MG/L AS NO3)	0	0	0	2	0.2			36
	NITROGEN, AMMONIA, TOTAL (MG/L AS N)	No Data				No Data			
	ORTHOPHOSPHATE PHOSPHORUS,DISS,MG/L,FLDFILT<15MIN	No Data				No Data			
	PHOSPHORUS, TOTAL (MG/L AS P)	No Data				0.1			36
	CHLOROPHYLL-A (UG/L)	No Data				24.6			12
Solids-related	TOTAL SUSPENDED SOLIDS (MG/L)	No Data				No Data			
	TOTAL DISSOLVED SOLIDS (MG/L)	911	903	918	2	No Data			
Bacteria-related	E. COLI (MPN/100ML)*	No Data				No Data			
	FECAL COLIFORM,MEMBR FILTER,M-FC BROTH, #/100ML*	No Data				No Data			

6.1.1.3 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 and the surrounding tributaries are not listed in the 2018 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 6.9.

Table 6.9 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

6.1.1.4 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 and the surrounding tributaries are not listed in the 2018 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 6.10.

Table 6.10 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 111 strategies were identified for 78 entities in the NETRWPA. There are 60 strategies involving the drilling of wells for use in the immediate vicinity of the well. There are 29 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, 3 strategies entailing the voluntary reallocation of existing supplies, and 8 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 four (4) strategies recommending the movement of surface water supplies within the North East Texas Region, as denoted in Table 6.11 below.

Table 6.11 Recommended Strategies for WUGs Moving Surface Water Supplies

WUG	County of Use	Reservoir	County of Origin
CELESTE	Hunt	Lake Tawakoni	Hunt/Rains/Van Zandt
WOLFE CITY	Hunt/Fannin	Lake Tawakoni	Hunt/Rains/Van Zandt
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. It is noteworthy that given the extensive population growth between 2020 and 2070, the implementation of several of these strategies may, by 2070, be considered movement between urban to urban 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. At its February 6, 2019 meeting, the NETRWPG formally requested that TWDB perform this analysis. This assessment is included in its entirety in Appendix C6-5. Quoting from the TWDB analysis:

> *"It is estimated that not meeting the identified water needs in Region D would result in an annually combined lost income impact of approximately $5.9 billion in 2020, increasing to $6.1 billion in 2070. In 2020, the region would lose approximately 46,000 jobs, and by 2070 job losses would increase to approximately 60,000 if anticipated needs are not mitigated."*

Results of the TWDB socioeconomic impact analysis are summarized in Table 6.12 below. The full report containing a more detailed discussion of the analyses performed and their results is provided in Appendix C6-5.

Table 6.12 Summary of Socioeconomic Impact Analysis of Region D

Regional Economic Impacts	2020	2030	2040	2050	2060	2070
Income losses ($ millions)*	$5,868	$ 7,000	$ 6,602	$ 6,211	$ 6,068	$ 6,148
Job losses	46,069	57,405	55,266	54,160	56,434	59,710
Financial Transfer Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Tax losses on production and imports ($ millions)*	$ 445	$ 548	$ 500	$ 454	$ 440	$ 450
Water trucking costs ($ millions)*	$ 92	$ 94	$ 97	$ 101	$ 105	$ 114
Utility revenue losses ($ millions)*	$ 44	$ 46	$ 52	$ 69	$ 96	$ 139
Utility tax revenue losses ($ millions)*	$ 1	$ 1	$ 1	$ 1	$ 1	$ 2
Social Impacts	**2020**	**2030**	**2040**	**2050**	**2060**	**2070**
Consumer surplus losses ($ millions)*	$ 141	$ 146	$ 155	$ 173	$ 220	$ 300
Population losses	8,458	10,540	10,147	9,944	10,361	10,963
School enrollment losses	1,618	2,016	1,941	1,902	1,982	2,097

6.3.1 Unmet Municipal Need

There is a single instance of an unmet municipal need within this Plan for the Hickory Creek SUD. Communications with Hickory Creek SUD have indicated that this WUG intends to meet projected water needs through the construction of additional well(s) as needed. This WUG is not currently in the regulatory area of a Groundwater Conservation District, and thus has the legal capability to pursue such a strategy.

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 2021 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 2021 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 and conservation, 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.

Two recommendations are proffered based on the aforementioned process. These recommendations have also been included in the Recommendations portion of Chapter 8 of this 2021 Plan:

1. That the Joint Planning Process representing the coordination between GMA 8 and the NETRWPG incorporate the above information as appropriate to make adjustments to better address the identified limitations in the MAG amounts relating to actual and planned legal pumping activities; and
2. 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.

As noted in Chapter 3, 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.

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 2021 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 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 2020 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 6.13, 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.

[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 2021 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 2021 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 6.13. Table 6.14 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 6.13, 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.

Table 6.13 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	Renew Existing Contract (Hooks)	201	2020	1	$483	N/A	1	N/A	1	1	1	1
BOWIE	CENTRAL BOWIE COUNTY WSC	Renew Existing Contract (Riverbend WRD)	962	2020	1	$482	N/A	1	N/A	1	1	1	1
BOWIE	DE KALB	Renew Existing Contract (Riverbend WRD)	298	2020	1	$242	N/A	1	N/A	1	1	1	1
BOWIE	HOOKS	Renew Existing Contract (Riverbend WRD)	281	2020	1	$242	N/A	1	N/A	1	1	1	1
BOWIE	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sulphur)	4,134	2020	1	$778	17	1	17	2	1	1	2
BOWIE	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Sulphur)	417	2020	1	$1,017	6	1	2	1	1	1	1
BOWIE	LIVESTOCK	Drill New Wells (Nacatoch, Red)	252	2020	1	$1,063	7	1	2	1	1	1	1
BOWIE	MACEDONIA-EYLAU MUD #1	Renew Existing Contract (Riverbend WRD)	601	2020	1	$483	N/A	1	N/A	1	1	1	1
BOWIE	MANUFACTURING BOWIE	Advanced Water Conservation	204	2020	1	$0	N/A	1	N/A	1	1	1	1
BOWIE	MANUFACTURING BOWIE	Renew Existing Contract (Riverbend WRD)	100,609	2020	1	$482	N/A	1	N/A	1	1	1	1
BOWIE	MAUD	Renew Existing Contract (Riverbend WRD)	238	2020	1	$241	N/A	1	N/A	1	1	1	1
BOWIE	NASH	Renew Existing Contract (Riverbend WRD)	589	2020	1	$243	N/A	1	N/A	1	1	1	1
BOWIE	NEW BOSTON	Renew Existing Contract (Riverbend WRD)	1,399	2020	1	$243	N/A	1	N/A	1	1	1	1
BOWIE	REDWATER	Renew Existing Contract (Riverbend WRD)	616	2020	1	$242	N/A	1	N/A	1	1	1	1
BOWIE	TEXARKANA	Renew Existing Contract (Riverbend WRD)	8,380	2020	1	$243	N/A	1	N/A	1	1	1	1
BOWIE	RIVERBEND WRD	Riverbend WMS	115,820	2020	1	$592	46	1	0	1	1	1	1
BOWIE	WAKE VILLAGE	Renew Existing Contract (Riverbend WRD)	932	2020	1	$242	N/A	1	N/A	1	1	1	1
CAMP	LIVESTOCK	Drill New Wells (Queen City, Cypress)	4,025	2020	1	$123	1	1	1	1	1	1	1
CASS	ATLANTA	Renew Existing Contract (Riverbend WRD)	1,206	2030	1	$242	N/A	1	N/A	1	1	1	1
CASS	COUNTY-OTHER	Drill New Wells (Carrizo-Wilcox, Cypress)	323	2020	1	$514	1	1	0	1	1	1	1
CASS	COUNTY-OTHER	Drill New Wells (Carrizo-Wilcox, Sulphur)	216	2020	1	$528	1	1	0	1	1	1	1
CASS	COUNTY-OTHER	Renew Existing Contract (Riverbend WRD)	44	2030	1	$483	N/A	1	N/A	1	1	1	1
CASS	HOLLY SPRINGS WSC	Increase Existing Contract (NETMWD)	80	2020	1	$1,629	N/A	1	N/A	1	1	1	1
CASS	LIVESTOCK	Drill New Wells (Queen City, Cypress)	968	2020	1	$111	1	1	1	1	1	1	1
CASS	LIVESTOCK	Drill New Wells (Queen City, Sulphur)	968	2020	1	$111	1	1	1	1	1	1	1
CASS	MANUFACTURING	Voluntary Reallocation Supply for Atlanta	1,206	2030	1	$0	N/A	1	N/A	1	1	1	1
CASS	MANUFACTURING	Voluntary Reallocation Supply for Cass County-Other	44	2030	1	$0	N/A	1	N/A	1	1	1	1
CASS	RIVERBEND WRD	New 2.5 MGD Package WTP and Transmission Line	1,493	2030	1	$1,812	18	1	1	1	1	1	1
DELTA	LIVESTOCK	Drill New Wells (Nacatoch, Sulphur))	262	2020	1	$1,134	1	1	1	1	1	1	1
FRANKLIN	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Cypress)	805	2020	1	$111	1	1	1	1	1	1	1
FRANKLIN	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Sulphur)	1,129	2020	1	$111	1	1	1	1	1	1	1
GREGG	MINING	Drill New Wells (Carrizo-Wilcox, Sabine)	27	2020	1	$370	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)
HARRISON	HARLETON WSC	Increase Existing Contract (NETMWD)	230	2020	1	$652	N/A	1	N/A	1	1	1	1
HARRISON	IRRIGATION	Drill New Wells (Queen City, Cypress)	484	2020	1	$120	1	1	1	1	1	1	1
HARRISON	IRRIGATION	Drill New Wells (Queen City, Sabine)	161	2020	1	$118	1	1	1	1	1	1	1
HARRISON	LEIGH WSC	Drill New Wells (Queen City, Cypress)	162	2040	1	$981	1	1	0	1	1	1	1
HARRISON	MINING	Drill New Wells (Queen City, Cypress)	332	2020	1	$117	1	1	0	1	1	1	1
HARRISON	MINING	Drill New Wells (Queen City, Sabine)	1,452	2020	1	$126	1	1	0	1	1	1	1
HARRISON	NORTH HARRISON WSC	Drill New Wells (Queen City, Cypress)	54	2060	1	$926	1	1	0	1	1	1	1
HARRISON	PANOLA-BETHANY WSC	Drill New Wells (Queen City, Sabine)	324	2030	1	$602	1	1	0	1	1	1	1
HARRISON	SCOTTSVILLE	Drill New Wells (Queen City, Cypress)	162	2020	1	$716	1	1	0	1	1	1	1
HARRISON	WASKOM	Drill New Wells (Queen City, Cypress)	324	2020	1	$602	1	1	0	1	1	1	1
HOPKINS	BRINKER WSC	Increase Existing Contract (Sulphur Springs)	83	2050	1	$1,145	N/A	1	N/A	1	1	1	1
HOPKINS	CUMBY	Drill New Wells (Nacatoch, Sabine)	88	2020	1	$1,614	2	1	0	1	1	1	1
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sabine)	931	2040	1	$803	5	1	5	1	1	1	1
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sulphur)	4,627	2020	1	$759	15	1	12	2	1	1	1
HOPKINS	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Sulphur)	1,219	2020	1	$979	18	1	6	1	1	1	1
HOPKINS	MARTIN SPRINGS WSC	Increase Existing Contract (Sulphur Springs)	29	2070	1	$1,172	N/A	1	N/A	1	1	1	1
HOPKINS	MILLER GROVE WSC	Drill New Wells (Carrizo-Wilcox, Sulphur)	52	2020	1	$2,173	2	1	0	1	1	1	1
HOPKINS	MINING	Drill New Wells (Carrizo-Wilcox, Sulphur)	639	2020	1	$983	10	1	0	1	1	1	1
HUNT	B H P WSC	Advanced Water Conservation	3	2030	1	$770	N/A	1	N/A	1	1	1	1
HUNT	B H P WSC	Increase Existing Contract (NTMWD)	502	2020	1	$500	N/A	1	N/A	1	1	1	1
HUNT	CADDO BASIN SUD	Advanced Water Conservation	18	2020	1	$770	N/A	1	N/A	1	1	1	1
HUNT	CADDO BASIN SUD	Increase Existing Contract (NTMWD)	1,848	2020	1	$228	N/A	1	N/A	1	1	1	1
HUNT	CADDO MILLS	Increase Existing Contract (Greenville)	254	2030	1	$882	N/A	1	N/A	1	1	1	1
HUNT	CASH SUD	Advanced Water Conservation	18	2020	1	$770	N/A	1	N/A	1	1	1	1
HUNT	CASH SUD	Increase Existing Contract (NTMWD)	1,353	2020	1		N/A	1	N/A	1	1	1	1
HUNT	CELESTE	Drill New Wells (Woodbine, Trinity)	229	2020	1	$1,275	4	1	0	1	1	1	1
HUNT	CELESTE	Treated Water Pipeline and New Contract (Greenville)	87	2070	1	$3,920	34	1	1	1	1	1	1
HUNT	COUNTY-OTHER	Increase Existing Contract (Greenville)	3,834	2060	1	$883	N/A	1	N/A	1	1	1	1
HUNT	GREENVILLE	Voluntary Reallocation (Hunt Manuf)	455	2070	1	$0	N/A	1	N/A	1	1	1	1
HUNT	GREENVILLE	Advanced Water Conservation	9,741	2020	1	$681	N/A	1	N/A	1	1	1	1
HUNT	GREENVILLE	WTP Expansion	9,335	2020	1	$569	8	1	1	1	1	1	1
HUNT	GREENVILLE	New WTP	9,335	2070	1	$529	8	1	1	1	1	1	1
HUNT	IRRIGATION	Drill New Wells (Nacatoch Aquifer, Sabine)	230	2020	1	$983	5	1	5	1	1	1	1
HUNT	LIVESTOCK	Drill New Wells (Trinity Aquifer, Sabine)	2	2020	1	$16,500	1	1	1	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	MINING	Drill New Wells (Trinity Aquifer, Sabine)	73	2020	1	$1,384	2	1	0	1	1	1	1
HUNT	NORTH HUNT SUD	Drill New Wells (Nacatoch Aquifer, Sabine)	888	2020	1	$1,642	28	1	14	2	1	1	2
HUNT	POETRY WSC	Advanced Water Conservation	7	2020	1	$770	N/A	1	N/A	1	1	1	1
HUNT	POETRY WSC	Increase Existing Contract (NTMWD)	503	2030	1		N/A	1	N/A	1	1	1	1
HUNT	WOLFE CITY	Greenville Tie-in Pipeline	308	2050	1	$2,747	44	1	3	1	1	1	1
LAMAR	COUNTY-OTHER	Increase Existing Contract (Lamar County WSD)	244	2020	1	$1,631	N/A	1	N/A	1	1	1	1
LAMAR	IRRIGATION	Pat Mayse Raw Water Pipeline (Paris)	1,468	2020	1	$897	50	1	8	1	1	1	1
LAMAR	LIVESTOCK	Water Pipeline (Lamar County WSD)	617	2020	1	$3,626	50	1	6	1	1	1	1
MARION	MINING	Drill New Wells (Queen City, Cypress)	645	121	1	$121	1	1	1	1	1	1	1
MORRIS	LIVESTOCK	Local Supply	60	2020	1	$0	N/A	1	N/A	1	1	1	1
MORRIS	LIVESTOCK	Drill New Wells (Queen City, Sulphur)	483	2020	1	$97	1	1	1	1	1	1	1
MORRIS	LIVESTOCK	Drill New Wells (Queen City, Cypress)	644	2020	1	$121	1	1	1	1	1	1	1
RAINS	MANUFACTURING	Advanced Water Conservation	1	2020	1	$0	N/A	1	N/A	1	1	1	1
RED RIVER	CLARKSVILLE	Drill New Wells (Blossom, Sulphur)	388	2020	1	$4,312	25	2	1	1	1	3	3
RED RIVER	IRRIGATION	Drill New Wells (Nacatoch, Sulphur)	2,057	2020	1	$790	1	1	1	1	1	1	1
RED RIVER	LIVESTOCK	Drill New Wells (Blossom, Red)	11	2020	1	$3,636	1	1	1	1	1	1	1
RED RIVER	LIVESTOCK	Drill New Wells (Trinity Aquifer, Sulphur)	174	2020	1	$1,207	5	1	1	1	1	1	1
SMITH	CRYSTAL SYSTEMS INC	Drill New Wells (Carrizo-Wilcox, Sabine)	538	2040	1	$429	1	1	0	1	1	1	1
SMITH	CRYSTAL SYSTEMS INC	Drill New Wells (Carrizo-Wilcox, Neches)	538	2040	1	$429	1	1	0	1	1	1	1
SMITH	LINDALE	Drill New Wells (Carrizo-Wilcox, Sabine)	1,932	2020	1	$370	18	1	6	1	1	1	1
SMITH	SMITH COUNTY MUD 1	Drill New Wells (Queen City, Sabine)	648	2040	1	$537	1	1	0	1	1	1	1
SMITH	STAR MOUNTAIN WSC	Drill New Wells (Queen City, Sabine)	216	2020	1	$611	1	1	0	1	1	1	1
SMITH	STARRVILLE-FRIENDSHIP WSC	Drill New Wells (Carrizo-Wilcox, Sabine)	108	2060	1	$574	1	1	0	1	1	1	1
SMITH	WINONA	Drill New Wells (Carrizo-Wilcox, Sabine)	108	2050	1	$611	1	1	0	1	1	1	1
TITUS	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Cypress)	560	2020	1	$886	1	1	0	1	1	1	1
TITUS	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Sulphur)	1,664	2020	1	$819	1	1	0	1	1	1	1
TITUS	MANUFACTURING	Advanced Water Conservation	415	2030	1	$0	N/A	1	N/A	1	1	1	1
TITUS	MANUFACTURING	Increase Existing Contract (Mount Pleasant)	1,279	2030	1	$782	N/A	1	N/A	1	1	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD, Lake O' The Pines)	28,811	2020	1	$100	N/A	1	N/A	1	1	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD; Bob Sandlin)	6,119	2020	1	$100	N/A	1	N/A	1	1	1	1
UPSHUR	GILMER	Drill New Wells (Carrizo-Wilcox, Cypress)	216	2030	1	$319	1	1	0	1	1	1	1
UPSHUR	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Cypress)	161	2020	1	$106	1	1	0	1	1	1	1
UPSHUR	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Sabine)	161	2020	1	$106	1	1	0	1	1	1	1
UPSHUR	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Cypress)	161	2020	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	Drill New Wells (Carrizo-Wilcox, Sabine)	100	2020	1	$1,420	1	1	0	1	1	1	1
VAN ZANDT	CANTON	Indirect Reuse	323	2020	1	$3,291	81	2	46	3	1	1	2
VAN ZANDT	EDOM WSC	Drill New Wells (Carrizo-Wilcox, Neches)	64	2020	1	$2,125	3	1	1	1	1	1	1
VAN ZANDT	IRRIGATION	Drill New Wells (Queen City, Neches)	227	2020	1	$1,137	6	1	6	1	1	1	1
VAN ZANDT	LITTLE HOPE MOORE WSC	Drill New Wells (Carrizo-Wilcox, Neches)	17	2050	1	$2,588	1	1	0	1	1	1	1
VAN ZANDT	MANUFACTURING	Advanced Water Conservation	75	2030	1	$0	N/A	1	N/A	1	1	1	1
VAN ZANDT	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Trinity)	207	2030	1	$1,106	1	1	0	1	1	1	1
VAN ZANDT	MANUFACTURING	Increase Existing Contract (Grand Saline)	72	2070	1	$2,806	N/A	1	N/A	1	1	1	1
VAN ZANDT	MANUFACTURING	Increase Existing Contract (Golden WSC)	62	2050	1	$1,304	N/A	1	N/A	1	1	1	1
VAN ZANDT	R P M WSC	Drill New Wells (Carrizo-Wilcox, Neches)	217	2030	1	$1,945	12	1	4	1	1	1	1
WOOD	LIVESTOCK	Local Supply	34	2020	1	$0	N/A	1	N/A	1	1	1	1
WOOD	LIVESTOCK	Drill New Wells (Queen City, Sabine)	1,129	2020	1	$111	1	1	1	1	1	1	1
WOOD	MANUFACTURING	Drill New Wells (Queen City, Sabine)	1,610	2020	1	$78	1	1	0	1	1	1	1

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Table 6.14 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 2021 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 6.15.

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 6.14 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 6.15, 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 6.16, 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 2021 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.

Table 6.15 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	Renew Existing Contract (Hooks)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	CENTRAL BOWIE COUNTY WSC	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	DE KALB	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	HOOKS	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sulphur)	17	2	0	1	1	1	14	1	N/A	1	1
BOWIE	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Sulphur)	6	1	0	1	1	1	14	1	N/A	1	1
BOWIE	LIVESTOCK	Drill New Wells (Nacatoch, Red)	7	1	0	1	1	1	14	1	N/A	1	1
BOWIE	MACEDONIA-EYLAU MUD #1	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	MANUFACTURING BOWIE	Advanced Water Conservation	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	MANUFACTURING BOWIE	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	MAUD	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	NASH	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	NEW BOSTON	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	REDWATER	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	TEXARKANA	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
BOWIE	RIVERBEND WRD	Riverbend WMS	46	3	2	1	1	2	14	2	N/A	1	1
BOWIE	WAKE VILLAGE	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
CAMP	LIVESTOCK	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	11	1	N/A	1	1
CASS	ATLANTA	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
CASS	COUNTY-OTHER	Drill New Wells (Carrizo-Wilcox, Cypress)	1	1	0	1	1	1	14	1	N/A	1	1
CASS	COUNTY-OTHER	Drill New Wells (Carrizo-Wilcox, Sulphur)	1	1	0	1	1	1	14	1	N/A	1	1
CASS	COUNTY-OTHER	Renew Existing Contract (Riverbend WRD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
CASS	HOLLY SPRINGS WSC	Increase Existing Contract (NETMWD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
CASS	LIVESTOCK	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	14	1	N/A	1	1
CASS	LIVESTOCK	Drill New Wells (Queen City, Sulphur)	1	1	0	1	1	1	14	1	N/A	1	1
CASS	MANUFACTURING	Voluntary Reallocation Supply for Atlanta	N/A	1	N/A	1	1	1	14	1	N/A	1	1
CASS	MANUFACTURING	Voluntary Reallocation Supply for Cass County-Other	N/A	1	N/A	1	1	1	14	1	N/A	1	1
CASS	RIVERBEND WRD	New 2.5 MGD Package WTP and Transmission Line	18	2	2	1	1	2	14	2	N/A	1	1
DELTA	LIVESTOCK	Drill New Wells (Nacatoch, Sulphur))	1	1	0	1	1	1	9	1	N/A	1	1
FRANKLIN	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Cypress)	1	1	0	1	1	1	13	1	N/A	1	1
FRANKLIN	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Sulphur)	1	1	0	1	1	1	13	1	N/A	1	1
GREGG	MINING	Drill New Wells (Carrizo-Wilcox, Sabine)	1	1	0	1	1	1	18	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)
HARRISON	HARLETON WSC	Increase Existing Contract (NETMWD)	N/A	1	N/A	1	1	1	23	1	N/A	1	1
HARRISON	IRRIGATION	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	23	1	N/A	1	1
HARRISON	IRRIGATION	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	23	1	N/A	1	1
HARRISON	LEIGH WSC	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	23	1	N/A	1	1
HARRISON	MINING	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	23	1	N/A	1	1
HARRISON	MINING	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	23	1	N/A	1	1
HARRISON	NORTH HARRISON WSC	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	23	1	N/A	1	1
HARRISON	PANOLA-BETHANY WSC	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	23	1	N/A	1	1
HARRISON	SCOTTSVILLE	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	23	1	N/A	1	1
HARRISON	WASKOM	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	23	1	N/A	1	1
HOPKINS	BRINKER WSC	Increase Existing Contract (Sulphur Springs)	N/A	1	N/A	1	1	1	11	1	N/A	1	1
HOPKINS	CUMBY	Drill New Wells (Nacatoch, Sabine)	2	1	0	1	1	1	11	1	N/A	1	1
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sabine)	5	1	0	1	1	1	11	1	N/A	1	1
HOPKINS	IRRIGATION	Drill New Wells (Carrizo-Wilcox, Sulphur)	15	2	0	1	1	1	11	1	N/A	1	1
HOPKINS	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Sulphur)	18	2	0	1	1	1	11	1	N/A	1	1
HOPKINS	MARTIN SPRINGS WSC	Increase Existing Contract (Sulphur Springs)	N/A	1	N/A	1	1	1	11	1	N/A	1	1
HOPKINS	MILLER GROVE WSC	Drill New Wells (Carrizo-Wilcox, Sulphur)	2	1	0	1	1	1	11	1	N/A	1	1
HOPKINS	MINING	Drill New Wells (Carrizo-Wilcox, Sulphur)	10	1	0	1	1	1	11	1	N/A	1	1
HUNT	B H P WSC	Advanced Water Conservation	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	B H P WSC	Increase Existing Contract (NTMWD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	CADDO BASIN SUD	Advanced Water Conservation	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	CADDO BASIN SUD	Increase Existing Contract (NTMWD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	CADDO MILLS	Increase Existing Contract (Greenville)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	CASH SUD	Advanced Water Conservation	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	CASH SUD	Increase Existing Contract (NTMWD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	CELESTE	Drill New Wells (Woodbine, Trinity)	4	1	0	1	1	1	14	1	N/A	1	1
HUNT	CELESTE	Treated Water Pipeline and New Contract (Greenville)	34	3	0	1	1	1	14	1	N/A	1	1
HUNT	COUNTY-OTHER	Increase Existing Contract (Greenville)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	GREENVILLE	Voluntary Reallocation (Hunt Manuf)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	GREENVILLE	Advanced Water Conservation	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	GREENVILLE	WTP Expansion	8	1	0	1	1	2	14	2	N/A	1	1
HUNT	GREENVILLE	New WTP	8	1	0	1	1	2	14	2	N/A	1	1
HUNT	IRRIGATION	Drill New Wells (Nacatoch Aquifer, Sabine)	5	1	0	1	1	1	14	1	N/A	1	1
HUNT	LIVESTOCK	Drill New Wells (Trinity Aquifer, Sabine)	1	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)
HUNT	MINING	Drill New Wells (Trinity Aquifer, Sabine)	2	1	0	1	1	1	14	1	N/A	1	1
HUNT	NORTH HUNT SUD	Drill New Wells (Nacatoch Aquifer, Sabine)	28	3	0	1	1	2	14	2	N/A	1	1
HUNT	POETRY WSC	Advanced Water Conservation	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	POETRY WSC	Increase Existing Contract (NTMWD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
HUNT	WOLFE CITY	Greenville Tie-in Pipeline	44	3	0	1	1	1	14	1	N/A	1	1
LAMAR	COUNTY-OTHER	Increase Existing Contract (Lamar County WSD)	N/A	1	N/A	1	1	1	14	1	N/A	1	1
LAMAR	IRRIGATION	Pat Mayse Raw Water Pipeline (Paris)	50	3	0	1	1	2	14	2	N/A	1	1
LAMAR	LIVESTOCK	Water Pipeline (Lamar County WSD)	50	3	0	1	1	2	14	2	N/A	1	1
MARION	MINING	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	15	1	N/A	1	1
MORRIS	LIVESTOCK	Local Supply	N/A	1	N/A	1	1	1	12	1	N/A	1	1
MORRIS	LIVESTOCK	Drill New Wells (Queen City, Sulphur)	1	1	0	1	1	1	12	1	N/A	1	1
MORRIS	LIVESTOCK	Drill New Wells (Queen City, Cypress)	1	1	0	1	1	1	12	1	N/A	1	1
RAINS	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	14	1	N/A	1	1
RED RIVER	CLARKSVILLE	Drill New Wells (Blossom, Sulphur)	25	3	1	1	1	1	14	1	N/A	1	2
RED RIVER	IRRIGATION	Drill New Wells (Nacatoch, Sulphur)	1	1	0	1	1	1	14	1	N/A	1	1
RED RIVER	LIVESTOCK	Drill New Wells (Blossom, Red)	1	1	0	1	1	1	14	1	N/A	1	1
RED RIVER	LIVESTOCK	Drill New Wells (Trinity Aquifer, Sulphur)	5	1	0	1	1	1	14	1	N/A	1	1
SMITH	CRYSTAL SYSTEMS INC	Drill New Wells (Carrizo-Wilcox, Sabine)	1	1	0	1	1	1	16	1	N/A	1	1
SMITH	CRYSTAL SYSTEMS INC	Drill New Wells (Carrizo-Wilcox, Neches)	1	1	0	1	1	1	16	1	N/A	1	1
SMITH	LINDALE	Drill New Wells (Carrizo-Wilcox, Sabine)	18	2	0	1	1	1	16	1	N/A	1	1
SMITH	SMITH COUNTY MUD 1	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	16	1	N/A	1	1
SMITH	STAR MOUNTAIN WSC	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	16	1	N/A	1	1
SMITH	STARRVILLE-FRIENDSHIP WSC	Drill New Wells (Carrizo-Wilcox, Sabine)	1	1	0	1	1	1	16	1	N/A	1	1
SMITH	WINONA	Drill New Wells (Carrizo-Wilcox, Sabine)	1	1	0	1	1	1	16	1	N/A	1	1
TITUS	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Cypress)	1	1	0	1	1	1	12	1	N/A	1	1
TITUS	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Sulphur)	1	1	0	1	1	1	12	1	N/A	1	1
TITUS	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	12	1	N/A	1	1
TITUS	MANUFACTURING	Increase Existing Contract (Mount Pleasant)	N/A	1	N/A	1	1	1	12	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD, Lake O' The Pines)	N/A	1	N/A	1	1	1	12	1	N/A	1	1
TITUS	STEAM ELECTRIC POWER	Increase Existing Contract (NETMWD; Bob Sandlin)	N/A	1	N/A	1	1	1	12	1	N/A	1	1
UPSHUR	GILMER	Drill New Wells (Carrizo-Wilcox, Cypress)	1	1	0	1	1	1	16	1	N/A	1	1
UPSHUR	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Cypress)	1	1	0	1	1	1	16	1	N/A	1	1
UPSHUR	LIVESTOCK	Drill New Wells (Carrizo-Wilcox, Sabine)	1	1	0	1	1	1	16	1	N/A	1	1
UPSHUR	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Cypress)	1	1	0	1	1	1	16	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	CANTON	Drill New Wells (Carrizo-Wilcox, Sabine)	1	1	0	1	1	1	17	1	N/A	1	1
VAN ZANDT	CANTON	Indirect Reuse	81	4	2	1	1	1	17	1	N/A	1	2
VAN ZANDT	EDOM WSC	Drill New Wells (Carrizo-Wilcox, Neches)	3	1	0	1	1	1	17	1	N/A	1	1
VAN ZANDT	IRRIGATION	Drill New Wells (Queen City, Neches)	6	1	0	1	1	1	17	1	N/A	1	1
VAN ZANDT	LITTLE HOPE MOORE WSC	Drill New Wells (Carrizo-Wilcox, Neches)	1	1	0	1	1	1	17	1	N/A	1	1
VAN ZANDT	MANUFACTURING	Advanced Water Conservation	N/A	1	N/A	1	1	1	17	1	N/A	1	1
VAN ZANDT	MANUFACTURING	Drill New Wells (Carrizo-Wilcox, Trinity)	1	1	0	1	1	1	17	1	N/A	1	1
VAN ZANDT	MANUFACTURING	Increase Existing Contract (Grand Saline)	N/A	1	N/A	1	1	1	17	1	N/A	1	1
VAN ZANDT	MANUFACTURING	Increase Existing Contract (Golden WSC)	N/A	1	N/A	1	1	1	17	1	N/A	1	1
VAN ZANDT	R P M WSC	Drill New Wells (Carrizo-Wilcox, Neches)	12	2	0	1	1	1	17	1	N/A	1	1
WOOD	LIVESTOCK	Local Supply	N/A	1	N/A	1	1	1	18	1	N/A	1	1
WOOD	LIVESTOCK	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	18	1	N/A	1	1
WOOD	MANUFACTURING	Drill New Wells (Queen City, Sabine)	1	1	0	1	1	1	18	1	N/A	1	1

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Table 6.16 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 2021 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 12 of the NETRWP collectively comply with these regulations.

6.9 Marvin Nichols I Reservoir and Impacts on Water Resources, Agricultural Resources and Natural Resources

Although not a recommended water planning strategy for the NETRWPG for this round of planning, Marvin Nichols I Reservoir was a recommended water management strategy for Region C in 2011 and 2016, and was included in the 2012 and 2017 State Water Plans. A larger Marvin Nichols reservoir has also been included in Region C's drafts as a proposed water management strategy for this round 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 2017 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 2022 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. The NETRWPG supports its positions with both the facts set out in its previous 2011 and 2016 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.

Per the terms of agreement set forth from the October 5, 2015 mediation between Regions C and D and ratified by the NETRWPG at its October 21, 2015 meeting, the NETRWPG does not challenge Marvin Nichols Reservoir as a unique reservoir site for the purposes of this 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 2021 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).

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. The recent SRBA 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 Region C'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 the recent 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 relatively recent 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 2016 Region C Water Plan similarly reported potential impacted acreage of timberland 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 P.3: Strategy Evaluation Matrix" as presented in the 2016 Region C Plan corroborates the negative impacts of Marvin Nichols I upon "Other Natural Resources" in its rating of "medium high." 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 2016 Region C Water Plan, rating the impacts of Marvin Nichols I upon "Agricultural Resources/Rural Areas" as "high" and "Possible Third Party" as high.

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 this 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 may decrease these amounts due to 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 6.17.

Although the full reallocation of Wright Patman Reservoir is presented as having the greatest overall ranking (7 = most impact), it is noteworthy that the lower reallocation of Wright Patman (237.5 ft. msl.) is considered to have a lesser impact than that of Marvin Nichols 1A.

Table 6.17 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.

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 I, the NETRWP incorporates Marvin Nichols I, Marvin Nichols IA, and any major dam sites on the main stem of the Sulphur River.

Per the terms of agreement set forth from the October 5, 2015 mediation between Regions C and D and ratified by the NETRWPG at its October 21, 2015 meeting, the NETRWPG does not challenge Marvin Nichols Reservoir as a unique reservoir site for the purposes of this 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 2021 Region D Plan.

Considering the aforementioned information, 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.

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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 the Regional Water Planning Area (RWPA)

7.1.1 Overview

The severity of the recent 2011 drought has 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, agricultural, hydrological 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://www.dps.texas.gov/dem/CouncilsCommittees/droughtCouncil/droughtPrepPlan.pdf.

Meteorological drought is quantified by how dry it is (for example, a rain 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 so much 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 the demand for an economic product (such as hydroelectric power) exceeds supply due to a weather-related deficit. Typically, demand for a good 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.

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, and "severe drought" conditions have a PDSI between 3.99 and 3.0.

An accumulated area graph of the weekly PDSI categories for East Texas is included as Figure 7.1. The week of September 13, 2011 had the highest percent of the East Texas climate division experiencing exceptional drought (99 percent) for the period of record shown (January 2000 through January 2019). 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 (see Figure 7.2).

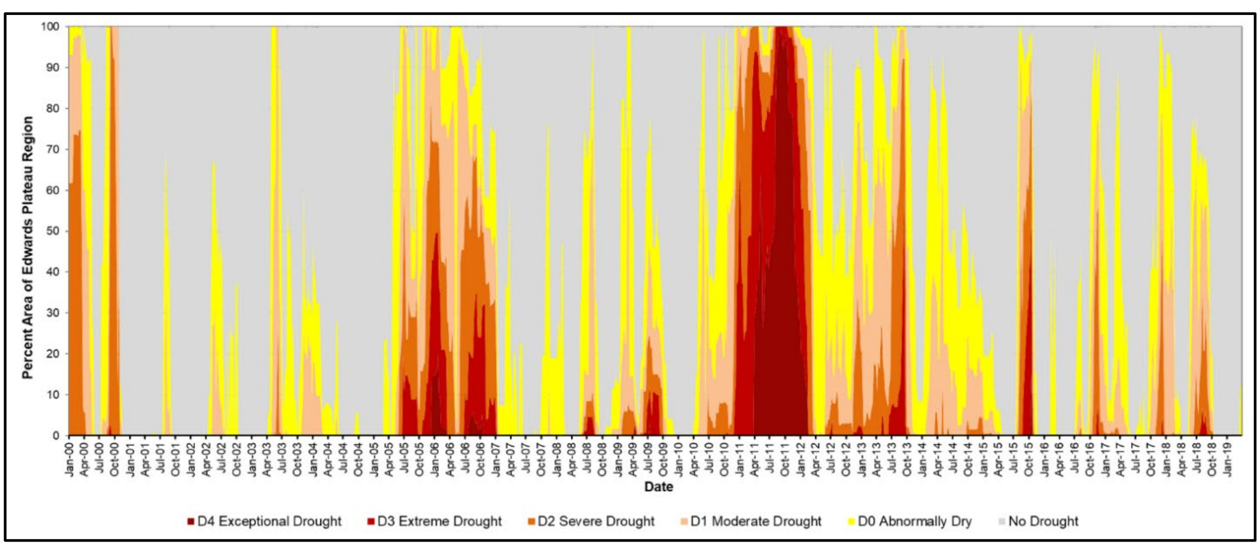

Figure 7.1 Drought in East Texas Climate Division, 2000 – 2019

(Source: U.S. Drought Monitor)

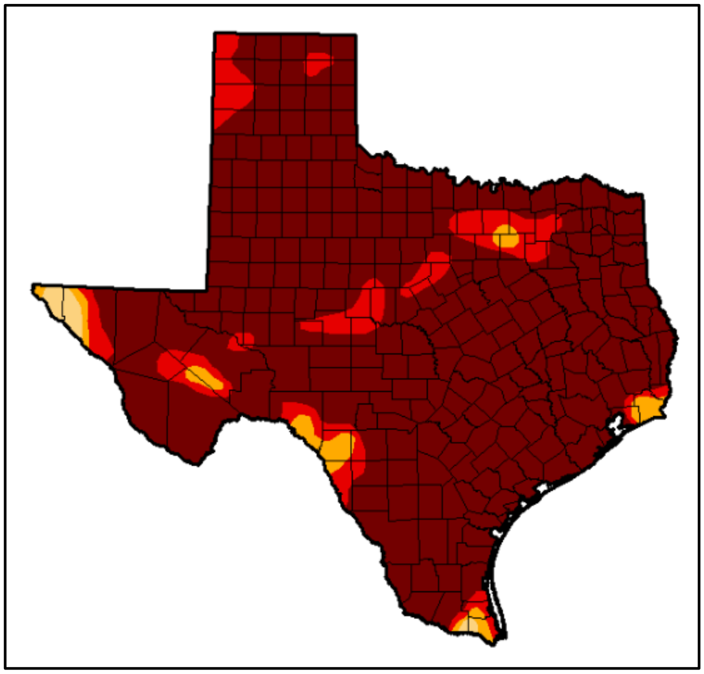

Figure 7.2 Drought in Texas, September 2011

Source: U.S. Drought Monitor

7.1.2 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 2018 are shown in Figure 7.3. These four quadrangles collectively cover the entire RWPA. The average annual rainfall for these quadrangles is 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 low in 2005 is also more extreme than 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 7.4, the PDSI values indicate similar patterns as the average annual precipitation data except the years may vary because the PDSI incorporates different factors.

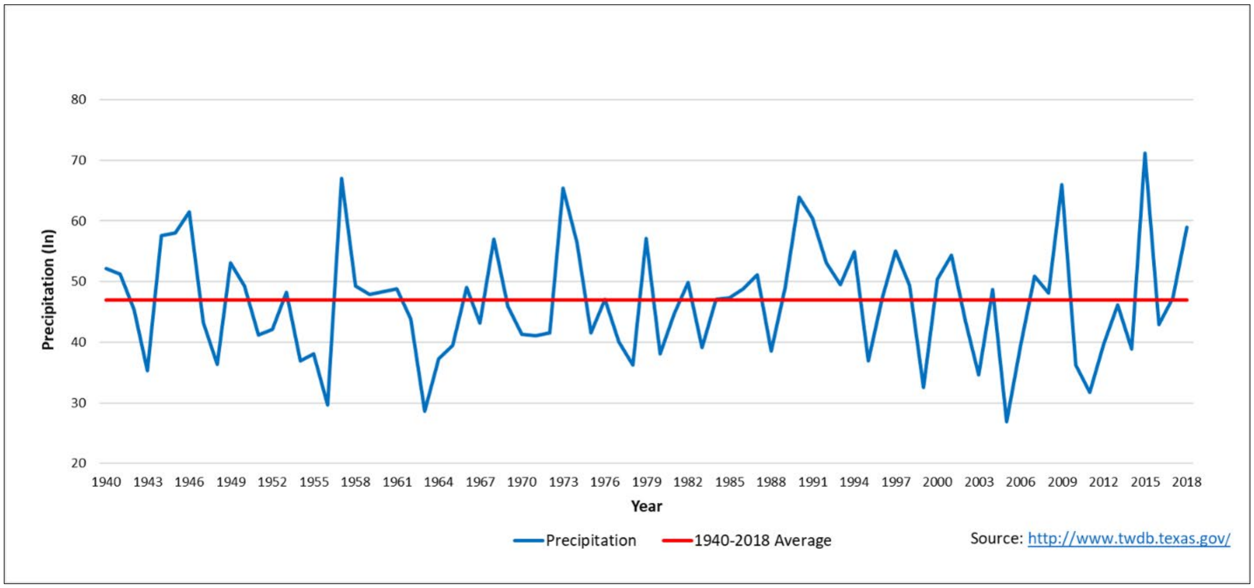

Figure 7.3 Annual Precipitation, 1940 – 2018, TWDB

Source: (https://waterdatafortexas.org/lakeevaporationrainfall)

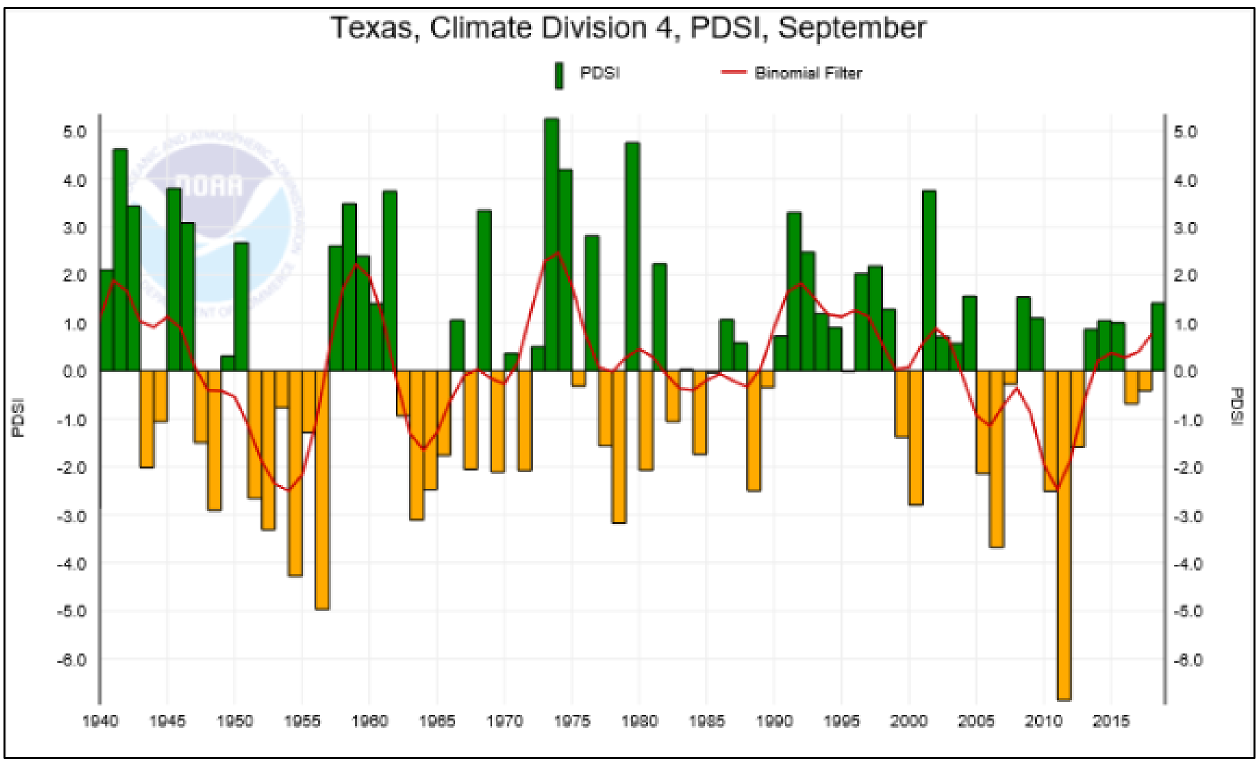

Figure 7.4 PDSI, 1940 – 2018

Source: (https://www.ncdc.noaa.gov/cag/divisional/timeseries)

7.1.3 North East Texas Region Drought of Record

For the purpose of this planning cycle, the drought of the 1950s is declared the DOR. This drought is the key drought period represented and utilized in the official Texas Commission on Environmental Quality (TCEQ) Water Availability Models (WAMs) for the river basins within the RWPA. While subsequent major droughts have occurred in the Region, none have yet displayed the combination of intensity and duration of the 1950's drought. Further, the official WAMs do not yet incorporate more recent hydrology observed since the year 2000, so it is yet unknown whether more recent drought conditions might be a new DOR for watersheds within the Region.

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 Current Drought Preparations and Response

As mandated by 31 TAC 357.42(a)&(b), this section of the RWP summarizes and assesses all preparations and drought contingency plans (DCPs) that have been adopted by municipalities and water providers 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 that have been developed by local entities to decrease water demand during the drought stage.

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, TCEQ requires all wholesale public water providers, retail public water suppliers serving 3,300 connections or more, and irrigation districts to submit DCPs to the 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.

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.

At present, no specific drought response strategies amongst user groups in the Region have been identified as unnecessary or counterproductive by confusing the public or impeding drought response efforts.

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).

7.2.1 Drought Response Triggers

Drought response triggers 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; 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.

7.2.2 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.

7.2.3 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. 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. No entities utilize groundwater triggers in the RWPA.

7.2.4 System Capacity Triggers

Because of the above described problems with using water 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 use both supply triggers as well as demand triggers with one exception. The Red River Authority bases its' drought triggers on average daily use.

7.2.5 Municipal and Wholesale Water Provider Drought Contingency Plans

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. 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. The following entities have prepared DCPs. Several of the entities have plans accessible at the specified websites:

- City of Commerce http://commercetx.org
- City of Cooper https://www.cityofcoopertx.municipalimpact.com/waterutilities
- City of Emory https://www.cityofemory.com/
- City of Greenville http://www.ci.greenville.tx.us
- City of Hughes Springs http://www.hughesspringstxusa.com/water.html
- City of Mount Pleasant https://www.mpcity.net/159/Water
- City of Paris http://www.paristexas.gov
- City of Sulphur Springs http://www.sulphurspringstx.org/departments/utilities.php
- Combined Consumers Water Utility http://www.ccsud.com
- Lamar County Water Supply District https://www.lamarcountywater-supply.com/
- North East Texas Municipal Water District http://www.netmwd.com/
- North Texas Municipal Water District https://ntmwd.com
- Red River Authority http://www.rra.texas.gov
- Texarkana Water Utilities http://twu.txkusa.org/

A list of entities, their supply source, specific triggers and actions (highlighted), for each drought stage is provided in Table 7.1.

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Table 7.1 Municipal Mandated Drought Triggers and Actions

Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
BICOUNTY WSC	• Capacity usage.	• Consumption > 80% daily max supply for 3 consecutive days; or • Supply reduced to 20% > consumption of previous month; or • >8 weeks of low rainfall; and • Daily use > 20% above same period of previous year.	• Consumption > 90% available for 3 consecutive days; or • Levels in any storage tanks cannot refill for 3 consecutive days.	• System failure; • Consumption > 95% available 3 days; • Consumption > 100% available; and storage levels drop during 24hour period; • Contamination; • Disaster declaration; • Wholesale supply reduction due to drought conditions; • Imminent health or safety risks to public.	N/A	N/A
		• Schedule restrictions • Reduce flushing operations • Reduce use via education.	• Prohibit outside use unless variance • Public outreach via local media	• Prohibit outside use • Usage restrictions • Enforcement and educational efforts	N/A	N/A
BIG SANDY	• Capacity usage.	• Shortage reaches 85% of capacity per day; or • Supply < 50% capacity.	• Shortage reaches 90% capacity per day; or • Supply < 40% capacity.	• Shortage reaches 95% capacity per day; or • Supply < 25% capacity.	N/A	• System failure; • Supply contamination.
		• Voluntary reduction 10%.	• Prohibit nonessential use except landscape use; • Reduce demand 15%.	• Prohibit nonessential use except landscape use; • Reduce demand 20%.	N/A	• Assess severity of problem; • Identify actions needed, time required to solve.
CENTRAL BOWIE COUNTY	• Daily supply and demand.	• Voluntarily conservation; • Prescribed restrictions on certain use.	• 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; • 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 • PDSI reaches 2 to 3; or • Requested by SRA.	• Production reaches 3.1 MGD for 5 consecutive days; or • Storage not refilled for 3 consecutive days.	• Emergency pump activation; or • Shortages deemed severe by City Manager.	• Production reaches 3.5 MGD for 7 days; or • Storage not completely refilled for 5 days.	• Contamination; or • System failure; or • 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.
CITY OF COOPER	• Multistage drop in water levels in water supply lakes.	• Reservoir levels < 455 ft.; or • PDSI at "Moderate;" or • Reservoir recharged 2 times in 1 year; and • Demand is 75% capacity for 3 consecutive days.	• Reservoir levels < 454 ft.; or • PDSI at "Severe;" or • Reservoir recharged 1 time in the past 12 months; and • Demand is 85% capacity for 3 consecutive days.	• Reservoir levels < 453 ft.; or • PDSI at "Extreme;" or • Reservoir does not recharge in the past 12 months; and • Demand is 95% capacity for 3 consecutive days.	N/A	N/A
		• Voluntary usage reduction; • Reduce demand by 70%	• Prohibit unnecessary water use except for landscape use; • Reduce demand by 75%.	• Prohibit all unnecessary water use; • Reduce demand by 85%.	N/A	N/A

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<table>
<tr><th rowspan="2">Water Supply Entity</th><th rowspan="2">Drought Trigger</th><th colspan="5">Drought Stage and Response</th></tr>
<tr><th>Mild</th><th>Moderate</th><th>Severe</th><th>Critical</th><th>Emergency</th></tr>
<tr><td rowspan="2">CITY OF DETROIT</td><td rowspan="2">• Daily supply and demand.</td><td>• 85% peak daily use for 7 days; 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
• 100% peak daily use in east line is 3.67 west line is 1.7 MGD; or
• Treated reservoir levels fill < 90% overnight; or
• “Mild" status implemented.</td><td>• 90% peak daily use for 14 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
• 100% peak daily use in east line is 3.67 and west line is 1.7 MGD; Treated reservoir levels fill < 80% overnight; or
• "Moderate" status implemented.</td><td>• 95% peak daily use for 21 days; or
• 95% peak daily use in east line is 3.49 and west line is 1.61 MGD;
• 100% peak daily use for 9 days; or
• 100% peak daily use in east line is 3.67 and west line is 1.7 MGD;
• Treated reservoir levels fill < 70% overnight; or
• "Severe" status implemented.</td><td>• 97% peak daily use for 21 days; or
• 97% peak daily use in east line is 3.56 and west line is 1.65 MGD; or
• 100% peak daily use for 9 days; or
• 100% peak daily use in east line is 3.67 and west line is 1.7 MGD; or
• Treated reservoir levels fill < 50% overnight; or
• "Critical" status implemented.</td><td>• System failure; or
• Supply contamination; or
• "Emergency status" implemented.</td></tr>
<tr><td>• Reduce demand 10%.</td><td>• Reduce demand 10%.</td><td>• Reduce demand 15%.</td><td>• Reduce demand 20%.</td><td>• Reduce demand 25%.</td></tr>
<tr><td rowspan="3">CITY OF EMORY</td><td rowspan="3">• Multistage drop in water levels in water supply lakes.</td><td>• Lake Tawakoni volume<728.3K ac-ft.;
• Demand > 1.45 MGD for 30 days; or
• Demand > 1.7 MGD;
• Demand >60% safe capacity 30 days or 75% safe capacity one day.</td><td>• Lake Tawakoni volume<705.4K ac-ft.;
• Demand >1.7 MGD for 30 days; or
• Demand > 1.93 MGD; or
• Demand >70% safe capacity 30 days or 80% safe capacity 1 day.</td><td>• Lake Tawakoni volume<663.2k ac-ft,
• Demand >1.93 MGD 30 days; or
• Demand >2.17 MGD;
• Demand > 80% safe capacity 30 days, or 85% safe capacity one day; or
• Supply < 180 days.</td><td>• Lake Tawakoni volume < 632.4K acre-ft.; or
• Demand > 2.17 million gallons for 30 days, or
• Demand >2.42 MGD; or
• Demand > 90% safe capacity for 30 days or 100% safe capacity one day; or
• Supply < 120 days.</td><td>• System failure; or
• System contamination; or
• Supply will not last 90 days.</td></tr>
<tr><td>• Usage reduction 10%.</td><td>• Prohibit unnecessary water use except for landscape use; Reduce demand 20%.</td><td>• Prohibit unnecessary water use; Limited landscape use at prescribed times. Reduce demand 40%.</td><td>• Prohibit unnecessary water use; Limit landscape use; Reduce demand 50%; Alternative pumping devices into Lake Tawakoni.</td><td>• Prohibit any and all unnecessary water use;
• Reduce demand 70%.</td></tr>
<tr><td colspan="5">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.</td></tr>
<tr><td rowspan="2">CITY OF FROGNOT</td><td rowspan="2">• Capacity usage range; and
• Replenishment percentage.</td><td>• Voluntarily conservation; Prescribed restrictions on certain uses;
• Treated reservoir levels fill < 100% overnight; or
• Well may be temporarily out of service; or
• Pumping levels continue to decline.</td><td>• Restrictions on certain nonessential uses; if
• Treated reservoir levels fill < 90% overnight; or
Well may be temporarily out of service; or
• Pumping levels continue to decline.</td><td>• Stage 3 restrictions on certain non-essential water uses; if
• Treated reservoir levels fill < 85% overnight; or
• Well may be temporarily out of service; or
• Pumping levels continue to decline.</td><td>• Stage 4 restrictions on certain nonessential uses; if Treated reservoir levels fill < 75% overnight; or
• Well may be temporarily out of service; or
• Pumping levels continue to decline.</td><td>• System damage or failure; or
• Supply contamination; or
• One or more wells are out of service; or
• One or more wells are experiencing significant pumping level declines.</td></tr>
<tr><td>• Reduce demand 10%.</td><td>• Reduce demand 15%.</td><td>• Reduce demand 20%.</td><td>• Reduce demand 30%.</td><td>• Reduce demand 50%.</td></tr>
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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
CITY OF GREENVILLE	• Reservoir levels; and • Lake Tawakoni levels; and • Palmer Drought Severity Index; and • Reservoir recharge frequency; and • Demand.	• Reservoir levels <532.5 ft.; and • Lake Tawakoni <434 ft and • PDSI at Moderate, and • Reservoir recharged 2 times in the past 12 months; and • Demand is 60% capacity.	• Reservoir levels <531.5 ft.; and • Lake Tawakoni <432 ft.; and • PDSI at Severe and • Reservoir recharged 1 time in the past 12 months; and • Demand is 70% capacity.	• Reservoir levels <531.5 ft.; and • Lake Tawakoni <431 ft.; and • PDSI at Extreme and • Reservoir recharged 0 times in the past 12 months; and • Demand is 80% capacity.	• Four of the triggering criteria in "Severe" Stage met; or • Critical water shortage declaration.	• All five of the triggering criteria in "Severe" Stage are met; or • System failure; or • Supply contamination.
		• Voluntary usage reduction and conservation.	• Reduce demand by 10%; • Restricted use.	• Reduce demand by 20% • Restricted use; • Nonessential use prohibited.	• Reduce demand by 30%; • Restricted use; • Nonessential use prohibited.	• Reduce demand by 40%; • Prohibit all watering; 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 • Replenishment percentage.	• Consumption > 90% production capacity; or • 90% consumption for 3 days; and Weather conditions considered in drought classification determination.	• Consumption >100% prod. capacity 3 days; Mild drought will exist > 5 days; or • Storage tank taken out of service during mild drought; or • Storage capacity not maintained during period of 100% prod. Existence of preceding conditions listed for 36 hours.	• Consumption > 110% capacity for 24 hrs or • Consumption prevents storage maintained; or • Demand > available pump capacity; or • Two conditions listed during moderate drought occurs in 24 hours; or • Contamination; or • Severe condition or system damage/failure.	N/A	• System failure; or • Supply contamination.
		• Reduce demand 10%.	• Reduce demand 20%.	• Reduce demand 30%.	N/A	• Assess severity; Identify actions and time required to solve.
CITY OF HUGHES SPRINGS	• Capacity usage.	• Shortage reaches 85% of capacity per day; or • Supply < 50% capacity.	• Shortage reaches 90% capacity per day; or • Supply < 40% capacity.	• Shortage reaches 95% capacity per day; or • Supply < 25% capacity.	N/A	• System failure; Supply contamination.
		• Voluntary usage reduction of 10%.	• Prohibit nonessential use except for landscape use; Reduce demand by 15%.	• Prohibit nonessential use except for landscape use; Reduce demand by 20%.	N/A	• Assess the severity of the problem; Identify the actions needed and time required to solve.
CITY OF KILGORE	• Capacity usage.	• Available supply < 70% storage capacity; or • Stage 1 drought initiation notification; or • Specific capacity is < 70% of original specific capacity; or • Other triggering criteria deemed by city.	• Available supply < 60% storage capacity; or • Stage 2 drought initiation notification; or • Specific capacity is < 60% of original specific capacity; or • Other triggering criteria deemed by city.	• Available supply < 50% storage capacity; or • Stage 3 drought initiation notification; or • Specific capacity is < 50% of original specific capacity; or • Other triggering criteria deemed by city.	• Available supply < 40% storage capacity; or • Stage 4 drought initiation notification; or • Specific capacity is < 40% of original specific capacity; or • Other triggering criteria deemed by city.	• System failure; Supply contamination.
		• Voluntary 5% reduction.	• Voluntary 10% reduction.	• Voluntary 15% reduction.	• Voluntary 20% reduction.	• Voluntary 30% reduction.

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
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 MOUNT PLEASANT	• Based on a percentage of capacity usage rate.	• Daily demand > 85% for 3 consecutive days; or • Levels in Lake Bob Sandlin decline at a rate disruptive to supply.	• Daily demand > 90% for 3 consecutive days; or • Levels in Lake Bob Sandlin decline at a rate causing imminent disruption to supply.	• Daily demand > 90% for 3 consecutive days; or • Pump failure; or • Storage levels no longer achieve full recovery in low demand periods.	• Daily demand > 100% for 1 day; or • Demand > safe limits; • Storage levels cannot maintain fire protection; • Lake Bob Sandlin levels decline to potential pumping failure.	• System failure; or • Supply contamination; or • Storage levels and pressures prevent fire protection.
		• Voluntary usage reduction of 10%; • Nonessential use prohibited.	• Prohibit nonessential use; • Landscape use limited to prescribed times; Reduce demand by 15%.	• Prohibit nonessential use; • Landscape use limited to prescribed times; • Reduce demand by 25%.	• Prohibit nonessential use; • Landscape use limited to prescribed times; • Reduce demand by 30%.	• All use prohibited except for public health and safety; • Reduce demand by 75%; • Implement any available alternative supply sources.
CITY OF PARIS	• Based on a percentage of capacity usage rate.	• Supply < 70% in Pat Mayse Lake and Lake Crook combined; or • Period of high demand; or • Production or distribution limits exist.	• Supply < 60% in Pat Mayse Lake and Lake Crook combined; or • Daily demand > 32 million gallons for 7 days; or • Daily demand > 36 million gallons for 3 days; or • Production or distribution limits exist.	• Supply < 50% in Pat Mayse Lake and Lake Crook combined; or • Daily demand > 34 million gallons for 14 days; or • Daily demand > 36 million gallons for 6 days; or • Production or distribution limits exist.	N/A	• Supply < 40% in Pat Mayse Lake and Lake Crook combined; or • Daily demand > 35 million gallons for 21 days; or • Daily demand > 36 million gallons for 9 days; or • Production or distribution limits exist; or • System failure; or • Supply contamination.
		• Voluntary usage reduction of 10%; • Limited nonessential use.	• Prohibit nonessential use; • Landscape use limited to prescribed times; • Reduce demand by 20%.	• Prohibit nonessential use; • Landscape use limited to prescribed times; • Reduce demand by 30%.	N/A	• Prohibit nonessential use; • Landscape use prohibited; • Reduce demand by 40%; • Prorata curtailment to wholesale customers.
CITY OF SULFUR SPRINGS		• Daily demand > 90%; or • Lake level decline disruptive to supply; or • Supply low enough to cause concern.	• Daily demand > 100%; or • Lake level decline causes serious disruption; or • Storage capacity not maintained.	• Daily demand > 110%; or • Lake levels too low for production equipment; or • Storage capacity prevents fire protection; or • Pumping capacity unable to refill; or • Failure could cause immediate health and safety hazard; or • Supply contamination.	N/A	N/A
CITY OF SULFUR SPRINGS	• Percent capacity usage; Lake capacity; Potential disruption of supply.	• Usage reduction of 10%; • Limited nonessential use.	• Prohibit nonessential use; • Landscape use limited to prescribed times; • Reduce demand by 15%.	• Prohibit nonessential use; • Landscape use limited to prescribed times; • Reduce demand by 20%.	N/A	N/A

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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 capacity; • Replenishment percentage.	• Lake Tawakoni < 432 ft.; or • Demand reaches 80% of daily supply for 3 days; or • System not replenished to 80% capacity in 3 days.	• Lake Tawakoni < 430 ft.; • Demand reaches 90% of daily supply for 2 days; or • System not replenished to 90% capacity in 2 days.	• Lake Tawakoni < 428 ft.; or • Demand 100% of daily supply for 1 day; or • Contamination; or • Disaster declaration; • Health or safety concerns; or • System failure.	• Lake Tawakoni < 426 ft.; then • Emergency booster pump installation.	• All previous triggering criteria; or • System failure; or • Supply contamination; then • Deeper water source required.
		• Voluntary usage reduction of 5%; • Voluntary landscape use reduction; • Conservation request.	• Prohibit nonessential use; • Landscape use limited to prescribed times; Reduce demand 15%.	• Prohibit nonessential use; • Landscape use limited to prescribed times; • Reduce demand 20%.	• Prohibit nonessential use; • Landscape use limited to prescribed times; • Reduce demand 30%.	• Prohibit nonessential use; • Landscape use prohibited; • 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 > 2.8 MGD for 3 days; or • Big Sandy Creek levels decline at disruptive supply rate.	• Demand > 90% safe capacity; or • Demand > 2.97 MGD for 3 days; or • Demand causes storage levels to fall daily and recover during low demand periods; or • Big Sandy Creek levels decline rate makes supply problems imminent.	• Demand > 90% safe system capacity; or • Demand > 2.97 MGD for 7 days; or • Pump failure; or • Storage levels no longer achieve recovery in low demand periods; or • Big Sandy Creek levels lower than highest intake tower.	• Demand > 100% safe capacity; or • Demand > 3.3 MGD for 1 day; or • Demand > safe system limits; or • Storage reservoir levels cannot maintain fire protection; or • Big Sandy Creek decline to levels that may cause system failure.	• System failure; or • Supply contamination; or • System cannot maintain fire protection.
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 • Supply is 20% > previous month's consumption; or • >4 weeks of low rainfall and use > 15% more than same period of previous year.	• Consumption is 80% of supply for 3 consecutive days; or • Levels in any storage tanks cannot be refilled for 3 consecutive days.	• Consumption > 95% of supply for 3 consecutive days; or • Disaster declaration; or • Wholesale supply reduction due to drought conditions.	• Consumption > 100% of supply; and • Storage levels drop during one 24hour period.	• System failure; • Supply contamination.
		• Voluntary usage reduction of 5%.	• 10% demand reduction.	• 15% demand reduction.	• 20% demand reduction.	• 30% demand reduction.
LAMAR COUNTY WATER SUPPLY DISTRICT	• Capacity usage rate; • Replenishment percentage.	• Demand reached 85% of peak daily use for 7 days; or • System reaches 100% of peak daily use for 3 days; or • Reservoir levels < 90%.	• Demand reached 90% of peak daily use for 14 days; or • System reaches 100% of peak daily use for 6 days; or • Reservoir levels < 80%.	• Demand reached 95% of peak daily use for 21 days; or • System reaches 100% of peak daily use for 9 days; or • Reservoir levels < 70%.	• Demand reached 97% of peak daily use for 21 days; or • System reaches 100% of peak daily use for 9 days; or • Reservoir levels < 50%.	• System failure; or • Supply contamination.
		• Voluntary usage reduction of 10%; • Voluntary landscape use reduction; • Nonessential water use prohibited.	• Reduce demand by 10%; • Nonessential water use prohibited; • Landscape use limited to prescribed times.	• Reduce demand by 15%; • Nonessential water use prohibited; • Landscape use limited to prescribed times.	• Reduce demand by 20%; • Nonessential water use prohibited; • Landscape use prohibited.	• Reduce demand by 25%; • Nonessential water use prohibited; • Landscape use prohibited.
		Lamar County Water Supply District employs a water allocation stage when emergency conditions are in place.				

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<table>
<tr><th rowspan="2">Water Supply Entity</th><th rowspan="2">Drought Trigger</th><th colspan="5">Drought Stage and Response</th></tr>
<tr><th>Mild</th><th>Moderate</th><th>Severe</th><th>Critical</th><th>Emergency</th></tr>
<tr><td rowspan="3">LAKE FORK WSC</td><td rowspan="3">• Capacity usage.</td><td>• Consumption is 80% of supply for 3 consecutive days; or
• Supply is 20% > previous month's consumption; or
• > 8 weeks of low rainfall; and Usage > 20% same period of previous year.</td><td>• Consumption > 90% available for 3 consecutive days; or
• Levels in any storage tanks cannot refill for 3 consecutive days.</td><td>• System failure; or
• Consumption > 95% supply for 3 days; or
• Consumption of 100% available; and
• Storage levels drop during 24hour period; Contamination; or
• Disaster declaration; Wholesale supply reduction from drought; or
• Events of public health or safety risks.</td><td>N/A</td><td>N/A</td></tr>
<tr><td>• Schedule restrictions;
• Reduce flushing operations. Reduce use via education.</td><td>• Prohibit outside use unless variance; Public outreach via local media.</td><td>• Prohibit outside use.
• Usage restrictions.
• Enforcement and educational efforts.</td><td>N/A</td><td>N/A</td></tr>
<tr><td colspan="5">Prorata water allocation triggered when severe water shortage conditions have been met.</td></tr>
<tr><td rowspan="3">NORTH EAST TEXAS MUNICIPAL WATER DISTRICT</td><td rowspan="3">• Capacity usage rate;
• Replenishment percentage.</td><td>• 48 hours of 85% pumping capacity utilized in a 24hour period; or
• Supply volume < 50% capacity.</td><td>• 48 hours of 90% pumping capacity utilized in a 24hour period; or
• Supply volume < 40% capacity.</td><td>• 48 hours of 95% pumping capacity utilized in a 24hour period; or
• Supply volume < 25% capacity.</td><td>N/A</td><td>• System failure; or
• Supply contamination.</td></tr>
<tr><td>• Voluntary usage reduction of 10%; or
• Voluntary landscape use reduction.</td><td>• Reduce demand by 15%;
• Nonessential use prohibited.</td><td>• Reduce demand by 20%;
• Nonessential use prohibited;
• Prorate curtailment for wholesale customers.</td><td>N/A</td><td>• Assess the severity of the problem;
• Identify the actions needed and time required to solve.</td></tr>
<tr><td colspan="5">Prorata water allocation triggered when severe water shortage conditions have been met.</td></tr>
<tr><td rowspan="2">NORTH TEXAS MUNICIPAL WATER DISTRICT</td><td rowspan="2">• Multistage drop in water levels in water supply lakes.</td><td colspan="2">• Demand projected as limit; or
• Lavon Lake or Jim Chapman Lake < 65% full; or
• Sabine River Authority (SRA) indicates "Mild Drought" in Upper Basin supplies; or
• Demand > 90% delivered amount for 3 consecutive days; or
• Demand approaches delivery capacity; or
• Supply contamination; or
• System damage.</td><td>• Demand projected as limit; or
• Lavon Lake or Jim Chapman Lake < 55% full; or
• SRA indicates "Mild Drought" in Upper Basin water supplies; or
• Demand > 95% of amount delivered for 3 consecutive days; or
• Demand approaches delivery capacity; or
• Contamination; or
• System damage.</td><td>• Demand projected above limit; or
• Lavon Lake or Jim Chapman Lake < 45% full; or
• SRA indicates "Moderate Drought" in Upper Basin water supplies; or
• Demand > 98% of amount delivered for 3 consecutive days; or
• Demand > delivery capacity; or
• Supply contaminated; or
• System damage.</td><td>• Demand projected as supply limit; or
• Lavon Lake or Jim Chapman Lake < 35% full; or
• SRA indicates "Severe Drought" in Upper Basin water supply; or
• Demand > delivery capacity; or
• Supply contamination; or
• System damage.</td></tr>
<tr><td colspan="2">• Voluntary usage reduction;
• Increase public education of water reduction.</td><td>• Reduce production 5%;
• Further accelerate public education;
• Halt nonessential use;
• Notify TCEQ.</td><td>• Reduce production by 10%;
• Initiate use restrictions;
• Limit landscape water to once weekly;
• Notify TCEQ</td><td>• Reduce production;
• Impose mandatory restrictions on cities and customers;
• Notify TCEQ.</td></tr>
</table>

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
RED RIVER AUTHORITY	• Daily average use; and • Demand percentage.	• System > 2.5 times daily average for 14 days; and • Wholesale demand vol. reduced by 20%; or • Reduce demand 20%.	• System > 3.5 times daily average for 7 days; and • Wholesale demand vol. reduced by 20% to 50%; and • Demand reduced between 20% & 50%.	• System > 5.5 times daily average 3 days; and • Wholesale demand vol. reduced over 50%; and • Reduce demand > 50%.	N/A	N/A
		• Reduce demand by 20%.	• Reduce demand by 20%; • Prohibit landscape and nonessential use.	• Reduce demand to maintain public health and safety; • Prohibit landscape and nonessential use.	N/A	N/A
RIVERBEND	• Capacity usage range; and Replenishment percentage.	• 72 consecutive hours of 85% pumping capacity; or • Supply volume < 50% capacity.	• 72 consecutive hours of 90% pumping capacity; or • Supply volume < 40% capacity.	• 72 consecutive hours of 95% pumping capacity; or • Supply volume < 25% capacity.	N/A	• System failure; or • 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.
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; • Notify customers.	• Reduce contract diversion from temporary and short-term contracts; • Reduce diversion to long-term contracts; • Notify customers.	• Reduce contract diversion from temporary and short-term contracts; • Reduce diversion to long-term contracts; • Notify public; • Possible emergency meetings.	• Reduce contract diversion, temporary and short-term contracts; • Reduce diversion to long-term contracts; • Municipal customers to prohibit all outdoor use and limit indoor use; Notify public; • Possible emergency meetings.	• Ration contract diversion amounts; • All nonessential outdoor use prohibited; • Indoor use minimized; • Notify public; • 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 • Sabine River flow < "mild" condition trigger.	• Surface elevation in Toledo Bend < 162.2 ft. for 14 consecutive days; or • Sabine River flow < "moderate" condition trigger.	• Surface elevation in Toledo Bend < 156 ft. for 14 consecutive days; or • Sabine River flow < "severe" condition trigger.	N/A	N/A
SABINE RIVER AUTHORITY TOLEDO BEND AND GULF COAST DIVISIONS		• Inform customers of drought condition; and • Activate system to answer inquiries.	• Inform customers of drought condition; Possible water curtailing; Potentially prohibit nonessential outdoor use.	• Inform public of drought condition; Possible emergency meeting; May curtail water delivery; Potentially prohibit all outdoor use and reduce indoor use.	N/A	N/A
		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 • Supply is 20% > previous month's consumption; or • > 8 weeks of low rainfall; and Usage > 20% same period of previous year.	• Consumption > 90% available for 3 consecutive days; or • Levels in any storage tanks cannot refill for 3 consecutive days.	• System failure; or • Consumption > 95% available supply for 3 consecutive days; or • Consumption of 100% available; and Storage levels drop during one 24hour 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.	N/A	N/A
		• Schedule restrictions; • Reduce flushing operations. • Reduce use via education.	• Prohibit outside use unless granted variance; • Public outreach via local media.	• Prohibit outside use. • Usage restrictions. • Enforcement and educational efforts.	N/A	N/A
TEXARKANA WATER UTILITIES	• Reservoir conditions; • Demand.	• Wright Patman Reservoir is 220.60 ft.; or • Pump is out of service; or • Demand > 18 MGD.	• Wright Patman Reservoir is 220.60 ft.; and/or; • Supply pump is out of service; and/or; • Demand > 18 MGD.	• Wright Patman Reservoir is 220.60 ft.; and • Supply pumps is out of service; and • Demand > 18 MGD.	N/A	• Unable to produce or provide treated water from both plants simultaneously.
		• Encourage conservation.	• Reduce demand by 30%; • Limit nonessential and landscape use.	• Reduce nonessential demand by 40%; Reduce total demand by 30%; Prohibit outdoor use; Curtail wholesale use.	N/A	• Reduce demand to 8.65 MGD; • Restricted to sanitary use only; • Curtailing wholesale use.
WEST CASS	• Capacity usage.	• Consumption is 80% of supply for 3 consecutive days; or • Supply is 20% > previous month's consumption; or • > 8 weeks of low rainfall; and Usage > 20% same period of previous year.	• Consumption > 90% available for 3 consecutive days; or • Levels in any storage tanks cannot refill for 3 consecutive days.	• System failure; or • Consumption > 95% available supply for 3 consecutive days; or • Consumption of 100% available; and • Storage levels drop during one 24hour 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.	N/A	N/A
		• Schedule restrictions; • Reduce flushing operations. • Reduce use via education.	• Prohibit outside use unless granted variance; • Public outreach via local media.	• Prohibit outside use. Usage restrictions. Enforcement and educational efforts.	N/A	N/A

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Water Supply Entity	Drought Trigger	Drought Stage and Response				
		Mild	Moderate	Severe	Critical	Emergency
WEST GREGG SUD	• Capacity usage.	• Demand > 60% total well capacity for 3 consecutive days; or • Demand causes line pressure below safe levels; or • Other triggering criteria deemed by operator.	• Demand > 70% total well capacity for 3 consecutive days; or • Demand causes line pressure below safe levels; or • Other triggering criteria deemed by operator.	• Demand > 80% total well capacity for 3 consecutive days; or • Demand causes line pressure below safe levels; or • Other triggering criteria deemed by operator.	• Demand > 90% total well capacity for 3 consecutive days; or • Demand causes line pressure below safe levels; or • Other triggering criteria deemed by operator.	• System failure; • Supply contamination.
		• Voluntary usage reduction of 5%.	• 10% demand reduction.	• 15% demand reduction.	• 20% demand reduction.	• 30% demand reduction.

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7.3 Existing and Potential Emergency Interconnects

According to 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.

7.3.1 Existing Emergency Interconnects

Water infrastructure facilities within the North East Texas Region were 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. Of those surveyed, 50 water supply systems have the ability to receive an emergency supply of water through an existing emergency interconnect. Table 7.2 presents the survey results for the existing emergency interconnects among water users and neighboring systems.

Table 7.2 Existing Emergency Interconnects to Major Water Facilities in the North East Texas Region

Entity *Providing* Supply	Entity *Receiving* Supply
Lamer County Water	410 WSC
Texarkana Water Utilities	Atlanta
City of Reyes City and Cash SUB, BHP WSC	BHP WSC
City of Marshall	Blocker Crossroads WSC
City of Farmersville and City of Greenville	Caddo Basin SUD
Karnack WSC	Caddo Lake WSC
NETMWD	City of Avinger
Caddo Basin Special Utility District	City of Caddo Mills
Texarkana Water Utilities	City of Domino
AlbaGolden	City of Grand Saline
Texarkana and Riverbend	City of Hooks
City of Gladewater	City of Warren City
City of Longview	City of White Oak, Gum Springs WSC #2
Lake Fork WSC	City of Yantis
Cash SUD	Combined Consumer SUD, West Tawakoni
City of Kilgore	Cross Roads SUD
City of Marshall	Cypress Valley WSC Plant 1
City of Marshall	Cypress Valley WSC Plant 2
NETMWD	Daingerfield
NETMWD	Diana SUD
Glenwood WSC	East Mountain Water System

Entity *Providing* Supply	Entity *Receiving* Supply
City of Longview	Elderville WSC
City of Longview	Forest Lake Subdivision
City Of Marshall	Gill WSC
East Mountain	Glenwood WSC
City of Longview	Gum Springs WSC
City of Longview	Hallsville
NETMWD	Harleton WSC
Gill WSC	Holiday Springs Mobile Home Park
Hughes Springs	Holly Springs WSC
NETMWD	Hughes Springs
NETMWD	Jefferson
City of Yantis	Lake Fork WSC
City Of Marshall	Leigh WSC
City of Kilgore	Liberty Danville FWSD 2
NETMWD	Lone Star
NETMWD	Mims WSC
BiCounty WSC	Newsome WSC
NETMWD	Pittsburg
Texarkana Water Utilities	Queen City
City of Winnsboro	Sharon WSC
City of Marshall	Talley WSC
BiCounty WSC	Thunderbird Point Water System
City of Mt. Pleasant	Tri SUD
City of Longview	Tryon Road SUD
Gum Springs WSC #1	West Harrison WSC
City of Longview	White Oak
BiCounty WSC	Woodland Harbor

7.3.2 Potential Emergency Interconnects

Responses to survey questions helped identify other potential emergency interconnects for various WUGs within the North East Texas Region. Table 7.3 presents a list of 163 WUGs potentially receiving and the WUGs supplying the potential emergency interconnects.

Table 7.3 Potential Emergency Interconnects to Major Water Facilities in the North East Texas Region

Entity *Providing* Supply	Entity *Receiving* Supply
Red River County WSC	410 WSC
McBee SUD	Ables Springs WSC
City of Van, R P M WSC, Edom WSC	Ben Wheeler WSC
Caddo Basin SUD, Cash SUD	BHP WSC
TRI SUD, Diana SUD, Sharon WSC, Cypress Springs SUD, Holly Springs WSC, Mims WSC, NETMWD	Bi-County WSC
Pritchett WSC	Big Sandy
Sharon WSC	Big Wood Springs Water System
City of Atlanta	Bloomburg WSC
410 WSC	Blossom
Red River County WSC	Bogata
Shirley WSC, Miller Grove WSC, City of Sulphur Springs, Gafford Chapel WSC	Brashear WSC
South Rains SUD, Golden WSC, Shirley WSC, Miller Grove WSC	Bright StarSalem SUD
North Hopkins WSC, Cypress Springs SUD, Martin Springs WSC, Franklin County WD	Brinker WSC
BiCounty WSC	Brookshires Camp Joy Water System
City of Texarkana, Texas Riverbend WRD	Burns Redbank WSC
City of Greenville, BHP WSC, Frognot WSC, Hickory Creek SUD, North Hunt SUD	Caddo Basin SUD
Karnack WSC	Caddo Lake WSC
Caddo Basin SUD, BHP WSC, Cash SUD	Caddo Mills
Shady Grove WSC	Campbell WSC
Myrtle Springs WSC, MacBee SUD, Fruitvale WSC	Canton
City of Greenville , Shady Grove WSC, Miller Grove WSC, South Rains SUD, Combined Consumers SUD, BHP WSC	Cash SUD
Hickory Creek SUD	Celeste
City of Texarkana, Texas Riverbend WRD Red River County WSC, City of New Boston	Central Bowie County WSC
BiCounty WSC	Cherokee Point Water Company
Fouke WSC	City of Big Sandy

Entity *Providing* Supply	Entity *Receiving* Supply
Western Cass WSC	City Of Douglassville
South Tawakoni	City of Edgewood
Western Cass WSC	City Of Marietta
City of Emory	City of Point
Jones WSC, Fouke WSC	City of Quitman
Cypress Springs SUD	City of Winnsboro
City of Texarkana, Texas Riverbend WRD, Red River County WSC	Clarksville
City of White Oak	Clarksville City
City of Quitman	Clear Lakes
City of Quinlan, City of West Tawakoni, Ables Springs WSC, MacBee SUD, South Tawakoni WSC	Combined Consumers SUD
North Hunt SUD, Gafford Chapel WSC	Commerce
Delta County MUD	Cooper
Cypress Springs SUD, City of Winnsboro, Sharon WSC	Cornersville WSC
Pritchett WSC	Country Club Estates
City of 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, City of Sulphur Springs, Gafford Chapel WSC, Cypress Springs SUD, NTMWD, Sabine River Authority	County-Other, Hopkins
Cash SUD, City of Greenville, NTMWD, Hickory Creek SUD, North Hunt SUD, City of Commerce, Sabine River Authority	County-Other, Hunt
Lamar County WSD, City of Paris, 410 WSC	County-Other, Lamar
Cash SUD, Miller Grove WSC, Shirley WSC, Bright Star Salem SUD, South Rains SUD, City of Emory, City of East Tawakoni, NTMWD, Sabine River Authority	County-Other, Rains
Red River County WSC, Lamar County WSD, City of Texarkana, Texas Riverbend WRD	County-Other, Red River
TRI SUD, City of Mount Pleasant, Bi County WSC	County-Other, Titus

Entity *Providing* Supply	Entity *Receiving* Supply
MacBee SUD, South Tawakoni WSC, Fruitvale WSC, Myrtle Springs WSC, City of Canton, Little Hope Moore WSC, Bethel Ash WSC, Ben Wheeler WSC, RPM WSC, City of Van, Carroll WSC, Pruitt Sandflat WSC	County-Other, Van Zandt
Mims WSC	Crestwood Water Company
Myrtle Springs WSC	Crooked Creek WSC
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
City of Texarkana, Texas Riverbend WRD	De Kalb
City of Cooper, Lamar County WSD, North Hunt SUD, City of Ladonia, North Hopkins WSC, NTMWD, Sabine River Authority	Delta County MUD
Northeast Texas MWD	Diana SUD
Cash SUD, South Rains SUD	East Tawakoni
City of Atlanta	Eastern Cass WSC
South Tawakoni WSC, MacBee SUD	Edgewood
Ben Wheeler WSC, RPM WSC, Leagueville WSC, City of Brownsboro	Edom WSC
Blocker Crossroads	Elysian Fields WSC
City of Jefferson	EMC WSC
South Rains SUD, Bright Star Salem SUD, Miller Grove WSC	Emory
Lindale Rural WSC	Enchanted Lakes Water System
City of Quitman	Fouke WSC
Pritchett WSC	Friendship Water System
South Tawakoni WSC, Golden WSC, South Rains SUD, Bright Star Salem SUD	Fruitvale WSC
City of Cumby, Brashear WSC, City of Sulphur Springs, North Hunt SUD, City of Commerce, North Hopkins WSC	Gafford Chapel WSC
City of Longview	Garden Acres Subdivision
Pritchett WSC	Gilmer
City of Grand Saline, Fruitvale WSC, Bright Star Salem SUD, Ramey WSC, Sabine River Authority	Golden WSC

Entity *Providing* Supply	Entity *Receiving* Supply
Fruitvale WSC, Golden WSC, Pruitt Sandflat WSC	Grand Saline
Shady Grove WSC, Cash SUD, North Hunt SUD, Caddo Basin SUD, Hickory Creek SUD	Greenville
BiCounty WSC	HAB WSC
Pritchett WSC	Harmony ISD
Fouke WSC	Hawkins
City of Celeste, Caddo Basin SUD, Frognot WSC, West Leonard WSC, City of Leonard, Arledge Ridge WSC, City of Wolfe City, North Hunt SUD, NTMWD, Sabine River Authority	Hickory Creek SUD
Mims WSC	Holiday Harbor
Jones WSC	Holiday Villages Of Fork
City of Texarkana, Texas Riverbend WRD	Hooks
Mims WSC	Indian Hills Harbor
West Gregg SUD	Jackson WSC
City of Hawkins	Jarvis Christian College
City of Longview	Johnson Mobile Home Park
Martin Springs WSC, Sharon WSC, Fouke WSC, City of Quitman, Sabine River Authority, NTMWD	Jones WSC
Leigh WSC	Karnack WSC
City of Jefferson	Kellyville Berea WSC
City of Paris, 410 WSC, Red River County WSC, Delta County MUD	Lamar County WSD
City of Kilgore	Liberty City WSC
Lindale Rural WSC	Lindale
City of Tyler	Lindale Rural WSC
NETMWD	Linden
City of Canton, Ben Wheeler WSC	Little Hope Moore WSC
Myrtle Springs WSC, City of Mabank, City of Wills Point, City of Edgewood, South Tawakoni WSC, Combined Consumers SUD, NTMWD, Sabine River Authority	Macbee SUD
City of Texarkana, Texas Riverbend WRD	Macedonia Eylau MUD 1
NETMWD	Marshall
City of Sulphur Springs, Shady Grove No. 2 WSC, Brinker WSC, Jones WSC, Lake Fork WSC	Martin Springs WSC
City of Texarkana, Texas Riverbend WRD	Maud

Entity *Providing* Supply	Entity *Receiving* Supply
Shirley WSC, Cash SUD, City of Cumby, 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, City of Canton, Fruitvale WSC	Myrtle Springs WSC
Tri SUD	Naples
City of Texarkana, Texas Riverbend WRD	Nash
City of Texarkana, Texas Riverbend WRD	New Boston
City of Mineola	New Hope SUD
City of Marshall	North Harrison WSC
North Hunt SUD, Gafford Chapel WSC, City of Sulphur Springs, Brinker WSC, Cypress Springs SUD, Delta County MUD	North Hopkins WSC
City of Wolfe City, Hickory Creek SUD, City of Ladonia, City of 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, City of Terrell, High Point WSC, RCH WSC, Blackland WSC, NTMWD, Sabine River Authority	Poetry WSC
City of East Tawakoni, Cash SUD, South Rains SUD, South Tawakoni WSC, NTMWD, Sabine River Authority	Point
City of Gilmer	Pritchett WSC
City of Van, Carroll WSC, Pine Ridge WSC, Golden WSC, City of Grand Saline, Fruitvale WSC	Pruitt Sandflat WSC
Combined Consumers SUD, City of West Tawakoni, Cash SUD, NTMWD, Sabine River Authority	Quinlan
Fouke WSC	Quitman
City of Mineola	Ramey WSC

Entity *Providing* Supply	Entity *Receiving* Supply
410 WSC, City of Paris, City of Texarkana, Texas Riverbend WRD Central Bowie County WSC, Lamar County WSD	Red River County WSC
City of Texarkana, Texas Riverbend WRD	Redwater
City of Paris, 410 WSC, Red River County WSC	Reno (Lamar)
City of Texarkana, Arkansas	Riverbend Water Resources District
Pritchett WSC	Rosewood Water System
City of Chandler, Southern Utilities, Ben Wheeler WSC, Edom WSC	RPM WSC
Lindale Rural WSC	Sand Flat WSC
City of Marshall	Scottsville
Leigh WSC	Shadowood Water Co
Brashear WSC, City of Sulphur Springs, Martin Springs WSC	Shady Grove NO. 2 WSC
City of Greenville, Cash SUD	Shady Grove WSC
Diana SUD	Shady Shores Water System
City of Winnsboro	Sharon WSC
Bright Star Salem SUD, Miller Grove WSC, Brashear WSC, Martin Springs WSC, Lake Fork WSC, NTMWD, Sabine River Authority	Shirley WSC
City of Tyler	Smith County MUD 1
City of Point, City of Emory, Bright Star Salem SUD, Fruitvale WSC, South Tawakoni WSC, NTMWD, Sabine River Authority	South Rains SUD
City of Wills Point	South Tawakoni
Combined Consumers SUD, MacBee SUD, South Rains SUD, Fruitvale SUD, City of Edgewood, City of Wills Point, NTMWD, Sabine River Authority	South Tawakoni WSC
City of Winona	Star Mountain WSC
City of Gladewater	Starrville-Friendship WSC
Shady Grove No. 2 WSC, Brashear WSC, Gafford Chapel WSC, North Hopkins WSC, Brinker WSC, Martin Springs WSC	Sulphur Springs
City of 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
City of Mount Pleasant, Cypress Springs SUD, Bi County WSC, Western Cass WSC	TRI SUD

Entity *Providing* Supply	Entity *Receiving* Supply
City of Gladewater	Union Grove WSC
Ben Wheeler WSC, Pruitt Sandflat WSC, Carroll WSC	Van
City of Texarkana, Texas Riverbend WRD	Wake Village
Waskom Rural WSC	Waskom
City of Waskom	Waskom Rural WSC
City of Kilgore	West Gregg SUD
Gum Springs WSC	West Harrison WSC
Combined Consumers SUD, City of Quinlan, NTMWD, Sabine River Authority	West Tawakoni
City of 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
BiCounty WSC	Woodland Harbor

7.4 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 2020 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.

7.4.1 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. The analysis included all 'county-other' WUGs and rural cities with a population less than 7,500 and on a sole source of water. Table 7.4 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.

Table 7.4 Emergency Responses to Local Drought Conditions in the North East Texas Region

Entity				Implementation Requirements										
County	Water User/ Group Name	TCEQ Service Connection (Count)	2020 Demand (AF/year)	Release from upstream reservoir	Curtailment of upstream or downstream water	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
BOWIE	Burns Redbank WSC	718	201	▪	▪	▪			▪	▪			
BOWIE	Central Bowie County WSC	2,765	619	▪	▪	▪			▪	▪			
BOWIE	De Kalb	953	295	▪	▪	▪			▪	▪			
BOWIE	Hooks	1,936	281	▪	▪	▪			▪	▪			
BOWIE	Macedonia Eylau MUD 1	2,791	588	▪	▪	▪			▪	▪			
BOWIE	Maud	735	211	▪	▪	▪			▪	▪			
BOWIE	Nash	660	392	▪	▪	▪			▪	▪			
BOWIE	Wake Village	2,133	699	▪	▪	▪				▪			
CAMP	Pittsburg	1,858	832	▪	▪	▪	▪		▪	▪		BiCounty WSC	
CASS	Atlanta	2,486	1,017	▪	▪	▪			▪	▪		Texarkana	
CASS	Linden	1,001	301			▪			▪	▪			
CASS	MIMS WSC	850	128	▪	▪	▪			▪	▪		NETMWD	
CASS	Hughes Springs	1,917	279	▪	▪	▪			▪	▪		NETMWD	
DELTA	Cooper		446		▪				▪	▪			
FRANKLIN	Mount Vernon	1,279	564			▪			▪	▪		Cypress Springs SUD	

Entity				Implementation Requirements									
County	Water User/ Group Name	TCEQ Service Connection (Count)	2020 Demand (AF/year)	Release from upstream reservoir	Curtailment of upstream or downstream water	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
FRANKLIN	Cypress Springs SUD	5,151	630		▪	▪			▪	▪	piping & meters	Mt. Vernon	
GREGG	Clarksville City	386	100			▪			▪	▪		White Oak	
GREGG	Gladewater	3111	731		▪	▪	▪		▪		well & equip.	Warren City	▪
GREGG	White Oak	2,548	1,347		▪	▪	▪		▪			Longview	▪
GREGG	Liberty City WSC	1,767	487			▪			▪	▪		Kilgore	
GREGG	Tryon Road SUD	3,220	717	▪	▪	▪	▪		▪	▪		Longview	
HARRISON	Blocker Crossroads WSC	534	133			▪			▪	▪		Marshall	
HARRISON	Leigh WSC	1,339	411			▪			▪	▪		Marshall	
HARRISON	Scottsville	480	247	▪	▪	▪			▪	▪		Marshall	
HARRISON	Waskom	1,150	435			▪			▪	▪		Waskom Rural WSC	
HARRISON	Hallsville	1,515	545		▪	▪			▪	▪		Longview	
HARRISON	Gum Springs WSC 1	958	207		▪	▪			▪	▪			
HARRISON	Gum Springs WSC 2	2,368	563		▪	▪			▪			Longview	▪
HOPKINS	Brashear WSC	404	148	▪	▪				▪	▪			
HOPKINS	Cornersville WSC	363	90			▪			▪	▪		Cypress Springs SUD	

Entity				Implementation Requirements										
County	Water User/ Group Name	TCEQ Service Connection (Count)	2020 Demand (AF/year)	Release from upstream reservoir	Curtailment of upstream or downstream water	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
HOPKINS	Cumby	397	133			▪			▪	▪			
HOPKINS	Jones WSC	1,884	407			▪			▪	▪		Quitman	
HOPKINS	North Hopkins WSC	2,401	474		▪	▪	▪		▪	▪	well & equip.		
HUNT	Delta County MUD	1,051	130		▪	▪			▪	▪			
HUNT	Celeste	334	124			▪			▪	▪			
HUNT	Shady Grove SUD	232	139	▪	▪				▪	▪			
HUNT	Texas A&M University Commerce	904	156		▪	▪			▪	▪			
HUNT	West Tawakoni	1,506	276		▪				▪			Cash SUD	▪
HUNT	Combined Consumers SUD	2,854			▪				▪			Cash SUD	▪
LAMAR	Blossom	640	136		▪	▪			▪	▪			
LAMAR	Reno (Lamar)	1,280	548		▪	▪			▪	▪			
MARRION	KellyvilleBerea WSC	372	107			▪			▪			Jefferson	▪
MORRIS	Daingerfield	1,085	465	▪	▪	▪			▪	▪		NETMWD	
MORRIS	Holly Springs WSC	437	58	▪	▪	▪			▪	▪		Hughes Springs	
MORRIS	Lone Star	782	189	▪	▪	▪			▪	▪		NETMWD	

Entity				Implementation Requirements									
County	Water User/ Group Name	TCEQ Service Connection (Count)	2020 Demand (AF/year)	Release from upstream reservoir	Curtailment of upstream or downstream water	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
RAINS	Miller Grove WSC	656	29			▪			▪				▪
RAINS	Golden WSC	1,395	4			▪			▪	▪		Ramey WSC	
RAINS	Point	967	364		▪				▪	▪	well & equip.	Emory	
RED RIVER	410 WSC	802	224		▪				▪	▪			
RED RIVER	Bogata	651	123			▪			▪	▪			
RED RIVER	Clarksville	1,516	620			▪			▪	▪		White Oak	
SMITH	Sand Flat WSC	1,155	243			▪			▪	▪		Lindale Rural WSC	
SMITH	Winona	284	133			▪			▪	▪		Star Mountain WSC	
SMITH	Lindale	2,613	1,317			▪			▪	▪		Lindale Rural WSC	
SMITH	Crystal Systems	2,050	1,356			▪			▪	▪		Lindale Rural WSC	
SMITH	Lindale Rural WSC	4,207	830			▪			▪	▪		Lindale	▪
UPSHUR	Fouke WSC	2,443	10			▪			▪	▪		Quitman	
UPSHUR	Gladewater	3,111	444		▪	▪	▪		▪		well & equip.	Warren City	▪
UPSHUR	Glenwood WSC	1,087	287			▪			▪	▪		East Mountain	

Entity				Implementation Requirements										
County	Water User/ Group Name	TCEQ Service Connection (Count)	2020 Demand (AF/year)	Release from upstream reservoir	Curtailment of upstream or downstream water	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
UPSHUR	Big Sandy	767	224			▪	▪		▪	▪	piping & meters	Pritchett WSC	
UPSHUR	Diana SUD	2,222	422	▪	▪	▪			▪	▪	piping	Northeast Texas MUD	
WOOD	Hawkins	685	362			▪			▪	▪		Fouke WSC	
WOOD	Lake Fork WSC	1,509	218			▪			▪	▪		Yantis	
WOOD	Mineola	2,688	847			▪			▪	▪		Ramey WSC	
WOOD	New Hope SUD	848	329			▪			▪	▪		Mineola	
WOOD	Ramey WSC	1,505	278			▪			▪	▪		Mineola	
WOOD	Bright StarSalem Sud	1,957	151			▪			▪	▪			
WOOD	Quitman	1,252	316		▪	▪			▪	▪	well & equip.	Jones WSC; Fouke WSC	
WOOD	Winnsboro	1,775	548		▪	▪	▪		▪	▪	well & equip.	Cypress Springs SUD	
WOOD	Sharon WSC	2,769	307			▪	▪		▪	▪	piping & valves	Winnsboro	▪
VAN ZANDT	Ben Wheeler WSC	898	214			▪			▪	▪			
VAN ZANDT	Edom WSC	486	130			▪			▪	▪			

Entity				Implementation Requirements									
County	Water User/ Group Name	TCEQ Service Connection (Count)	2020 Demand (AF/year)	Release from upstream reservoir	Curtailment of upstream or downstream water	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
VAN ZANDT	Fruitvale WSC	1,183	305			■			■	■			
VAN ZANDT	Grand Saline	1,346	387			■			■	■			
VAN ZANDT	Little Hope Moore WSC	502	147			■			■	■			
VAN ZANDT	Myrtle Springs WSC	528	118			■			■	■			
VAN ZANDT	Pine Ridge WSC	556	6			■			■	■			
VAN ZANDT	Pruitt Sandflat WSC	485	156			■			■	■			
VAN ZANDT	South Tawakoni WSC	1,439	438		■				■	■		Wills Point	
COUNTY OTHER													
GREGG	Warren City	132			■	■	■		■	■	existing infrastructure	Gladewater	■
HARRISON	Caddo Mills	492		■		■				■		Karnack WSC	■
HARRISON	Talley WSC	551		■	■	■			■	■	piping & valves	Marshall	■

Entity				Implementation Requirements									
County	Water User/ Group Name	TCEQ Service Connection (Count)	2020 Demand (AF/year)	Release from upstream reservoir	Curtailment of upstream or downstream water	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
HARRISON	North Harrison WSC	505		▪	▪	▪			▪	▪	piping, meters & valves	Leign WSC	
HARRISON	West Harrison WSC	716		▪	▪	▪			▪	▪		Gum Springs WSC #1	▪
HUNT	Campbell WSC	503	49			▪	▪		▪	▪	1 mile of pipeline	Shady Grove WSC	
SMITH	East Texas MUD	858			▪	▪	▪		▪	▪	well & equip.		
SMITH	Star Mountain WSC	588			▪	▪	▪		▪	▪	well & equip.		
VAN ZANDT	Crooked Creek WSC	322			▪	▪			▪	▪	piping, meters & valves	Myrtle Springs WSC	
WOOD	South Rains WSC	1,050		▪	▪	▪			▪	▪		Bright StarSalem WSC	
WOOD	Yantis Water	263			▪	▪			▪	▪		Fork Lake/Reservoir	

7.4.2 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 on Table 7.4, 49 municipalities might have the option of implementing curtailment of water rights. In addition, release from upstream reservoirs was also evaluated. Table 7.4 presents 25 entities where this approach might be feasible.

7.4.3 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, but 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 7.4, ten will be able to potentially use brackish groundwater as a feasible solution to an emergency local drought condition.

7.4.4 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 7.4 presents this option as viable for most of the entities listed.

7.4.5 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

Thirty-four entities within the RWPA were identified by the TCEQ as Drought Affected Public Water Systems (PWS) list as of July 2019. 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 5124637853. Contact the TDA, Community Development Block Grants, or call 5129367891. Funding is limited.

7.4.6 Other TCEQ Guidance Resources

- Emergency and Temporary Use of Wells for Public Water Supplies (RG485) https://www.tceq.texas.gov/assets/public/comm_exec/pubs/rg/rg485.pdf
- Questions from the TCEQ's Workshops on Drought Emergency Planning: Answers to Help DrinkingWater 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

7.5 Region-Specific Drought Response Recommendations and Model Drought Contingency Plans

7.5.1 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 7.4, 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 7.5.

Drought triggers for surface water are usually related to reservoir levels. A summary of reservoir triggers and actions are included in Table 7.1 and Table 7.6.

Table 7.5 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	21 to 30
D1	Moderate Drought	Some damage to crops, pastures; Streams, reservoirs, or wells low, some water shortages developing or imminent; Voluntary wateruse restrictions requested	2.0 to 2.9	1120
D2	Severe Drought	Crop or pasture losses likely; Water shortages common; Water restrictions imposed	3.0 to 3.9	610
D3	Extreme Drought	Major crop/pasture losses; Widespread water shortages or restrictions	4.0 to 4.9	35
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; Shortages of water in reservoirs, streams, and wells creating water emergencies	5.0 or less	02

Source: https://droughtmonitor.unl.edu/AboutUSDM/AbouttheData/DroughtClassification.aspx

7.5.2 Region-Specific Model Drought Contingency Plan

The Regional Model DCP summary table (Table 7.6) provides an overview of all regional water sources and recommended drought triggers and actions.

Region-Specific Model DCPs for Wholesale Water Providers and for groundwater users are included in Appendix C7-2. Per the recommendation of the Drought Preparedness Council submitted to the NETRWPG on August 1, 2019, Region-Specific Model DCPs for those water use categories in the region that account for more than 10 percent of water demands in any decade over the 50year planning horizon are included in Appendix C7-3 for municipal, manufacturing, and steam-electric power generation use categories. The Regional 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.

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Table 7.6 Recommended Regional Drought Plan Triggers and Actions

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													
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	SSW	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	

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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
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	
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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7.5.3 WUG Specific Model Drought Contingency Plans

7.5.3.1 Public Water Supplier

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. Recommended changes to existing response actions are detailed in Table 7.6.

7.5.3.2 Irrigation

Irrigation wells located within a municipality are subject to the triggers and response actions designated by the city's drought plan. Nonexempt irrigation wells located outside of a municipality are not regulated as there are no GCDs within the RWPA.

7.5.3.3 Wholesale Water Provider

Wholesale water providers in the North East Texas Region are listed in Table 7.7. Their Drought Contingency Plan, if submitted, is summarized in Table 7.1. Generally, triggers are based upon reservoir capacities falling below a designated elevation or capacity, and when user demand exceeds a designated percent capacity of the supply system.

Table 7.7 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

Name	Entity Type	Wholesale Customers
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 HopkinWSC, 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 StarSalem, CIty of Kilgore, City of Longivew, Mac Bee SUD, City of Point, City of Quitman, Release from TXU, South Tawakoni WSC, West Tawakoni, City of Wills Point

7.6 Drought Management Water Management Strategies

31 TAC 357.42(f) states that 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 2021 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. 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.

Hence, the economic impacts on WUG reductions associated with increasing 5, 10, 15, 20, 25, and 30 percent drought management scenarios are shown in Table 7.8 for decades 2020 through 2070 for each municipal water user group with projected needs for additional water supply at year 2020.

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 household size data are for year 2010, and monthly prices and usage are from 2016. WUG-specific TML data were used when available. The costing tool is only applicable to residential outdoor water use. The WUGs with the greatest estimated economic impacts are Greenville, Texarkana, and Cash SUD.

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Table 7.8 Drought Management Strategy Evaluation Summary

Entity Name	Total Annual Water Reduction (Percentage and volume in ac-ft)						Total Annual Cost (in 2018 $)					
	5% 2020	10% 2030	15% 2040	20% 2050	25% 2060	30% 2070	2020	2030	2040	2050	2060	2070
ABLES SPRINGS WSC	5	16	36	69	124	213	1,115	7,140	24,848	67,350	160,693	356,372
B H P WSC	15	38	73	125	207	335	1,923	10,088	30,401	74,032	162,827	339,646
BURNS REDBANK WSC	7	15	22	30	37	44	888	3,852	9,256	17,484	29,139	44,958
CADDO BASIN SUD	33	89	177	318	543	904	3,065	17,154	54,490	138,443	315,104	675,311
CASH SUD	89	213	382	608	908	1,302	8,187	41,279	117,357	264,674	527,103	972,262
CELESTE	4	9	17	29	47	77	421	2,208	6,655	16,214	35,654	74,361
CENTRAL BOWIE COUNTY WSC	37	78	130	192	266	353	3,357	15,129	39,926	83,538	154,224	263,583
CLARKSVILLE	14	28	42	56	71	85	1,713	7,232	17,229	32,545	54,241	83,686
DE KALB	8	16	24	33	41	50	970	4,185	10,090	19,178	32,377	50,617
EAST MOUNTAIN WATER SYSTEM	10	21	34	48	63	79	1,178	5,371	13,625	27,301	47,961	77,533
EDOM WSC	5	11	17	24	32	42	599	2,768	7,050	14,207	25,558	42,505
GREENVILLE	260	597	1,052	1,692	2,631	4,055	19,466	94,403	264,370	602,322	1,248,332	2,474,082
HARLETON WSC	21	45	72	105	144	190	2,599	11,787	30,079	62,123	113,153	192,130
HICKORY CREEK SUD	16	48	102	193	342	585	2,032	12,541	42,673	113,995	269,286	593,229
HOLLY SPRINGS WSC	7	15	23	30	38	45	930	3,955	9,422	17,797	29,661	45,763
HOOKS	13	27	42	55	69	83	911	4,003	9,926	18,750	31,250	48,214
LINDALE	25	60	108	163	243	347	2,136	10,946	31,276	66,860	132,838	244,194
MABANK	1	2	4	6	11	19	133	627	1,647	4,069	9,470	20,364
MACEDONIA EYLAU MUD 1	41	83	126	167	209	251	3,753	16,117	38,599	72,908	121,514	187,479
MAUD	5	12	19	25	32	38	593	2,765	7,211	13,620	22,701	35,024
MILLER GROVE WSC	6	13	21	29	39	49	780	3,539	8,918	17,428	30,681	49,805
NASH	16	37	63	95	118	142	1,451	7,153	19,480	41,402	69,004	106,463
NEW BOSTON	25	52	79	106	132	159	2,268	9,847	23,653	44,678	74,464	114,887

Entity Name	Total Annual Water Reduction (Percentage and volume in ac-ft)						Total Annual Cost (in 2018 $)					
	5% 2020	10% 2030	15% 2040	20% 2050	25% 2060	30% 2070	2020	2030	2040	2050	2060	2070
NORTH HUNT SUD	17	43	85	149	250	411	2,101	11,396	35,290	87,866	196,796	416,546
OVERTON	0	1	1	1	2	3	23	111	306	663	1,268	2,254
POETRY WSC	9	24	45	78	131	211	1,182	6,302	18,931	46,102	103,028	213,957
POINT	7	14	22	29	37	44	834	3,734	9,037	17,241	28,894	44,662
QUITMAN	10	22	33	45	57	70	1,706	7,508	18,172	35,180	59,347	92,256
REDWATER	13	30	51	75	98	117	1,564	7,448	19,759	41,126	71,714	110,644
RIVERBEND WATER RESOURCES DISTRICT	1	3	4	5	6	8	156	677	1,627	3,073	5,121	7,902
ROYSE CITY	1	3	6	10	17	28	159	833	2,508	6,108	13,438	28,053
SCOTTSVILLE	5	10	17	24	33	44	600	2,723	6,948	14,352	26,134	44,353
SOUTH TAWAKONI WSC	20	46	75	109	145	183	2,523	12,111	31,499	64,476	114,338	185,513
STAR MOUNTAIN WSC	7	14	24	35	48	64	811	3,804	9,994	20,837	38,161	64,599
TEXARKANA	168	350	548	763	996	1,247	11,464	50,527	125,649	247,744	431,007	694,132
WAKE VILLAGE	33	73	121	177	240	288	2,855	13,428	35,259	72,776	131,585	203,017
WASKOM	14	29	47	69	94	124	1,711	7,759	19,802	40,883	74,475	126,452
WEST TAWAKONI	12	29	51	84	133	207	2,759	13,614	38,785	89,853	189,150	380,186

7.7 Other Drought-related Considerations and Recommendations

31 TAC 357.42(f), (h)&(i) state that RWPGs shall consider any relevant recommendations from the Drought Preparedness Council. Additionally, RWPGs shall make drought preparation and response recommendations regarding: development of, content contained within, 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.

7.7.1 Texas Drought Preparedness Council

The Drought Preparedness Council was authorized and established by the 76th legislature (HB 2660) in 1999, subsequent to the establishment of the Drought Monitoring and Response Committee (75th legislature, SB1). 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:

1. the assessment and public reporting of drought monitoring and water supply conditions;
2. advising the governor on significant drought conditions;
3. 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;
4. advising the regional water planning groups on drought-related issues in the regional water plans;
5. ensuring effective coordination among state, local, and federal agencies in drought-response planning; and
6. 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 with regard to 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.

Per the recommendations of the Texas Drought Preparedness Council provided to the NETRWPG in a August 1, 2019 letter, portions of this chapter have been formulated consistent with the outline template for Chapter 7 provided by the TWDB. Additionally, water supplies developed for the 2021 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, in an effort 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. These reports can be found at:

https://www.dps.texas.gov/dem/sitrep/default.aspx

7.7.2 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.

Presented in Table 7.9 is a list of wholesale water providers and/or retail entities within Region D that have reported to the TCEQ their implementation of drought contingency measures since 2015.

Table 7.9 Region D Retail and Wholesale Water Providers Reporting Implementation of Drought Contingency Measures since 2015

Date	Name	County	Source	Condition	Implementation Status
1/6/2015	CITY OF HALLSVILLE	Harrison	SWP from City of Longview (Sabine River, Lake Cherokee, and Lake O The Pines) and 2 Carrizo Sand wells	Not experiencing any drought problems at this time.	Not implementing a stage of drought contingency plan.
1/15/2015	CITY OF WEST TAWAKONI	Hunt	Lake Tawakoni	Having drought related issues. Lake Tawakoni is 12.5 ft low. There is 3.5 to 4 feet of water above current back-up intake line.	Currently implementing Voluntary Stage of Drought Contingency Plan (DCP). The system is adopting a new DCP and once it is passed the watering restrictions will become stricter. Working to secure funds for extension of current back-up system or a new intake structure.

Date	Name	County	Source	Condition	Implementation Status
2/11/2015	COMBINED CONSUMERS SUD	Hunt	Lake Tawakoni	Low lake levels at Lake Tawakoni. Six feet of water above surface water intake.	Implementing PWS Stage 3, which allows outdoor watering using a hose-end sprinkler or automatic irrigation system twice a week based on address from midnight to 10am and 8pm to midnight.
3/2/2015	CITY OF WEST TAWAKONI	Hunt	Lake Tawakoni	Low lake levels near surface water intake on Lake Tawakoni.	Implementing PWS Stage 5 watering restrictions, which prohibits all outdoor watering.
3/6/2015	COMBINED CONSUMERS SUD	Hunt	Lake Tawakoni	Lake Tawakoni levels have risen from recent precipitation events.	Implementing PWS Stage 2, which allows outdoor watering twice a week based on address between midnight to 10am and 8pm to midnight on designated days.
3/18/2015	COMBINED CONSUMERS SUD	Hunt	Lake Tawakoni	Lake Tawakoni's water level has risen from recent rains.	Implementing PWS Stage 2, which requests customers to voluntarily limit irrigation of landscaped areas to twice a week based on physical address between midnight and 10am and 8pm to midnight.
4/8/2015	CITY OF MARSHALL	Harrison	Big Cypress Bayou	Mechanical problem. Water line to water plant broke. Treatment plant shut down until repair is made.	Contractor on sight. Repair to be finished soon. Stage 4 of DCP enacted at 4 p.m. on April 8, 2015.
4/9/2015	CITY OF MARSHALL	Harrison	Big Cypress Bayou	Mechanical problem resolved. Water line to plant repaired at 8 pm on April 8, 2015. Began treating water at water plant and filling clearwell reserves.	PWS Stage 4 watering restrictions rescinded.
4/27/2015	COMBINED CONSUMER SUD	Hunt	Lake Tawakoni	Precipitation and available supply meet our needs.	We are lifting our drought restrictions.

Date	Name	County	Source	Condition	Implementation Status
5/5/2015	CITY OF WEST TAWAKONI	Hunt	Lake Tawakoni	Lake Tawakoni's water level is four feet below the conservation level.	We are asking customers to voluntarily limit water usage. There are no other restrictions.
5/27/2015	CITY OF EMORY	Rains	Lake Tawakoni	Lake Tawakoni is at 100% capacity.	No remedial action required. The City is not implementing a stage of their DCP.
6/18/2015	WEST HARRISON WSC	Harrison	3 Carrizo Sand and 1 Wilcox Aquifer	Implementing Stage 1 of the DCP	There are no outdoor watering restrictions. Asking customers to voluntarily conserve outdoor watering
7/6/2015	WEST HARRISON WSC	Harrison	3 Carrizo Sand wells and 1 Wilcox well	Relaxed outdoor watering restrictions and now implementing the Voluntary stage of the DCP	Asking customers to voluntarily conserve water. No mandatory outdoor watering restrictions
9/14/2015	CASH SUD	Hunt	SWP from North Texas MWD Wylie WTP (Lavon Lake) and Lake Tawakoni	Implementing the voluntary stage of the DCP	Asking customers to restrict watering to once every five days based on address
9/14/2015	MACBEE SUD	Van Zandt	Lake Tawakoni	Not implementing any stage of the DCP	No outdoor watering restrictions
9/14/2015	LINDALE RURAL WSC	Smith	4 Wilcox Aquifer wells and 2 Carrizo Sand wells	Not implementing any stage of the DCP	No outdoor watering restrictions
9/14/2015	LINDALE RURAL WSC DC	Smith	3 Wilcox Aquifer wells	Not implementing any stage of the DCP	No outdoor watering restrictions
9/14/2015	SAND FLAT WSC	Smith	4 Carrizo Sand wells	Not implementing any stage of the DCP	No outdoor watering restrictions
9/14/2015	BEN WHEELER WSC	Van Zandt	3 Wilcox Aquifer wells and 1 Carrizo-Wilcox well	Not implementing any stage of the DCP	No outdoor watering restrictions

Date	Name	County	Source	Condition	Implementation Status
8/2/2016	PINE TRAIL SHORES	Smith	1 Queen City well	The system has implemented stage 1 of their DCP due to excessive water use.	Outdoor watering is limited to twice weekly between the hours of either 12am - 4am, 7am -10am or 8pm -11:59pm dependent on address. Hand watering is allowed any day between 12am-10am and 7pm - 11:59pm.
10/5/2017	RIVERBEND WATER RESOURCES DISTRICT	Bowie	Lake Wright Patman and Lake Millwood	NA	NA
10/17/2018	CITY OF HALLSVILLE	Harrison	SWP from City of Longview (Sabine River, Lake Cherokee, and Lake O The Pines) and 2 Carrizo Sand wells	No drought related problems or mechanical issues at this time.	Voluntary water conservation at this time.
2/28/2019	CITY OF YANTIS	Wood	Carisso-Wilcox Aquifer	NA	NA
4/16/2019	CADDO LAKE WSC	Harrison	4 Wilcox wells	NA	NA
4/24/2019	CITY OF AVERY	Red River	SWP from City of Texarkana	NA	NA
11/19/2019	PINE TRAIL SHORES	Smith	1 Queen City well	No longer experiencing any drought related issues.	The system is implementing a voluntary water conservation stage of their DCP.

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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 (RWPGs) to include legislative recommendations in the regional water plan with regard to 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 SH 43 in Marion/Harrison County upstream to Ferrell's Bridge Dam in Marion County (TCEQ classified stream Segment 0402).
	Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985).
	Riparian conservation area - Caddo Lake State Park and Wildlife Management Area.
	Threatened or endangered species/unique communities - Paddlefish (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 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).

Name	Description
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).
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 (Fig. 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) (U.S. Fish and Wildlife Service, 1985) Emergent wetland (PEM1), Shrub-Scrub wetland (PSS1), and Forested wetland (PFO1) (U.S. Fish and Wildlife Service, 2009) Intact natural hydrologic regime. No modification to stream. (U.S. Fish and Wildlife Service, 1985);
	Riparian conservation area - White Oak Creek Wildlife Management Area; and
	Threatened or endangered species/unique communities - Wintering area for bald eagle (U.S. Fish and Wildlife Service, 1985). High value habitat for migratory birds. (U.S. Fish and Wildlife Service, 1985).

Name	Description
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 sq. mi. (Fig. 8.3 & Fig. 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 (Fig. 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).

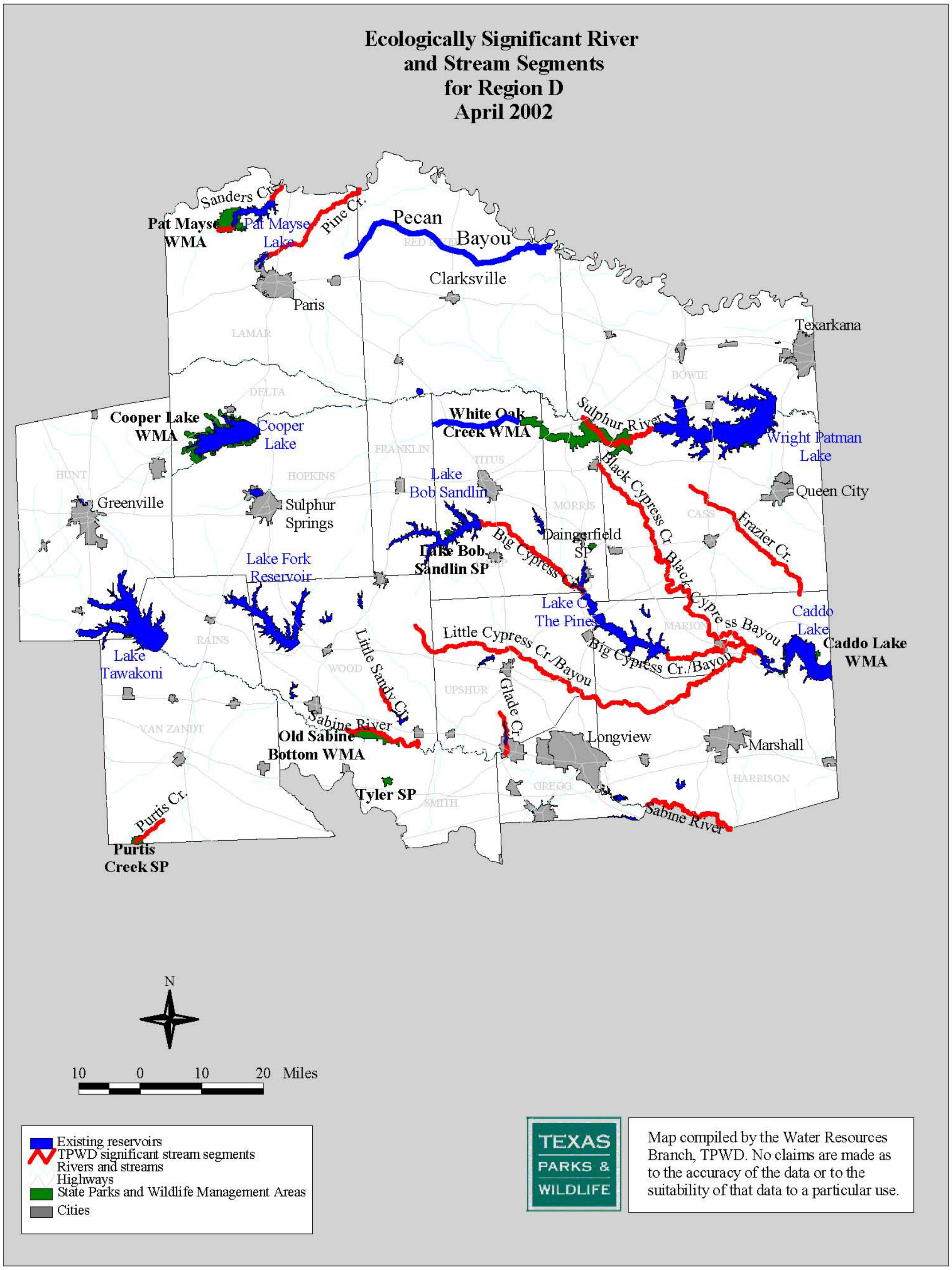

Figure 8.1 Ecologically Significant River and Stream Segments (from TPWD, 2000)

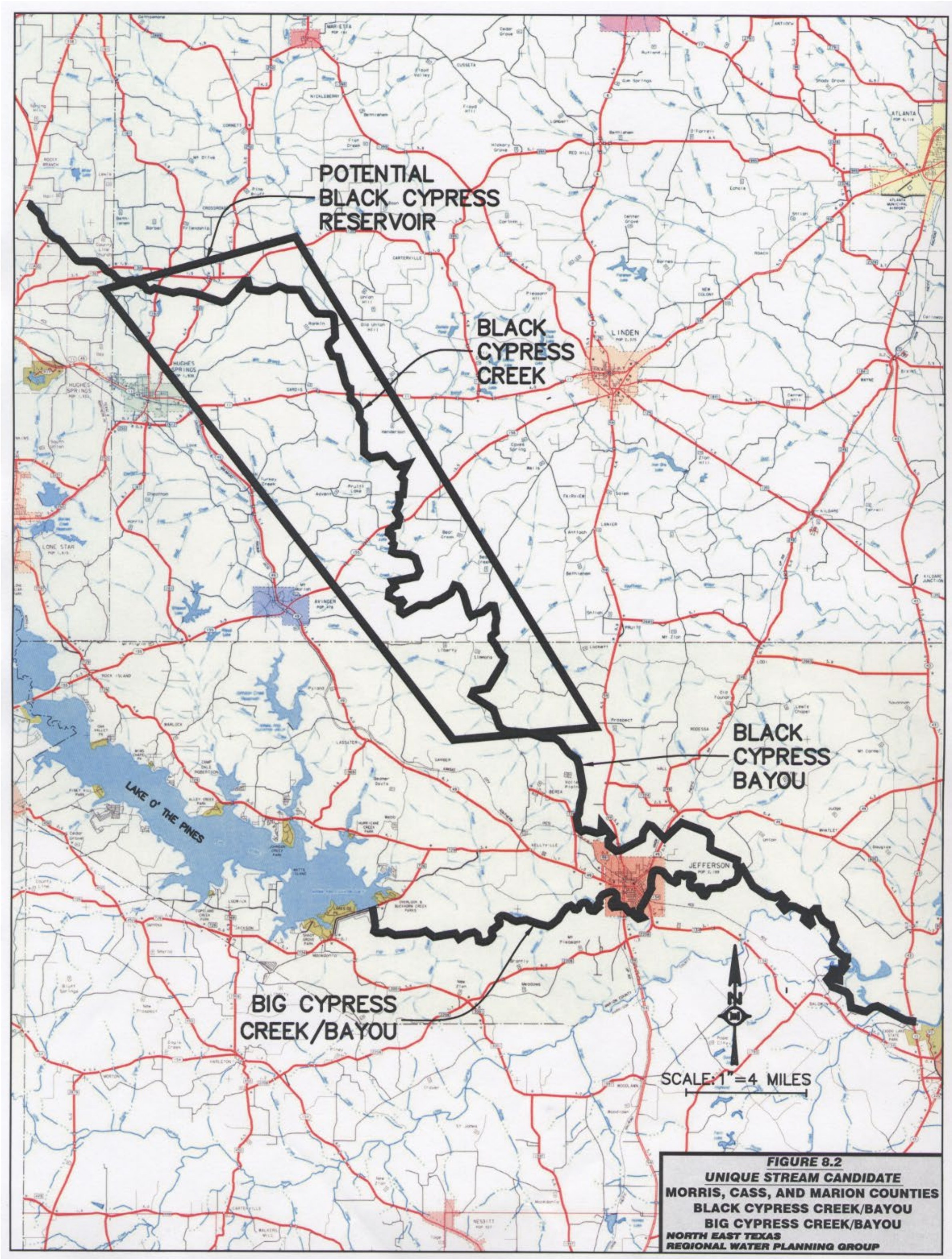

Figure 8.2 Black Cypress Creek/Black Cypress Bayou

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 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 operation 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 North East Texas Regional Planning Group 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 Regional Water Planning Group believes that there exists a lack of clarity as to the effects of designation with respect to private property takings issues.
2. The Regional Water Planning Group 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 2021 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 2021 Region D Water Plan. The conditional recommendations herein are those as presented in the previously adopted 2011 and 2016 Region D Water Plans. The information required in 31 TAC §357.43(b) is presented herein as part of the conditional recommendations proffered in this Plan. The TPWD has had the opportunity to review this information as part of their review of the Region D IPP. Comments from TPWD on the 2021 Region D IPP stated "TPWD staff applauds the planning group for making this recommendation." A separate, standalone package reflecting these recommendations was submitted to the TPWD by the NETRWPG on September 4, 2020.

There are no recommended strategies in the 2021 Region D Water Plan that impact the conditionally recommended ecologically unique stream segments.

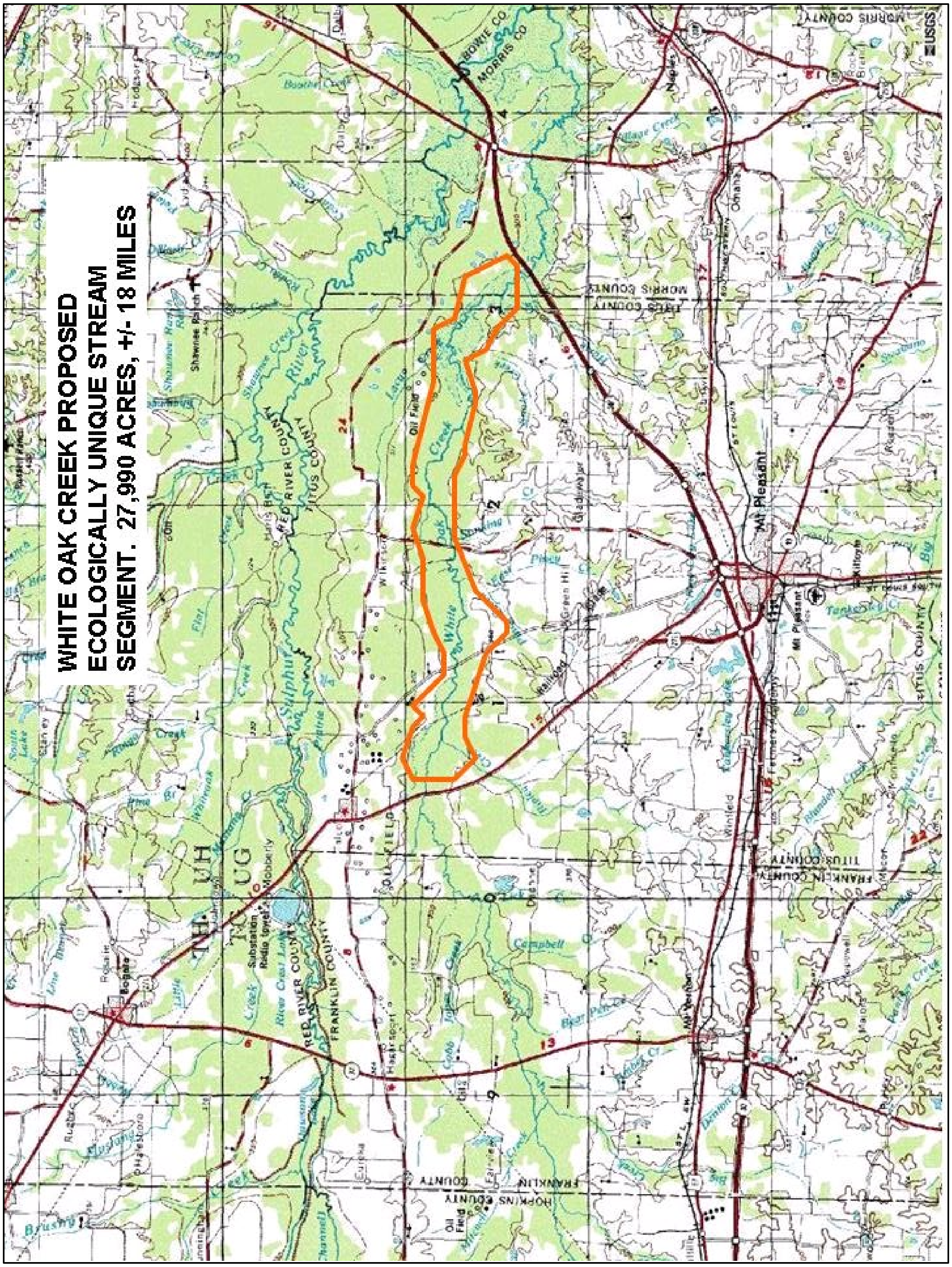

Figure 8.3 White Oak Creek Proposed

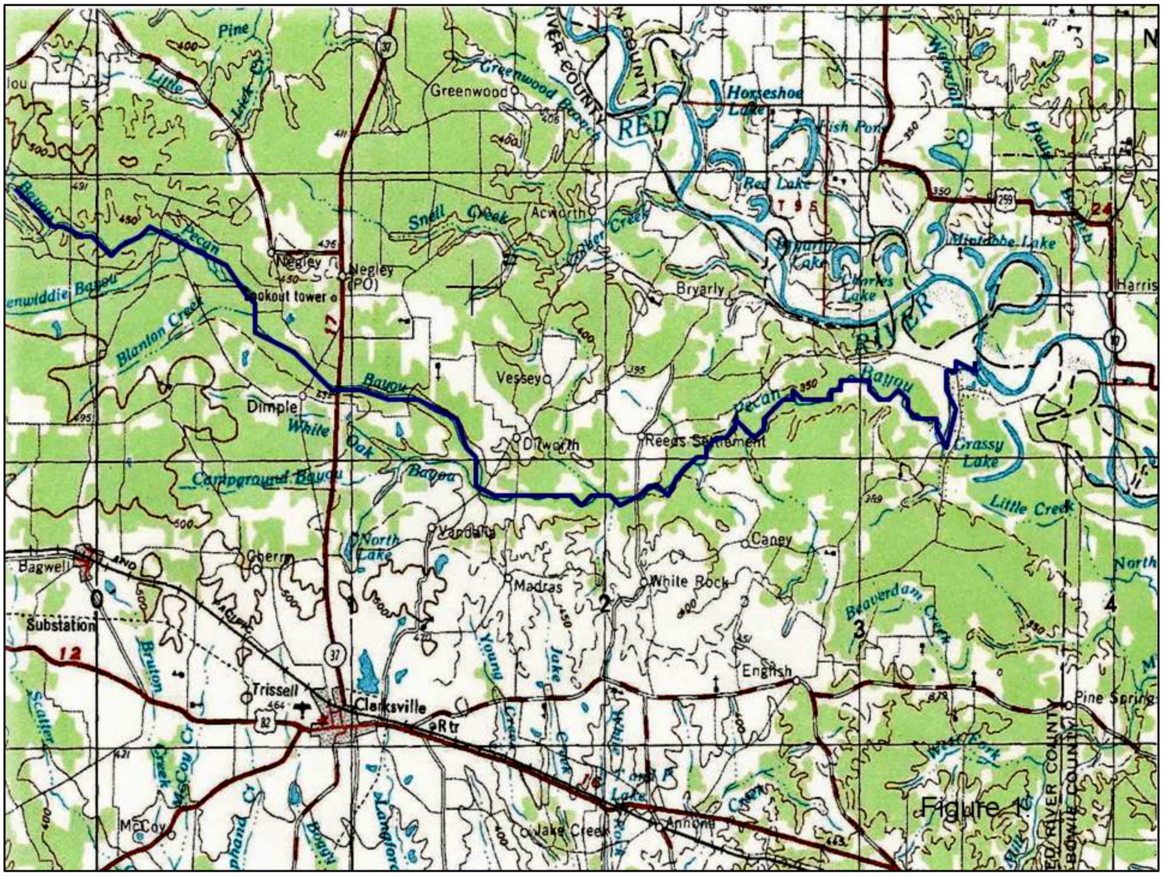

Figure 8.4 Reach of the Pecan Bayou in Red River County

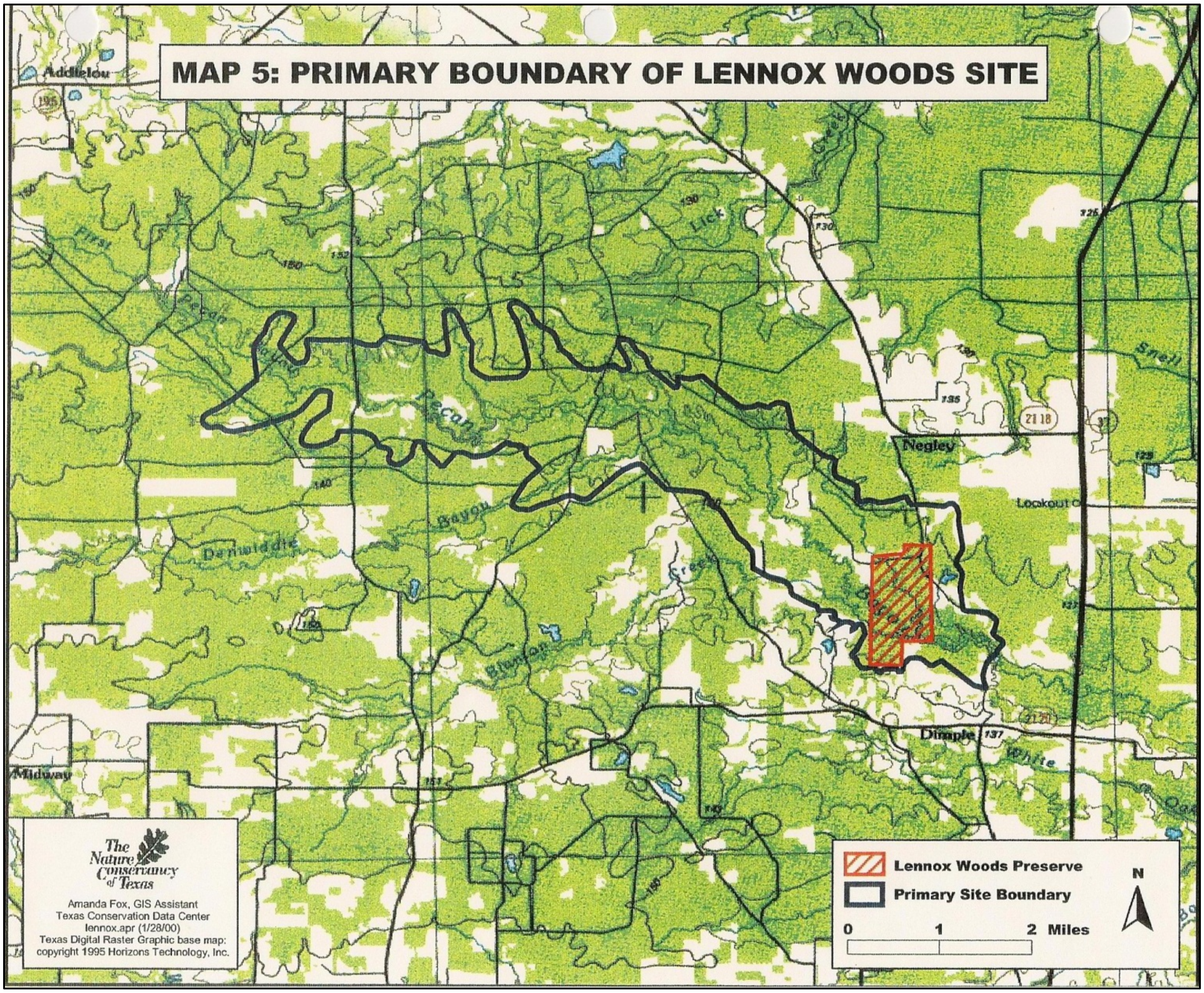

Figure 8.5 Primary Boundary of Lennox Woods Site

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 Texas Water Development Board (TWBD) for the 2022 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 regional water planning groups 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 the subsequent 2016 Plan, 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 Plan and 2016 Plan 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 North East Texas Regional Water Planning Group 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 15 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 Creek Basin. Over the past 9 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 2021 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. The strategies to meet future water needs of regional water plans and the State Water Plan are not to be limited by these voluntary goals for instream flows. Rather, such goals 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 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. 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 are incorporated in this regional water plan as the voluntary goals for instream flows in that basin.

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:

---

[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

[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.

https://caddolakeinstitute.org/docs/flows/RegionD_Sulphur_eflows_20150409%20%281%29.pdfAs 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 regional water planning groups 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.

8.8 Reservoir Sites

Rules for regional water planning (31 TAC§ 357.43) state that a regional water planning group "*…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's 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

Little Cypress (Harrison)

Red River Basin

Barkman (Bowie)

Big Pine (Lamar and Red River)

Liberty Hills (Bowie)

Pecan Bayou (Red River)

Dimple (Red River)

Sabine 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)

Sulphur River Basin

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, hydro power 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) 2018 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% over a period of 40 years as these are the current default values in the TWDB's Unified Costing Model (UCM).

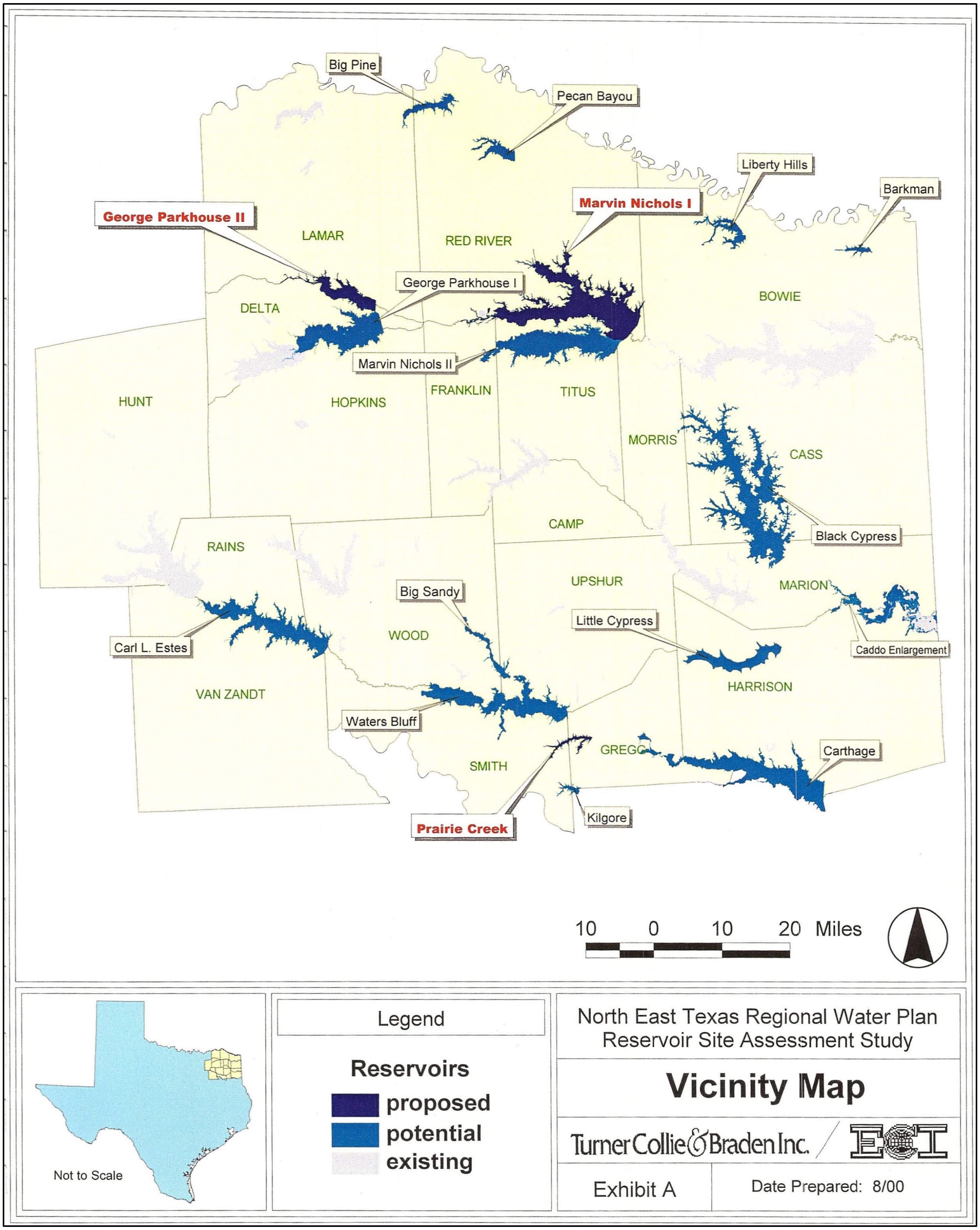

Figure 8.6 Potential Reservoir Vicinity Map, Site Assessment Study (2000)

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 msl, with a storage capacity of 217,234 ac-ft. The maximum design water surface elevation would be 252.0 feet msl. An earth fill 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/yr. In current dollars (2018), the total cost to develop the reservoir is estimated to be approximately $537.9 million with an annualized cost of nearly $33.3 million. The unit cost of water from the project on an annualized basis would be $230 per ac-ft ($0.71/1,000 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	$537,900	$230

The North East Texas Regional Water Planning Group 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 U.S. Fish and Wildlife Service (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 North East Texas Regional Water Planning Group 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 U.S. Fish and Wildlife Service (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 (Natural Resource Conservation Service) data shows that there is a hydric soil association is 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 North East Texas Regional Water Planning Group 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 located 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 $97 million dollars. The cost per ac-ft of firm yield on an annualized basis is $167 ($0.52/1,000 gallons). This site has apparently not been studied in detail as no information was found with regard to type and size of the dam.

The USFWS and TPWD combined lists for threatened, endangered, or rare species lists 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 (Natural Resource Conservation Service) 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 North East Texas Regional Water Planning Group 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 feet msl. The estimated firm yield of the project is 1,866 ac-ft/yr. The total cost to develop the project would be $25.7 million. The unit cost of water from the reservoir would be $852 per ac-ft of firm yield ($2.62/1,000). 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 lists 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 North East Texas Regional Water Planning Group 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 were 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 feet msl. The calculated firm yield of the project is 10,200 ac-ft/yr, utilizing the latest TCEQ Water Availability Model (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 $46 million, including pipeline. If the entirety of the firm yield is utilized, the unit cost of water from the reservoir would be $326 per ac-ft of firm yield ($1.01/1,000 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 Texas Parks and Wildlife Department. State and federal agency listings for threatened, endangered, or rare plant or animal species lists 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 North East Texas Regional Water Planning Group 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	$25,700	$852
BIG PINE	N/A	9200	35,840	$97,000	$167
DIMPLE	28,541	2,130	10,200	$53,800	$326

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 feet msl, the conservation storage capacity of the reservoir would be 69,300 ac-ft and it would cover 4,400 surface acres. An earth fill 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 $147.4 million. The annualized cost per ac-ft of firm yield would be $196 ($0.61/1,000 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 lists 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 have been classified by the U.S. Fish & Wildlife Service 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 North East Texas Regional Water Planning Group 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 feet 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 feet 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 earth fill. The flood spillway would be an uncontrolled ogee shaped spillway with a crest elevation of 403.0 feet 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 $693.4 million. The project would provide water at a unit cost of approximately $448 per ac-ft ($1.38 /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 mollusk, 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 North East Texas Regional Water Planning Group 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 U.S. Highway 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 feet 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 $855.3

million. On an annualized basis, the unit cost of water from the project would be approximately $98 per ac-ft of firm yield ($0.31/1,000 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 indicates 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 lists seven birds, five fish, three mammals, five mollusk, 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 North East Texas Regional Water Planning Group 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 acre-feet per square mile of basin drained. The annual average gross lake surface evaporation rate from 1950 - 1979 was approximately 54 inches, and the monthly average equaled or exceeded rainfall 5 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) ground water, 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 North East Texas Regional Water Planning Group 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 feet 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 North East Texas Regional Water Planning Group 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 feet 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 feet 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 feet msl. The spillway for the dam would be ogee shaped with a crest elevation of 300 feet 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 $104.4 million, which would provide water at an annualized cost of $375 per ac-ft of firm yield ($1.16/1,000 gallons). The diversion of flows from the Sabine River would increase the project development costs to $126.4 million and would reduce the unit cost of water to $263 per ac-ft ($0.81/1,000 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 $175 per ac-ft of firm yield ($0.54/1,000 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 mollusk, 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 North East Texas Regional Water Planning Group 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 U.S. Highway 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 feet msl and would cover 36,396 surface acres. The maximum flood pool elevation would be 314.7 feet msl. The dam for the Waters Bluff Reservoir would be a homogeneous earthen embankment 70 feet high with a crest elevation of 320 feet msl and a crest length of 11,000 feet. The spillway would be a concrete gravity ogee with a crest elevation of 276.0 feet 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 $863 million, with an annualized unit cost of water of $165 per ac-ft of firm yield ($0.51/1,000 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 U.S. Fish & Wildlife Service 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 lists 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 North East Texas Regional Water Planning group 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	$147,400	$196
CARL ESTES	393,000	44,900	95,630	$693,400	$448
CARTHAGE	651,914	41,200	537,000	$855,300	$98
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	$104,400	$375

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
PRAIRIE CREEK WITH DIVERSION	45,164	2,280	29,685	$126,400	$263
PRAIRIE CREEK WITH PIPELINE	45,164	2,280	115,000	$325,500	$175
WATERS BLUFF	525,163	36,396	324,000	$863,000	$165

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 three identified studies concerning the Marvin Nichols site. The Texas Forest Service produced the "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 has been an ongoing study performed for the SRBA and U.S. Army Corps of Engineers (USACE) by Freese and Nichols, Inc. and MTG Engineers and Surveyors (referred to hereafter as the 2014 SRBA Study). These three studies, along with previous efforts, have been previously presented to the NETRWPG and reviewed (results of the more recent SRBA study have been 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 feet 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 probable maximum flood (PMF) elevation of 319.1 feet 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 flood plain 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 feet 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 Water Availability Model (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 acre-feet per year. The difference in yield is the result of different assumptions with regards to the operation of the project:

- The North East Region's yield of 550,842 acre-feet 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 (CWP) 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 acre-feet 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 2018 dollars, was $825.9 million. The total annualized cost of the reservoir (alone), including debt service and operations and maintenance costs, was $51.1 million, which resulted in a unit cost of roughly $93 per ac-ft of firm yield ($0.29/1,000 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 ft. NGVD is 590,000 acre-feet/yr, although with environmental flows considered this yield decreases to 571,710 acre-feet/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 (IDC) added to the estimated capital costs for the reservoirs as well as for the transmission systems (using a 6% annual interest rate on total borrowed funds, less a 4% 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 2018 dollars, is $1.249 billion. Including transmission, the total capital cost of the project is $5.003 billion. The total annualized cost of the project, during debt service is $309.3 million, and after debt service is $75 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 $524 per ac-ft of firm yield ($1.61/1,000 gallons), and after debt service is approximately $127 per ac-ft of firm yield ($0.40/1,000 gallons). Unit costs with environmental flow requirements based on the Lyons method in place during debt service is roughly $541 per ac-ft of firm yield ($1.67/1,000 gallons). After debt service, unit costs considering environmental flows is approximately $131 per ac-ft of firm yield ($0.41/1,000 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% 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 $676 per ac-ft of firm yield ($2.08/1,000 gallons). After debt service, the unit cost is roughly $164 per ac-ft of firm yield ($0.51/1,000 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 streams 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 U.S. Fish & Wildlife Service 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 North East Texas Regional Water Planning Group 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 feet 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 $463.2 million in 2018 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 lists 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 U.S. Fish & Wildlife Service 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 North East Texas Regional Water Planning Group 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 feet 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 July 2013 estimates reported by SRBA (2014) to September 2018 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 $1.53 billion. The project would provide water at a total annual cost, during debt service, of $94.6 million, and $23 million after debt service. 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 $761 per ac-ft of firm yield ($2.34/1,000 gallons), and after debt service is approximately $185 per ac-ft of firm yield ($0.57/1,000 gallons). Unit costs with environmental flow requirements (based on the Lyons method) during debt service is roughly $797 per ac-ft of firm yield ($2.45/1,000 gallons). After debt service, unit costs with environmental flows applied are approximately $193 per ac-ft of firm yield ($0.60/1,000 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% 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 $996 per ac-ft of firm yield ($3.06/1,000 gallons). After debt service, the unit cost is roughly $242 per ac-ft of firm yield ($0.75/1,000 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 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 lists 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 North East Texas Regional Water Planning Group 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 *State Water Plan* 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 feet 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 feet 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 feet 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 $296.7 million to develop the reservoir, the annualized cost of water from the project would be $139 per ac-ft of firm yield ($0.43/1,000 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 $1.4 billion. The project would provide water at a total annual cost, during debt service, of $87.2 million, and $21.2 million after debt service. 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 $702 per ac-ft of firm yield ($2.16/1,000 gallons), and after debt service is approximately $170 per ac-ft of firm yield ($0.53/1,000 gallons). Unit costs with environmental flow requirements (based on the Lyons method) during debt service is roughly $718 per ac-ft of firm yield ($2.21/1,000 gallons). After debt service, unit costs with environmental flows applied are approximately $174 per ac-ft of firm yield ($0.54/1,000 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% 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 $898 per ac-ft of firm yield ($2.76/1,000 gallons). After debt service, the unit cost is roughly $218 per ac-ft of firm yield ($0.67/1,000 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 North East Texas Regional Water Planning Group 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 I*	1,369,717	62,128	550,842	$ 825.9	Not Analyzed	87	Not Analyzed
MARVIN NICHOLS IA	1,532,031	66,103	571,710	$ 1,249	$5,002.7	676	164
MARVIN NICHOLS II*	772,000	35,900	280,100	$ 463.2	Not Analyzed	Not Analyzed	Not Analyzed
PARKHOUSE I	651,712	28,362	118,707	$ 540	$1,530	996	242
PARKHOUSE II	330,871	15,359	121,343	$ 440	$1,410	898	218

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 Texas Administrative Code (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 North East Texas Water Planning Group 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 regional water planning group 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 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 Texas Parks and Wildlife Department 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 North East Texas Regional Planning Group 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 2022 State Water Plan, excepting that per the terms of agreement set forth from the October 5, 2015 mediation between Regions C and D and ratified by the NETRWPG at its October 21, 2015 meeting, the NETRWPG does not challenge Marvin Nichols Reservoir as a unique reservoir site for the purposes of this 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 2021 Region D Plan.

The NETRWPG recognizes that there are 16 locations 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 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 Texas Commission on Environmental Quality (TCEQ). Among its many provisions, 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 regional water planning groups 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 2021 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.*
>
> *(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 2021 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 actives as well as issues in the North East Texas Region.

Throughout the 2021 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 and 2016 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 2021 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. For the purposes of the 2016 Region D Plan, Region D continued to oppose Marvin Nichols Reservoir, but did not challenge Marvin Nichols Reservoir as a unique reservoir site for the purposes of that plan. 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 2022 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. As noted previously, per the terms of agreement set forth from the October 5, 2015 mediation between Regions C and D and ratified by the NETRWPG at its October 21, 2015 meeting, the NETRWPG does not challenge Marvin Nichols Reservoir as a unique reservoir site for the purposes of this 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 2021 Region D Plan.

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 2-10 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. As noted previously, per the terms of agreement set forth from the October 5, 2015 mediation between Regions C and D and ratified by the NETRWPG at its October 21, 2015 meeting, the NETRWPG does not challenge Marvin Nichols Reservoir as a unique reservoir site for the purposes of this 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 2021 Region D Plan.

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 in 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 thirteen 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 $250,000 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 in 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 U. S. Fish and Wildlife Service 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 *Watershed 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/non-regulatory 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, State Bill (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

  - 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 Texas Administrative Code §357.10(43) 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 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.

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 70-80 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 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, 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-Water User Group (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. Analyses in the Sulphur River Basin (SRBA Watershed Study; 2014) suggest that although the historic Drought of Record for the basin is 1951 to 1956, a more significant drought occurs between 2002 and 2006. As a result, the SRBA study suggests the official TCEQ "Sulphur WAM misses the critical drought" that forms the basis for calculations of firm supply, since the official TCEQ WAM for the Sulphur River Basin is based upon historic data from 1940 to 1996. Indeed, an effort is already underway to update the hydrology for Sulphur River Basin WAM that is being funded by the Riverbend Water Resources District. While this effort has not produced a model in time for the purposes of the 2021 Region D Plan, it is likely that the result of this effort will be considered in the next round of water planning for Region D. Further, during the most recent legislative session HB 723 was passed requiring TCEQ to obtain or develop updated water availability models 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.

   Thus, the NETRWPG recommends that the legislature initiate a process through TCEQ to appropriately update the Sabine, and Cypress 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 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 2021 Region D Water Plan be incorporated into the determination of Desired Future Conditions (DFCs) for 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 GMAs 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" (gallons per capita per day) and also known as "municipal per capita usage". Recently, the TWDB 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 present round of 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 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

INFRASTRUCTURE FINANCING ANALYSIS

9.1 Introduction

The Infrastructure Financing Report (IFR) requirement was incorporated into the regional water planning process in response to Senate Bill 2 (77th Texas Legislature). The Texas Administrative Code, 31 TAC 357.44 requires that regional water planning groups shall assess and quantitatively report on how individual local governments, regional authorities, and other political subdivisions in their Regional Water Planning Area (RWPA) propose to finance recommended water management strategies.

According to TWDB guidelines, the primary objectives of the IFR are:

- To determine the number of political subdivisions with identified needs for additional water supplies that will be unable to pay for their water infrastructure needs without some form of outside financial assistance.
- To determine how much of the infrastructure costs in the regional water plans cannot be paid for solely using local utility revenue sources.
- To determine the financing options proposed by political subdivisions to meet future water infrastructure needs (including the identification of any State funding sources considered).
- To determine what role(s) the RWPGs propose for the State in financing the recommended water supply projects.

9.2 Methodology

The NETRWPG obtained the IFR survey material developed by TWDB. In order to help insure statewide consistency, no deviations were allowed by TWDB from the standard survey questions. The NETRWPG then attempted to contact all of the water user groups (WUGs) with recommended water management strategies involving capital costs identified in this round of planning. WUGs with strategies involving only contract renewals were not contacted, since it is assumed that no capital improvements would be required.

Historically, responses to mailed and/or emailed surveys in Region D have been nominal. Anticipating this, the NETRWPG distributed email surveys, then attempted to contact all WUGs via telephone calls, supplemented by additional emails containing the survey when requested or necessary. The information obtained from the surveys is included in Table 9.1. Groundwater strategies with multiple entries represent decadal implementation of groundwater projects per aquifer/basin/county.

9.3 County Aggregates

For county aggregate WUGs (i.e., manufacturing, agriculture, etc.), for which needs were identified during the planning period and where no political subdivision is responsible for providing water supplies, the NETRWPG considered potential funding mechanisms for meeting the water management strategies.

Table 9.1 Infrastructure Financing Report Survey Results

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
B H P WSC	D	B H P WSC - Direct Connection To NTWMD	C	Planning, Design, Permitting & Acquisition Funding	$0.00	
B H P WSC	D	B H P WSC - Direct Connection To NTWMD	C	Construction Funding	$0.00	
B H P WSC	D	B H P WSC - Direct Connection To NTWMD	C	Percent State Participation In Owning Excess Capacity	$0.00	
CADDO BASIN SUD	D	Conservation, Water Loss Control - Caddo Basin SUD	C	Planning, Design, Permitting & Acquisition Funding		
CADDO BASIN SUD	D	Conservation, Water Loss Control - Caddo Basin SUD	C	Construction Funding		
CADDO BASIN SUD	D	Conservation, Water Loss Control - Caddo Basin SUD	C	Percent State Participation In Owning Excess Capacity		
CANTON	D	Canton Indirect Reuse	D	Planning, Design, Permitting & Acquisition Funding	$500,000.00	2021
CANTON	D	Canton Indirect Reuse	D	Construction Funding	$2,000,000.00	2022
CANTON	D	Canton Indirect Reuse	D	Percent State Participation In Owning Excess Capacity	$0.00	
CANTON	D	Drill New Wells (Canton, Carrizo-Wilcox, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$716,000.00	
CANTON	D	Drill New Wells (Canton, Carrizo-Wilcox, Sabine)	D	Construction Funding	$0.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
CANTON	D	Drill New Wells (Canton, Carrizo-Wilcox, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
CASH SUD	D	Cash WSC - Additional Delivery Infrastructure From NTMWD	C	Planning, Design, Permitting & Acquisition Funding	$0.00	
CASH SUD	D	Cash WSC - Additional Delivery Infrastructure From NTMWD	C	Construction Funding	$0.00	
CASH SUD	D	Cash WSC - Additional Delivery Infrastructure From NTMWD	C	Percent State Participation In Owning Excess Capacity	$0.00	
CASH SUD	D	Conservation, Water Loss Control - Cash SUD	C	Planning, Design, Permitting & Acquisition Funding	$0.00	
CASH SUD	D	Conservation, Water Loss Control - Cash SUD	C	Construction Funding	$0.00	
CASH SUD	D	Conservation, Water Loss Control - Cash SUD	C	Percent State Participation In Owning Excess Capacity	$0.00	
CELESTE	D	Drill New Wells (Celeste, Woodbine, Trinity, 2020)	D	Planning, Design, Permitting & Acquisition Funding	$140,000.00	
CELESTE	D	Drill New Wells (Celeste, Woodbine, Trinity, 2020)	D	Construction Funding	$554,000.00	
CELESTE	D	Drill New Wells (Celeste, Woodbine, Trinity, 2020)	D	Percent State Participation In Owning Excess Capacity		
CELESTE	D	Drill New Wells (Celeste, Woodbine, Trinity, 2040)	D	Planning, Design, Permitting & Acquisition Funding	$102,000.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
CELESTE	D	Drill New Wells (Celeste, Woodbine, Trinity, 2040)	D	Construction Funding	$407,000.00	
CELESTE	D	Drill New Wells (Celeste, Woodbine, Trinity, 2040)	D	Percent State Participation In Owning Excess Capacity		
CELESTE	D	Drill New Wells (Celeste, Woodbine, Trinity, 2060)	D	Planning, Design, Permitting & Acquisition Funding	$102,000.00	
CELESTE	D	Drill New Wells (Celeste, Woodbine, Trinity, 2060)	D	Construction Funding	$407,000.00	
CELESTE	D	Drill New Wells (Celeste, Woodbine, Trinity, 2060)	D	Percent State Participation In Owning Excess Capacity		
CELESTE	D	New Contract With Greenville And Pipeline To Celeste	D	Planning, Design, Permitting & Acquisition Funding	$650,000.00	
CELESTE	D	New Contract With Greenville And Pipeline To Celeste	D	Construction Funding	$2,692,000.00	
CELESTE	D	New Contract With Greenville And Pipeline To Celeste	D	Percent State Participation In Owning Excess Capacity		
CLARKSVILLE	D	Contract With Texarkana And Treated Water Pipeline To Dekalb (Clarksville, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
CLARKSVILLE	D	Contract With Texarkana And Treated Water Pipeline To Dekalb (Clarksville, Sulphur)	D	Construction Funding	$0.00	
CLARKSVILLE	D	Contract With Texarkana And Treated Water Pipeline To Dekalb (Clarksville, Sulphur)	D	Percent State Participation In Owning Excess Capacity	$0.00	
COUNTY-OTHER, CASS	D	Drill New Wells (County Other,	D	Planning, Design,		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
		Cass, Carrizo, Cypress)		Permitting & Acquisition Funding		
COUNTY-OTHER, CASS	D	Drill New Wells (County Other, Cass, Carrizo, Cypress)	D	Construction Funding		
COUNTY-OTHER, CASS	D	Drill New Wells (County Other, Cass, Carrizo, Cypress)	D	Percent State Participation In Owning Excess Capacity		
COUNTY-OTHER, CASS	D	Drill New Wells (County Other, Cass, Carrizo, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding		
COUNTY-OTHER, CASS	D	Drill New Wells (County Other, Cass, Carrizo, Sulphur)	D	Construction Funding		
COUNTY-OTHER, CASS	D	Drill New Wells (County Other, Cass, Carrizo, Sulphur)	D	Percent State Participation In Owning Excess Capacity		
CRYSTAL SYSTEMS TEXAS	D	Crystal Systems Conservation	I	Planning, Design, Permitting & Acquisition Funding	$0.00	
CRYSTAL SYSTEMS TEXAS	D	Crystal Systems Conservation	I	Construction Funding	$0.00	
CRYSTAL SYSTEMS TEXAS	D	Crystal Systems Conservation	I	Percent State Participation In Owning Excess Capacity	$0.00	
CRYSTAL SYSTEMS TEXAS	D	Drill New Wells (Crystal Systems Inc, Carrizo, Neches)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
CRYSTAL SYSTEMS TEXAS	D	Drill New Wells (Crystal Systems Inc, Carrizo, Neches)	D	Construction Funding	$0.00	
CRYSTAL SYSTEMS TEXAS	D	Drill New Wells (Crystal Systems Inc, Carrizo, Neches)	D	Percent State Participation In Owning Excess Capacity	$0.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
CRYSTAL SYSTEMS TEXAS	D	Drill New Wells (Crystal Systems Inc, Carrizo, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
CRYSTAL SYSTEMS TEXAS	D	Drill New Wells (Crystal Systems Inc, Carrizo, Sabine)	D	Construction Funding	$0.00	
CRYSTAL SYSTEMS TEXAS	D	Drill New Wells (Crystal Systems Inc, Carrizo, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
CRYSTAL SYSTEMS TEXAS	D	Smth-Cys - Infrastructure	I	Planning, Design, Permitting & Acquisition Funding	$0.00	
CRYSTAL SYSTEMS TEXAS	D	Smth-Cys - Infrastructure	I	Construction Funding	$0.00	
CRYSTAL SYSTEMS TEXAS	D	Smth-Cys - Infrastructure	I	Percent State Participation In Owning Excess Capacity	$0.00	
CUMBY	D	Drill New Wells (Cumby, Hopkins, Nacatoch, Sabine, 2020)	D	Planning, Design, Permitting & Acquisition Funding		
CUMBY	D	Drill New Wells (Cumby, Hopkins, Nacatoch, Sabine, 2020)	D	Construction Funding		
CUMBY	D	Drill New Wells (Cumby, Hopkins, Nacatoch, Sabine, 2020)	D	Percent State Participation In Owning Excess Capacity		
CUMBY	D	Drill New Wells (Cumby, Hopkins, Nacatoch, Sabine, 2070)	D	Planning, Design, Permitting & Acquisition Funding		
CUMBY	D	Drill New Wells (Cumby, Hopkins, Nacatoch, Sabine, 2070)	D	Construction Funding		
CUMBY	D	Drill New Wells (Cumby, Hopkins,	D	Percent State Participation In		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
		Nacatoch, Sabine, 2070)		Owning Excess Capacity		
EDOM WSC	D	Drill New Well (Edom WSC, Van Zandt, Carrizo, Neches, 2020)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
EDOM WSC	D	Drill New Well (Edom WSC, Van Zandt, Carrizo, Neches, 2020)	D	Construction Funding	$0.00	
EDOM WSC	D	Drill New Well (Edom WSC, Van Zandt, Carrizo, Neches, 2020)	D	Percent State Participation In Owning Excess Capacity	$0.00	
EDOM WSC	D	Drill New Well (Edom WSC, Van Zandt, Carrizo, Neches, 2050)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
EDOM WSC	D	Drill New Well (Edom WSC, Van Zandt, Carrizo, Neches, 2050)	D	Construction Funding	$0.00	
EDOM WSC	D	Drill New Well (Edom WSC, Van Zandt, Carrizo, Neches, 2050)	D	Percent State Participation In Owning Excess Capacity	$0.00	
EDOM WSC	D	Drill New Well (Edom WSC, Van Zandt, Carrizo, Neches, 2070)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
EDOM WSC	D	Drill New Well (Edom WSC, Van Zandt, Carrizo, Neches, 2070)	D	Construction Funding	$0.00	
EDOM WSC	D	Drill New Well (Edom WSC, Van Zandt, Carrizo, Neches, 2070)	D	Percent State Participation In Owning Excess Capacity	$0.00	
GILMER	D	Drill New Wells (Gilmer, Carrizo, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
GILMER	D	Drill New Wells (Gilmer, Carrizo, Cypress)	D	Construction Funding	$0.00	
GILMER	D	Drill New Wells (Gilmer, Carrizo, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
GREENVILLE	D	New WTP Greenville	D	Planning, Design, Permitting & Acquisition Funding		
GREENVILLE	D	New WTP Greenville	D	Construction Funding		
GREENVILLE	D	New WTP Greenville	D	Percent State Participation In Owning Excess Capacity		
GREENVILLE	D	WTP Expansion 2030 (Greenville, Sabine)	D	Planning, Design, Permitting & Acquisition Funding		
GREENVILLE	D	WTP Expansion 2030 (Greenville, Sabine)	D	Construction Funding		
GREENVILLE	D	WTP Expansion 2030 (Greenville, Sabine)	D	Percent State Participation In Owning Excess Capacity		
HARLETON WSC	D	Increase Existing Contract (Harleton, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
HARLETON WSC	D	Increase Existing Contract (Harleton, Cypress)	D	Construction Funding	$0.00	
HARLETON WSC	D	Increase Existing Contract (Harleton, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
HICKORY CREEK SUD	D	New Contract With Greenville And Pipeline To Hickory Creek SUD	D	Planning, Design, Permitting & Acquisition Funding		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
HICKORY CREEK SUD	D	New Contract With Greenville And Pipeline To Hickory Creek SUD	D	Construction Funding		
HICKORY CREEK SUD	D	New Contract With Greenville And Pipeline To Hickory Creek SUD	D	Percent State Participation In Owning Excess Capacity		
HOLLY SPRINGS WSC	D	Increase Existing Contract (Holly Springs, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
HOLLY SPRINGS WSC	D	Increase Existing Contract (Holly Springs, Cypress)	D	Construction Funding	$0.00	
HOLLY SPRINGS WSC	D	Increase Existing Contract (Holly Springs, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
IRRIGATION, BOWIE	D	Drill New Wells (Bowie Irrigation, Carrizo-Wilcox, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding		
IRRIGATION, BOWIE	D	Drill New Wells (Bowie Irrigation, Carrizo-Wilcox, Sulphur)	D	Construction Funding		
IRRIGATION, BOWIE	D	Drill New Wells (Bowie Irrigation, Carrizo-Wilcox, Sulphur)	D	Percent State Participation In Owning Excess Capacity		
IRRIGATION, HARRISON	D	Drill New Wells (Irrigation Harrison, Queen City, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
IRRIGATION, HARRISON	D	Drill New Wells (Irrigation Harrison, Queen City, Cypress)	D	Construction Funding	$0.00	
IRRIGATION, HARRISON	D	Drill New Wells (Irrigation Harrison, Queen City, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
IRRIGATION, HARRISON	D	Drill New Wells (Irrigation Harrison, Queen City, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
IRRIGATION, HARRISON	D	Drill New Wells (Irrigation Harrison, Queen City, Sabine)	D	Construction Funding	$0.00	
IRRIGATION, HARRISON	D	Drill New Wells (Irrigation Harrison, Queen City, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
IRRIGATION, HOPKINS	D	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sabine, 2040)	D	Planning, Design, Permitting & Acquisition Funding		
IRRIGATION, HOPKINS	D	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sabine, 2040)	D	Construction Funding		
IRRIGATION, HOPKINS	D	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sabine, 2040)	D	Percent State Participation In Owning Excess Capacity		
IRRIGATION, HOPKINS	D	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sabine, 2060)	D	Planning, Design, Permitting & Acquisition Funding		
IRRIGATION, HOPKINS	D	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sabine, 2060)	D	Construction Funding		
IRRIGATION, HOPKINS	D	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sabine, 2060)	D	Percent State Participation In Owning Excess Capacity		
IRRIGATION, HOPKINS	D	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding		
IRRIGATION, HOPKINS	D	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sulphur)	D	Construction Funding		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
IRRIGATION, HOPKINS	D	Drill New Wells (Irrigation Hopkins, Carrizo-Wilcox, Sulphur)	D	Percent State Participation In Owning Excess Capacity		
IRRIGATION, HUNT	D	Drill New Wells (Irrigation Hunt, Nacatoch, Sabine)	D	Planning, Design, Permitting & Acquisition Funding		
IRRIGATION, HUNT	D	Drill New Wells (Irrigation Hunt, Nacatoch, Sabine)	D	Construction Funding		
IRRIGATION, HUNT	D	Drill New Wells (Irrigation Hunt, Nacatoch, Sabine)	D	Percent State Participation In Owning Excess Capacity		
IRRIGATION, LAMAR	D	Pat Mayse Raw Water Pipeline (Irrigation Lamar, Red)	D	Planning, Design, Permitting & Acquisition Funding		
IRRIGATION, LAMAR	D	Pat Mayse Raw Water Pipeline (Irrigation Lamar, Red)	D	Construction Funding		
IRRIGATION, LAMAR	D	Pat Mayse Raw Water Pipeline (Irrigation Lamar, Red)	D	Percent State Participation In Owning Excess Capacity		
IRRIGATION, RED RIVER	D	Drill New Wells (Irrigation, Red River, Nacatoch, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding		
IRRIGATION, RED RIVER	D	Drill New Wells (Irrigation, Red River, Nacatoch, Sulphur)	D	Construction Funding		
IRRIGATION, RED RIVER	D	Drill New Wells (Irrigation, Red River, Nacatoch, Sulphur)	D	Percent State Participation In Owning Excess Capacity		
IRRIGATION, VAN ZANDT	D	Drill New Wells (Irrigation Van Zandt, Queen, Neches)	D	Planning, Design, Permitting & Acquisition Funding		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
IRRIGATION, VAN ZANDT	D	Drill New Wells (Irrigation Van Zandt, Queen, Neches)	D	Construction Funding		
IRRIGATION, VAN ZANDT	D	Drill New Wells (Irrigation Van Zandt, Queen, Neches)	D	Percent State Participation In Owning Excess Capacity		
LEIGH WSC	D	Drill New Wells (Leigh, Queen City, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$193,000.00	2030
LEIGH WSC	D	Drill New Wells (Leigh, Queen City, Cypress)	D	Construction Funding	$464,667.00	2030
LEIGH WSC	D	Drill New Wells (Leigh, Queen City, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
LINDALE	D	Drill New Wells (Lindale, Carrizo, Neches)	D	Planning, Design, Permitting & Acquisition Funding	$362,833.00	2025
LINDALE	D	Drill New Wells (Lindale, Carrizo, Neches)	D	Construction Funding	$902,500.00	2025
LINDALE	D	Drill New Wells (Lindale, Carrizo, Neches)	D	Percent State Participation In Owning Excess Capacity	$0.00	
LINDALE	D	Smth-LDL-Infrastructure	I	Planning, Design, Permitting & Acquisition Funding		
LINDALE	D	Smth-LDL-Infrastructure	I	Construction Funding		
LINDALE	D	Smth-LDL-Infrastructure	I	Percent State Participation In Owning Excess Capacity		
LITTLE HOPE MOORE WSC	D	Drill New Well (Little Hope Moore WSC, Van Zandt, Carrizo, Neches	D	Planning, Design, Permitting & Acquisition Funding	$0.00	2034

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
LITTLE HOPE MOORE WSC	D	Drill New Well (Little Hope Moore WSC, Van Zandt, Carrizo, Neches	D	Construction Funding	$0.00	2035
LITTLE HOPE MOORE WSC	D	Drill New Well (Little Hope Moore WSC, Van Zandt, Carrizo, Neches	D	Percent State Participation In Owning Excess Capacity	$0.00	
LIVESTOCK, BOWIE	D	Drill New Wells (Livestock Bowie , Nacatoch, Red)	D	Planning, Design, Permitting & Acquisition Funding		
LIVESTOCK, BOWIE	D	Drill New Wells (Livestock Bowie , Nacatoch, Red)	D	Construction Funding		
LIVESTOCK, BOWIE	D	Drill New Wells (Livestock Bowie , Nacatoch, Red)	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, BOWIE	D	Drill New Wells (Livestock, Bowie, Carrizo-Wilcox, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding		
LIVESTOCK, BOWIE	D	Drill New Wells (Livestock, Bowie, Carrizo-Wilcox, Sulphur)	D	Construction Funding		
LIVESTOCK, BOWIE	D	Drill New Wells (Livestock, Bowie, Carrizo-Wilcox, Sulphur)	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, CAMP	D	Drill New Wells (Livestock, Camp, Queen, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
LIVESTOCK, CAMP	D	Drill New Wells (Livestock, Camp, Queen, Cypress)	D	Construction Funding	$0.00	
LIVESTOCK, CAMP	D	Drill New Wells (Livestock, Camp, Queen, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
LIVESTOCK, CASS	D	Drill New Wells (Livestock, Cass,	D	Planning, Design, Permitting &	$0.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
		Queen City, Cypress)		Acquisition Funding		
LIVESTOCK, CASS	D	Drill New Wells (Livestock, Cass, Queen City, Cypress)	D	Construction Funding	$0.00	
LIVESTOCK, CASS	D	Drill New Wells (Livestock, Cass, Queen City, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
LIVESTOCK, CASS	D	Drill New Wells (Livestock, Cass, Queen City, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
LIVESTOCK, CASS	D	Drill New Wells (Livestock, Cass, Queen City, Sulphur)	D	Construction Funding	$0.00	
LIVESTOCK, CASS	D	Drill New Wells (Livestock, Cass, Queen City, Sulphur)	D	Percent State Participation In Owning Excess Capacity	$0.00	
LIVESTOCK, DELTA	D	Drill New Wells (Livestock, Delta, Nacatoch, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding		
LIVESTOCK, DELTA	D	Drill New Wells (Livestock, Delta, Nacatoch, Sulphur)	D	Construction Funding		
LIVESTOCK, DELTA	D	Drill New Wells (Livestock, Delta, Nacatoch, Sulphur)	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, FRANKLIN	D	Drill New Wells (Livestock, Franklin, Carrizo, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
LIVESTOCK, FRANKLIN	D	Drill New Wells (Livestock, Franklin, Carrizo, Cypress)	D	Construction Funding	$0.00	
LIVESTOCK, FRANKLIN	D	Drill New Wells (Livestock, Franklin, Carrizo, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
LIVESTOCK, FRANKLIN	D	Drill New Wells (Livestock, Franklin, Carrizo, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
LIVESTOCK, FRANKLIN	D	Drill New Wells (Livestock, Franklin, Carrizo, Sulphur)	D	Construction Funding	$0.00	
LIVESTOCK, FRANKLIN	D	Drill New Wells (Livestock, Franklin, Carrizo, Sulphur)	D	Percent State Participation In Owning Excess Capacity	$0.00	
LIVESTOCK, HOPKINS	D	Drill New Wells (Livestock Hopkins, Hopkins, Carrizo, Sulphur, 2020)	D	Planning, Design, Permitting & Acquisition Funding		
LIVESTOCK, HOPKINS	D	Drill New Wells (Livestock Hopkins, Hopkins, Carrizo, Sulphur, 2020)	D	Construction Funding		
LIVESTOCK, HOPKINS	D	Drill New Wells (Livestock Hopkins, Hopkins, Carrizo, Sulphur, 2020)	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, HOPKINS	D	Drill New Wells (Livestock Hopkins, Hopkins, Carrizo, Sulphur, 2060)	D	Planning, Design, Permitting & Acquisition Funding		
LIVESTOCK, HOPKINS	D	Drill New Wells (Livestock Hopkins, Hopkins, Carrizo, Sulphur, 2060)	D	Construction Funding		
LIVESTOCK, HOPKINS	D	Drill New Wells (Livestock Hopkins, Hopkins, Carrizo, Sulphur, 2060)	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, HUNT	D	Drill New Well (Livestock Hunt, Trinity, Sabine)	D	Planning, Design, Permitting & Acquisition Funding		
LIVESTOCK, HUNT	D	Drill New Well (Livestock Hunt, Trinity, Sabine)	D	Construction Funding		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
LIVESTOCK, HUNT	D	Drill New Well (Livestock Hunt, Trinity, Sabine)	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, LAMAR	D	New Contract And Pipeline To Lamar Co WSD For Lamar Livestock	D	Planning, Design, Permitting & Acquisition Funding		
LIVESTOCK, LAMAR	D	New Contract And Pipeline To Lamar Co WSD For Lamar Livestock	D	Construction Funding		
LIVESTOCK, LAMAR	D	New Contract And Pipeline To Lamar Co WSD For Lamar Livestock	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, MORRIS	D	Drill New Wells (Livestock, Morris, Queen City, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
LIVESTOCK, MORRIS	D	Drill New Wells (Livestock, Morris, Queen City, Cypress)	D	Construction Funding	$0.00	
LIVESTOCK, MORRIS	D	Drill New Wells (Livestock, Morris, Queen City, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
LIVESTOCK, MORRIS	D	Drill New Wells (Livestock, Morris, Queen City, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
LIVESTOCK, MORRIS	D	Drill New Wells (Livestock, Morris, Queen City, Sulphur)	D	Construction Funding	$0.00	
LIVESTOCK, MORRIS	D	Drill New Wells (Livestock, Morris, Queen City, Sulphur)	D	Percent State Participation In Owning Excess Capacity	$0.00	
LIVESTOCK, RED RIVER	D	Drill New Wells (Livestock Red River, Blossom, Red)	D	Planning, Design, Permitting & Acquisition Funding		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
LIVESTOCK, RED RIVER	D	Drill New Wells (Livestock Red River, Blossom, Red)	D	Construction Funding		
LIVESTOCK, RED RIVER	D	Drill New Wells (Livestock Red River, Blossom, Red)	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, RED RIVER	D	Drill New Wells (Livestock Red River, Trinity Aquifer, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding		
LIVESTOCK, RED RIVER	D	Drill New Wells (Livestock Red River, Trinity Aquifer, Sulphur)	D	Construction Funding		
LIVESTOCK, RED RIVER	D	Drill New Wells (Livestock Red River, Trinity Aquifer, Sulphur)	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, TITUS	D	Drill New Wells (Livestock Titus, Carrizo, Cypress, 2020)	D	Planning, Design, Permitting & Acquisition Funding		
LIVESTOCK, TITUS	D	Drill New Wells (Livestock Titus, Carrizo, Cypress, 2020)	D	Construction Funding		
LIVESTOCK, TITUS	D	Drill New Wells (Livestock Titus, Carrizo, Cypress, 2020)	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, TITUS	D	Drill New Wells (Livestock Titus, Carrizo, Cypress, 2030)	D	Planning, Design, Permitting & Acquisition Funding		
LIVESTOCK, TITUS	D	Drill New Wells (Livestock Titus, Carrizo, Cypress, 2030)	D	Construction Funding		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
LIVESTOCK, TITUS	D	Drill New Wells (Livestock Titus, Carrizo, Cypress, 2030)	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, TITUS	D	Drill New Wells (Livestock Titus, Carrizo, Sulphur)	D	Planning, Design, Permitting & Acquisition Funding		
LIVESTOCK, TITUS	D	Drill New Wells (Livestock Titus, Carrizo, Sulphur)	D	Construction Funding		
LIVESTOCK, TITUS	D	Drill New Wells (Livestock Titus, Carrizo, Sulphur)	D	Percent State Participation In Owning Excess Capacity		
LIVESTOCK, UPSHUR	D	Drill New Wells (Livestock, Upshur, Queen City, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
LIVESTOCK, UPSHUR	D	Drill New Wells (Livestock, Upshur, Queen City, Cypress)	D	Construction Funding	$0.00	
LIVESTOCK, UPSHUR	D	Drill New Wells (Livestock, Upshur, Queen City, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
LIVESTOCK, UPSHUR	D	Drill New Wells (Livestock, Upshur, Queen City, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
LIVESTOCK, UPSHUR	D	Drill New Wells (Livestock, Upshur, Queen City, Sabine)	D	Construction Funding	$0.00	
LIVESTOCK, UPSHUR	D	Drill New Wells (Livestock, Upshur, Queen City, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
LIVESTOCK, WOOD	D	Drill New Well (Livestock, Wood, Queen City, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
LIVESTOCK, WOOD	D	Drill New Well (Livestock, Wood, Queen City, Sabine)	D	Construction Funding	$0.00	
LIVESTOCK, WOOD	D	Drill New Well (Livestock, Wood, Queen City, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
MANUFACTURING, UPSHUR	D	Drill New Wells (Manufacturing Upshur, Queen City, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
MANUFACTURING, UPSHUR	D	Drill New Wells (Manufacturing Upshur, Queen City, Cypress)	D	Construction Funding	$0.00	
MANUFACTURING, UPSHUR	D	Drill New Wells (Manufacturing Upshur, Queen City, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
MANUFACTURING, VAN ZANDT	D	Drill New Wells (Manufacturing Van Zandt, Carrizo-Wilcox, Trinity, 2020)	D	Planning, Design, Permitting & Acquisition Funding		
MANUFACTURING, VAN ZANDT	D	Drill New Wells (Manufacturing Van Zandt, Carrizo-Wilcox, Trinity, 2020)	D	Construction Funding		
MANUFACTURING, VAN ZANDT	D	Drill New Wells (Manufacturing Van Zandt, Carrizo-Wilcox, Trinity, 2020)	D	Percent State Participation In Owning Excess Capacity		
MANUFACTURING, VAN ZANDT	D	Drill New Wells (Manufacturing Van Zandt, Carrizo-Wilcox, Trinity, 2030)	D	Planning, Design, Permitting & Acquisition Funding		
MANUFACTURING, VAN ZANDT	D	Drill New Wells (Manufacturing Van Zandt, Carrizo-Wilcox, Trinity, 2030)	D	Construction Funding		
MANUFACTURING, VAN ZANDT	D	Drill New Wells (Manufacturing Van Zandt, Carrizo-	D	Percent State Participation In Owning Excess Capacity		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
		Wilcox, Trinity, 2030)				
MANUFACTURING, WOOD	D	Drill New Wells (Manufacturing, Wood, Queen City, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
MANUFACTURING, WOOD	D	Drill New Wells (Manufacturing, Wood, Queen City, Sabine)	D	Construction Funding	$0.00	
MANUFACTURING, WOOD	D	Drill New Wells (Manufacturing, Wood, Queen City, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
MILLER GROVE WSC	D	Drill New Wells (Miller Grove WSC, Hopkins, Carrizo-Wilcox, Sulphur, 2020)	D	Planning, Design, Permitting & Acquisition Funding		
MILLER GROVE WSC	D	Drill New Wells (Miller Grove WSC, Hopkins, Carrizo-Wilcox, Sulphur, 2020)	D	Construction Funding		
MILLER GROVE WSC	D	Drill New Wells (Miller Grove WSC, Hopkins, Carrizo-Wilcox, Sulphur, 2020)	D	Percent State Participation In Owning Excess Capacity		
MILLER GROVE WSC	D	Drill New Wells (Miller Grove WSC, Hopkins, Carrizo-Wilcox, Sulphur, 2070)	D	Planning, Design, Permitting & Acquisition Funding		
MILLER GROVE WSC	D	Drill New Wells (Miller Grove WSC, Hopkins, Carrizo-Wilcox, Sulphur, 2070)	D	Construction Funding		
MILLER GROVE WSC	D	Drill New Wells (Miller Grove WSC, Hopkins, Carrizo-Wilcox, Sulphur, 2070)	D	Percent State Participation In Owning Excess Capacity		
MINING, GREGG	D	Drill New Wells (Mining Gregg, Carrizo-Wilcox, Sabine)	D	Planning, Design, Permitting &	$0.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
				Acquisition Funding		
MINING, GREGG	D	Drill New Wells (Mining Gregg, Carrizo-Wilcox, Sabine)	D	Construction Funding	$0.00	
MINING, GREGG	D	Drill New Wells (Mining Gregg, Carrizo-Wilcox, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
MINING, HARRISON	D	Drill New Wells (Mining Harrison, Queen City, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
MINING, HARRISON	D	Drill New Wells (Mining Harrison, Queen City, Cypress)	D	Construction Funding	$0.00	
MINING, HARRISON	D	Drill New Wells (Mining Harrison, Queen City, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
MINING, HARRISON	D	Drill New Wells (Mining Harrison, Queen City, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
MINING, HARRISON	D	Drill New Wells (Mining Harrison, Queen City, Sabine)	D	Construction Funding	$0.00	
MINING, HARRISON	D	Drill New Wells (Mining Harrison, Queen City, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
MINING, HOPKINS	D	Drill New Wells (Mining Hopkins, Hopkins, Carrizo, Sulphur, 2020)	D	Planning, Design, Permitting & Acquisition Funding		
MINING, HOPKINS	D	Drill New Wells (Mining Hopkins, Hopkins, Carrizo, Sulphur, 2020)	D	Construction Funding		
MINING, HOPKINS	D	Drill New Wells (Mining Hopkins, Hopkins, Carrizo, Sulphur, 2020)	D	Percent State Participation In Owning Excess Capacity		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
MINING, HOPKINS	D	Drill New Wells (Mining Hopkins, Hopkins, Carrizo, Sulphur, 2050)	D	Planning, Design, Permitting & Acquisition Funding		
MINING, HOPKINS	D	Drill New Wells (Mining Hopkins, Hopkins, Carrizo, Sulphur, 2050)	D	Construction Funding		
MINING, HOPKINS	D	Drill New Wells (Mining Hopkins, Hopkins, Carrizo, Sulphur, 2050)	D	Percent State Participation In Owning Excess Capacity		
MINING, HOPKINS	D	Drill New Wells (Mining Hopkins, Hopkins, Carrizo, Sulphur, 2060)	D	Planning, Design, Permitting & Acquisition Funding		
MINING, HOPKINS	D	Drill New Wells (Mining Hopkins, Hopkins, Carrizo, Sulphur, 2060)	D	Construction Funding		
MINING, HOPKINS	D	Drill New Wells (Mining Hopkins, Hopkins, Carrizo, Sulphur, 2060)	D	Percent State Participation In Owning Excess Capacity		
MINING, HUNT	D	Drill New Wells (Mining Hunt, Trinity, Sabine)	D	Planning, Design, Permitting & Acquisition Funding		
MINING, HUNT	D	Drill New Wells (Mining Hunt, Trinity, Sabine)	D	Construction Funding		
MINING, HUNT	D	Drill New Wells (Mining Hunt, Trinity, Sabine)	D	Percent State Participation In Owning Excess Capacity		
MINING, MARION	D	Drill New Wells (Mining Marion, Queen City, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
MINING, MARION	D	Drill New Wells (Mining Marion, Queen City, Cypress)	D	Construction Funding	$0.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
MINING, MARION	D	Drill New Wells (Mining Marion, Queen City, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
MINING, SMITH	D	Smth-Min-Infrastructure	I	Planning, Design, Permitting & Acquisition Funding	$0.00	
MINING, SMITH	D	Smth-Min-Infrastructure	I	Construction Funding	$0.00	
MINING, SMITH	D	Smth-Min-Infrastructure	I	Percent State Participation In Owning Excess Capacity	$0.00	
NORTH HARRISON WSC	D	Drill New Wells (North Harrison, Queen City, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$181,000.00	2058
NORTH HARRISON WSC	D	Drill New Wells (North Harrison, Queen City, Cypress)	D	Construction Funding	$431,000.00	2058
NORTH HARRISON WSC	D	Drill New Wells (North Harrison, Queen City, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2020)	D	Planning, Design, Permitting & Acquisition Funding	$300,000.00	2021
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2020)	D	Construction Funding	$1,193,000.00	2021
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2020)	D	Percent State Participation In Owning Excess Capacity		
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2030)	D	Planning, Design, Permitting & Acquisition Funding	$210,000.00	
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD,	D	Construction Funding	$844,000.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
		Hunt, Nacatoch, Sabine, 2030)				
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2030)	D	Percent State Participation In Owning Excess Capacity		
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2040)	D	Planning, Design, Permitting & Acquisition Funding	$210,000.00	
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2040)	D	Construction Funding	$844,000.00	
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2040)	D	Percent State Participation In Owning Excess Capacity		
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2050)	D	Planning, Design, Permitting & Acquisition Funding	$400,000.00	
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2050)	D	Construction Funding	$1,598,000.00	
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2050)	D	Percent State Participation In Owning Excess Capacity		
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2060)	D	Planning, Design, Permitting & Acquisition Funding	$585,000.00	
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2060)	D	Construction Funding	$2,347,000.00	
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2060)	D	Percent State Participation In Owning Excess Capacity		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2070)	D	Planning, Design, Permitting & Acquisition Funding	$580,000.00	
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2070)	D	Construction Funding	$2,322,000.00	
NORTH HUNT SUD	D	Drill New Wells (North Hunt SUD, Hunt, Nacatoch, Sabine, 2070)	D	Percent State Participation In Owning Excess Capacity		
PANOLA-BETHANY WSC	D	Drill New Wells (Panola Bethany, Queen City, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
PANOLA-BETHANY WSC	D	Drill New Wells (Panola Bethany, Queen City, Sabine)	D	Construction Funding	$0.00	
PANOLA-BETHANY WSC	D	Drill New Wells (Panola Bethany, Queen City, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
POETRY WSC	D	Conservation, Water Loss Control - Poetry WSC	C	Planning, Design, Permitting & Acquisition Funding		
POETRY WSC	D	Conservation, Water Loss Control - Poetry WSC	C	Construction Funding		
POETRY WSC	D	Conservation, Water Loss Control - Poetry WSC	C	Percent State Participation In Owning Excess Capacity		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2030)	D	Planning, Design, Permitting & Acquisition Funding		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2030)	D	Construction Funding		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-	D	Percent State Participation In		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
		Wilcox, Neches, 2030)		Owning Excess Capacity		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2040)	D	Planning, Design, Permitting & Acquisition Funding		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2040)	D	Construction Funding		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2040)	D	Percent State Participation In Owning Excess Capacity		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2050)	D	Planning, Design, Permitting & Acquisition Funding		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2050)	D	Construction Funding		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2050)	D	Percent State Participation In Owning Excess Capacity		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2060)	D	Planning, Design, Permitting & Acquisition Funding		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2060)	D	Construction Funding		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2060)	D	Percent State Participation In Owning Excess Capacity		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2070)	D	Planning, Design, Permitting & Acquisition Funding		
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-	D	Construction Funding		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
		Wilcox, Neches, 2070)				
R P M WSC	D	Drill New Wells (R-P-M WSC, Carrizo-Wilcox, Neches, 2070)	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend Strategy Cass New WTP And Transmission Line	D	Planning, Design, Permitting & Acquisition Funding	$6,446,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend Strategy Cass New WTP And Transmission Line	D	Construction Funding	$16,361,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend Strategy Cass New WTP And Transmission Line	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Interim To Ultimate Storage Conversion	D	Planning, Design, Permitting & Acquisition Funding	$20,550,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Interim To Ultimate Storage Conversion	D	Construction Funding	$0.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Interim To Ultimate Storage Conversion	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS New Raw Water Intake 120 Mgd 2030	D	Planning, Design, Permitting & Acquisition Funding	$3,884,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS New Raw Water Intake 120 Mgd 2030	D	Construction Funding	$9,398,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS New Raw Water Intake 120 Mgd 2030	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER	D	Riverbend WMS New Raw Water	D	Planning, Design, Permitting &	$5,955,000.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
RESOURCES DISTRICT		Pipeline 32 Mgd 2050		Acquisition Funding		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS New Raw Water Pipeline 32 Mgd 2050	D	Construction Funding	$16,168,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS New Raw Water Pipeline 32 Mgd 2050	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS New WTP 25 Mgd 2030	D	Planning, Design, Permitting & Acquisition Funding	$35,881,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS New WTP 25 Mgd 2030	D	Construction Funding	$91,930,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS New WTP 25 Mgd 2030	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Pump Station Expansion 18 Mgd 2050	D	Planning, Design, Permitting & Acquisition Funding	$3,618,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Pump Station Expansion 18 Mgd 2050	D	Construction Funding	$7,985,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Pump Station Expansion 18 Mgd 2050	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Pump Station Expansion 30 Mgd 2060	D	Planning, Design, Permitting & Acquisition Funding	$4,972,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Pump Station Expansion 30 Mgd 2060	D	Construction Funding	$12,759,000.00	
RIVERBEND WATER	D	Riverbend WMS Pump Station	D	Percent State Participation In		

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
RESOURCES DISTRICT		Expansion 30 Mgd 2060		Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Pump Station Expansion 6 Mgd 2040	D	Planning, Design, Permitting & Acquisition Funding	$1,091,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Pump Station Expansion 6 Mgd 2040	D	Construction Funding	$2,734,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Pump Station Expansion 6 Mgd 2040	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Raw Water Pipeline 72 Mgd 2030	D	Planning, Design, Permitting & Acquisition Funding	$9,459,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Raw Water Pipeline 72 Mgd 2030	D	Construction Funding	$26,602,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Raw Water Pipeline 72 Mgd 2030	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Raw Water Pump Station 66 Mgd 2030	D	Planning, Design, Permitting & Acquisition Funding	$12,950,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Raw Water Pump Station 66 Mgd 2030	D	Construction Funding	$32,091,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Raw Water Pump Station 66 Mgd 2030	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Water Right Amendment	D	Planning, Design, Permitting & Acquisition Funding	$103,000.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Water Right Amendment	D	Construction Funding	$0.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS Water Right Amendment	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS WTP Expansion 10 Mgd 2050	D	Planning, Design, Permitting & Acquisition Funding	$9,484,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS WTP Expansion 10 Mgd 2050	D	Construction Funding	$23,864,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS WTP Expansion 10 Mgd 2050	D	Percent State Participation In Owning Excess Capacity		
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS WTP Expansion 5 Mgd 2040	D	Planning, Design, Permitting & Acquisition Funding	$5,462,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS WTP Expansion 5 Mgd 2040	D	Construction Funding	$14,068,000.00	
RIVERBEND WATER RESOURCES DISTRICT	D	Riverbend WMS WTP Expansion 5 Mgd 2040	D	Percent State Participation In Owning Excess Capacity		
SCOTTSVILLE	D	Drill New Wells (Scottsville, Queen City, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$142,667.00	2030
SCOTTSVILLE	D	Drill New Wells (Scottsville, Queen City, Cypress)	D	Construction Funding	$333,667.00	2030
SCOTTSVILLE	D	Drill New Wells (Scottsville, Queen City, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
SMITH COUNTY MUD 1	D	Drill New Wells (Smith County Mud 1, Queen City, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
SMITH COUNTY MUD 1	D	Drill New Wells (Smith County Mud 1, Queen City, Sabine)	D	Construction Funding	$0.00	
SMITH COUNTY MUD 1	D	Drill New Wells (Smith County Mud 1, Queen City, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
STAR MOUNTAIN WSC	D	Drill New Wells (Star Mountain, Queen City, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
STAR MOUNTAIN WSC	D	Drill New Wells (Star Mountain, Queen City, Sabine)	D	Construction Funding	$0.00	
STAR MOUNTAIN WSC	D	Drill New Wells (Star Mountain, Queen City, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
STARRVILLE-FRIENDSHIP WSC	D	Drill New Wells (Starrville Friendship, Carrizo, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$222,000.00	2058
STARRVILLE-FRIENDSHIP WSC	D	Drill New Wells (Starrville Friendship, Carrizo, Sabine)	D	Construction Funding	$539,000.00	2058
STARRVILLE-FRIENDSHIP WSC	D	Drill New Wells (Starrville Friendship, Carrizo, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
WASKOM	D	Drill New Wells (Waskom, Queen City, Cypress)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
WASKOM	D	Drill New Wells (Waskom, Queen City, Cypress)	D	Construction Funding	$0.00	

Sponsor	Primary Region	Project Name	Sponsor Region	IFR Element	IFR Value	Year Of Need
WASKOM	D	Drill New Wells (Waskom, Queen City, Cypress)	D	Percent State Participation In Owning Excess Capacity	$0.00	
WINONA	D	Drill New Wells (Winona, Carrizo-Wilcox, Sabine)	D	Planning, Design, Permitting & Acquisition Funding	$0.00	
WINONA	D	Drill New Wells (Winona, Carrizo-Wilcox, Sabine)	D	Construction Funding	$0.00	
WINONA	D	Drill New Wells (Winona, Carrizo-Wilcox, Sabine)	D	Percent State Participation In Owning Excess Capacity	$0.00	
WOLFE CITY	D	New Contract With Greenville And Pipeline To Wolfe City	D	Planning, Design, Permitting & Acquisition Funding		
WOLFE CITY	D	New Contract With Greenville And Pipeline To Wolfe City	D	Construction Funding		
WOLFE CITY	D	New Contract With Greenville And Pipeline To Wolfe City	D	Percent State Participation In Owning Excess Capacity		

In the North East Texas Region, there are twenty-nine (29) WUGs with water needs and corresponding water management strategies where no political subdivision is responsible for providing water supply. Since there is no one entity that is responsible for water supply, these WUGs were not sent an IFR survey form. During determination of the water management strategies, information regarding the cause of the water supply shortages was used to determine what type(s) of funding might be sought to provide water supply. County aggregate needs in the North East Texas Region are for irrigation, manufacturing, mining, and steam electric power generation WUGs. Water shortages for steam electric power generation, manufacturing, and mining WUGs are anticipated due to projected increases in customers and accordant demands over the planning horizon. Irrigation needs are projected due to increasing agricultural growth projected for the region. The NETRWPG has determined that since facilities associated with these WUGs are normally owned by private companies that are not eligible for State or Federal assistance, financing for these WMSs will likely come from private funding, unless the WMS is associated with the purchase of supply from a political subdivision.

9.4 Survey Findings

The NETRWPG identified 78 entities with needs during this planning round. Twenty-nine of these entities have contractual shortages, meaning that a simple renewal or increase of existing water purchase contracts has been recommended and will not require capital expenditure or new sources of supply. Since there is no capital funding required to meet this type of water need, entities with contractual shortages were not included in the IFR survey process. The 29 county aggregate WUGs with needs are mentioned above, 11 of which with contractual strategies. There are thus a total of 31 WUGs with water shortages that require capital costs and were involved in the IFR survey process.

The NETRWPG consultants contacted (or attempted to contact) each of the 31 entities with water management strategies requiring capital costs via phone and/or email. Questions from the TWDB survey form regarding anticipated funding sources that the WUG might access to implement the water management strategy. Once attempts had been made to contact all 31 WUGs, the survey results were compiled into Table 9.1. Completed survey forms have been included in Appendix C9.

Survey findings are as follows:

- Nine WUGs who responded to the survey indicated their intent to seek some level of financial assistance from the State.
- Five WUGs who responded to the survey indicated they do not, at present, intend to seek some level of financial assistance from the State.
- As in previous rounds of the water planning process, comments were received indicating the State should provide assistance through grants or interest-free loans for smaller projects. Many of the smaller systems could use financial assistance for projects less than $300,000.
- Many of the entities within Region D qualify as rural, and seek to ensure that such a qualification is considered by the State when financial aid is sought.

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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 are 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.

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 Northeast Texas Municipal Water District), and the NETRWPG Chairs Linda Price, Richard LeTourneau, and 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 NETMWD, 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 made 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 was also available on the internet, and in the administrator's office in Hughes Springs in Cass County, although the office is in Morris County.

10.3 Public Meetings and Hearings

10.3.1 Public Hearings and Comments on the Initially Prepared Plan

Initially, 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 prescribed public hearing was held on June 11, 2020, at Mount Pleasant in Titus County to allow interested persons to comment on the IPP. All oral and written comments were recorded and were considered by the NETRWPG in this adopted Regional Water Plan. This meeting was scheduled to allow the public to make comments prior to the completion of the final adopted Regional Water Plan.

All public comments provided either orally or in writing at the public meetings and hearing as well as comments received by interested parties who were not able to attend the public hearing are summarized in Appendix C10 and were considered by the NETRWPG prior to adoption of the final Regional Water Plan.

The public hearing was publicized with news releases and advance notice at a previous NETRWPG monthly public meeting. Approximately 50 people attended the public hearing in Mount Pleasant.

10.3.2 Summary of the Public Hearing

In advance of the June 11, 2020, public hearing held to solicit comments on the NETRWPG IPP, the hearing was well-publicized with news releases, and advance notice at a previous NETRWPG meeting.

Most of those attending the public hearing and presenting oral comments opposed the inclusion of Marvin Nichols Reservoir as a Water Management Strategy in the Region D Plan, Region C Plan, and the State Water Plan. A detailed transcription of all public comments received at this hearing is presented in Appendix C10-3. Responses to these comments are included in Appendix C10-6.

10.3.3 Synopsis of Oral and Written Comments

In addition to the oral comments provided at the June 11, 2020, public hearing on the IPP, the NETRWPG received thirty-one (31) comments to the IPP. Some emails received contained multiple comments, for a total of thirty-eight (38) comments in all. As noted previously, a summary of the comments provided at this public hearing on the IPP is presented in Appendix C10-3. Written comments on the IPP as submitted by the public are presented in Appendix C10-4, whereas written comments as submitted by other agencies are presented in Appendix C10-5. Written comments were accepted from the time of publication of the IPP (March 3, 2020) through August 11, 2020, sixty (60) days subsequent to the date of the Public Hearing.

Thirty-four (34) comments were submitted which reflect the opinion of the commenter but did not specifically request any changes to the text of the Plan (referred to as Group 1 herein). These comments are typically considered as general in nature, with the majority of comments expressing opposition to Marvin Nichols Reservoir as a recommended WMS in the Region D, Region C, or State Water Plans. Several comments included suggested alternatives for consideration. Four (4) comments were received commenting upon facts which were incorrectly stated or necessitating additional information or clarity to improve the quality of the Plan (referred to as Group 2 herein).

The Group 1 and 2 comments on the IPP are presented in Table 10.1 below.

Table 10.1 Summary of Comments on the 2021 Initially Prepared Plan

No.	Date	Name	Entity	Form of Comment	Location in Final 2021 Plan	Subject	Response
1-1	06/12/20	Jim Vignali	Self	Written	Appendix C10-4	Against Marvin Nichols, proposes alternative strategies	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan. A list of alternative strategies suggested by commenters to the Region D IPP has been aggregated and presented herein.
1-2	06/25/20	Adam Morin	Self	Written	Appendix C10-4	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-3	06/19/20	Kelly Kennedy	Self	Written	Appendix C10-4	Against Marvin Nichols, proposes alternative strategies	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan. A list of alternative strategies suggested by commenters to the Region D IPP has been aggregated and presented herein.

No.	Date	Name	Entity	Form of Comment	Location in Final 2021 Plan	Subject	Response
1-4	06/19/20	Aaron and Wendi Whitley	Self	Written	Appendix C10-4	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-5	06/19/20	Stephanie Wright	Self	Written	Appendix C10-4	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-6	06/19/20	Kasey Crawford	Self	Written	Appendix C10-4	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-7	06/18/20	Marla Ballard	Self	Written	Appendix C10-4	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-8	04/06/19	Laura Ashley Overdyke	Caddo Lake Institute	Written	Appendix C10-4	Supports emphasis on environmental flows and balancing of needs	No change required.

No.	Date	Name	Entity	Form of Comment	Location in Final 2021 Plan	Subject	Response
1-9	04/06/19	Laura Ashley Overdyke	Caddo Lake Institute	Written	Appendix C10-4	Grateful for celebrating success of Paddlefish restoration	No change required.
1-10	04/06/19	Laura Ashley Overdyke	Caddo Lake Institute	Written	Appendix C10-4	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-11	04/06/19	Laura Ashley Overdyke	Caddo Lake Institute	Written	Appendix C10-4	Expresses hope to see mining demand revised downwards after closing of multiple Coal Fired Power Plants in region	Demands for WUGs in the NETRWPA were formally adopted by the TWDB during the early portion of the planning process. Changes in specific non-municipal demand projections, such as for mining, will manifest through the development of revised projections for the purposes of the next planning cycle, and will incorporate more recent reported water use.
1-12	04/06/19	Laura Ashley Overdyke	Caddo Lake Institute	Written	Appendix C10-4	Preference for stronger stance against Little Cypress Reservoir as it would negatively impact Caddo Lake	The NETRWPG has not taken a position encouraging development of Little Cypress Reservoir, as the Little Cypress Reservoir is not identified as a recommended water management strategy for the purposes of the 2021 Regional Water Plan.
1-13	04/06/19	Laura Ashley Overdyke	Caddo Lake Institute	Written	Appendix C10-4	Support for designation of Black Cypress as an ecologically unique stream segment	No change required.

No.	Date	Name	Entity	Form of Comment	Location in Final 2021 Plan	Subject	Response
1-14	03/30/20	Walt Sears, Jr.	Northeast Texas Municipal Water District	Written	Appendix C10-4	Historical information on regional planning process and historical voting members	No change required.
1-15	03/20/20	Walt Sears, Jr.	Northeast Texas Municipal Water District	Written	Appendix C10-4	Sharing of surplus water with those who have need for it is worth pursuing	No change required.
1-16	03/18/20	Walt Sears, Jr.	Northeast Texas Municipal Water District	Written	Appendix C10-4	Conservation is important, presenting and comparing information on conservation from the Region C and Region D IPPs	No change required.
1-17	03/20/20	Walt Sears, Jr.	Northeast Texas Municipal Water District	Written	Appendix C10-4	Discusses interregional coordination, provides communication from Region C, and suggests language in the IPP be considered as a beginning point on the topic of Marvin Nichols Reservoir	No change required.
1-18	03/13/20	Walt Sears, Jr.	Northeast Texas Municipal Water District	Written	Appendix C10-4	Presents historical information on negotiations relating to Lake Bob Sandlin, and encourages a path forward for negotiation, not confrontation, relating to Marvin Nichols Reservoir	No change required.

No.	Date	Name	Entity	Form of Comment	Location in Final 2021 Plan	Subject	Response
1-19	06/11/20	Richard LeTourneau	Self	Oral	Appendix C10-3	Against Marvin Nichols, timing of Marvin Nichols has changed from the 2015 agreement, and asserts his position that a conflict exists between Region C and Region D again	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-20	06/11/20	Gary Cheatwood	Self	Oral	Appendix C10-3	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-21	06/11/20	Eddie Belcher	Self	Oral	Appendix C10-3	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-22	06/11/20	David Stewart	Self	Oral	Appendix C10-3	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.

No.	Date	Name	Entity	Form of Comment	Location in Final 2021 Plan	Subject	Response
1-23	06/11/20	Lindy Guest	Self	Oral	Appendix C10-3	Against Marvin Nichols. Poses multiple questions. 1. If Marvin Nichols ever happened, who would decide what the land prices would be? 2. What will happen to our taxes? 3. If the land is going to be developed, then why would they have mitigation and take our land and turn right around and develop it? 4. Why don't they consider other reasonable alternatives?	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan. Regarding the questions asked in this comment: 1. Acquisition costs are principally the responsibility of the Project Sponsor, which would include some form of negotiation. 2. Tax rates are established by local taxing entities. The tax base of those entities is affected by numerous factors, including how a property is used. The most recent information on the Marvin Nichols Reservoir is that the tax base of the taxing entities in Franklin, Red River, and Titus County would increase. (Sulphur River Basin Feasibility Study). 3. Mitigation is the primary responsibility of the project sponsor, which is required to be consistent with USACE requirements. 4. The project sponsor will be required to vet reasonable alternatives as part of the USACE permitting process. The Planning Rules require analysis of reasonable feasible alternatives.

No.	Date	Name	Entity	Form of Comment	Location in Final 2021 Plan	Subject	Response
1-24	06/11/20	Joe Coats	Self	Oral	Appendix C10-3	Against Marvin Nichols. Supports conservative water practices. Against Nestle and Ozarka bottling East Texas water, supports use of municipal water.	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-25	06/11/20	Aaron Rolen	Self	Oral	Appendix C10-3	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-26	06/11/20	Max Shumake	Self	Oral	Appendix C10-3	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-27	06/11/20	Heath Holt	Self	Oral	Appendix C10-3	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.

No.	Date	Name	Entity	Form of Comment	Location in Final 2021 Plan	Subject	Response
1-28	06/11/20	Martha Dalby	Self	Oral	Appendix C10-3	Against Marvin Nichols	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-29	06/11/20	D.D. Vignali	Self	Oral	Appendix C10-3	Against Marvin Nichols. Requests interregional coordination meetings be set up with opportunities for public comment at the end of the meetings.	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
1-30	06/11/20	J.B. Watson	Self	Oral	Appendix C10-3	Against Marvin Nichols. Indicates two revisions to the Region D IPP.	Drafts of individual chapters of the 2021 Region D IPP were developed over the course of the 5-year development process. These were finalized into a single, two volume document. A single formal Region D IPP was adopted and hardcopies distributed to libraries and the County Clerk offices in each of the 19 counties within the region, and was made available for download at www.netmwd.com.
1-31	06/11/20	J.B. Watson	Self	Oral	Appendix C10-3	Indicates Region D IPP lacks declaration of opposition to Marvin Nichols Reservoir. Requests declaration of conflict within the Final Plan.	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.

No.	Date	Name	Entity	Form of Comment	Location in Final 2021 Plan	Subject	Response
1-32	06/11/20	J.B. Watson	Self	Oral	Appendix C10-3	Identifies alternative groundwater source in Arkansas. Requests identification of potential groundwater supply from Arkansas within the Region D Plan.	A list of alternative strategies suggested by commenters to the Region D IPP has been aggregated and presented herein.
1-33	07/06/20	John Denison	Self	Written	Appendix C10-4	Against Marvin Nichols, proposes alternative strategies.	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan. A list of alternative strategies suggested by commenters to the Region D IPP has been aggregated and presented herein.
1-34	08/10/20	Mike McCoy	Self	Written	Appendix C10-4	Against Marvin Nichols, supportive of other strategies and fair land pricing	The IPP and Final 2021 Region D Water Plan include statements in Section ES.6.8, Section 6.9, and Section 6.10, indicating the NETRWPG's continued position that Marvin Nichols Reservoir should not be included as a water management strategy in any regional water plan or the State Water Plan.
2-1	03/02/20	Greg Carter	AE Power	Written	Appendix C10-4	Requests removal of references to combined cycle power plant in Hunt County	See Group 2 responses below.
2-2	05/18/20	Laura M. Rex	City of Big Sandy	Written	Appendix C10-4	Requests copy of Initially Prepared Plan	See Group 2 responses below.
2-3	03/24/20	Walt Sears, Jr.	Northeast Texas Municipal	Written	Appendix C10-4	Suggests that content about navigation in Section 1.5.4 in the IPP be adjusted to include more	See Group 2 responses below.

No.	Date	Name	Entity	Form of Comment	Location in Final 2021 Plan	Subject	Response
			Water District			information about navigation and the Cypress Valley Navigation District	
2-4	06/18/20	Barry Mahler Rex Isom	Texas State Soil and Water Conservation Board	Written	Appendix C10-5	Requests Page 1-50 be revised to more accurately reflect the offering of programs specifically from the Texas State Soil and Water Conservation Board	See Group 2 responses below.
2-5	8/18/20	Cindy Loeffler	Texas Parks and Wildlife Department	Written	Appendix C10-5	Update list of Threatened and Endangered Species.	See Group 2 responses below.
2-6	8/18/20	Cindy Loeffler	Texas Parks and Wildlife Department	Written	Appendix C10-5	Potential impacts to spring flows and spring ecosystems should also be addressed.	See Group 2 responses below.

Responses to the Group 1 comments are reflected in Table 10.1 above. More details regarding citing references within this Plan regarding the Region C Marvin Nichols Reservoir strategy are presented in Appendix C10-6.

Responses to the Group 2 comments are addressed by topic, as shown below.

Comment 2-1: Mr. Greg Carter, Engineering Principal at AE Power, requests that references to the combined cycle power plant in Hunt County should be removed, as the PUCT has included the Hunt County Cobisa project as cancelled in a 2017 update. References to this plant have been removed from the descriptions of power generation in Hunt County relating to recommended and alternative strategies for the City of Greenville in Appendix C5-7 and Appendix C5-11, respectively.

Comment 2-2: Ms. Laura M. Rex, City Administrator for the City of Big Sandy, requested a copy of the Region D IPP. A hardcopy of the 2021 Region D Initially Prepared Plan was sent to the City of Big Sandy.

Comment 2-3: Mr. Walt Sears, Jr., General Manager of the Northeast Texas Municipal Water District, suggested that content about navigation in Section 1.5.4 be adjusted to include more information about navigation and the Cypress Valley Navigation District. Section 1.5.4 has been revised to include additional information on the Cypress Valley Navigation District, its' activities, and relevant navigation projects reported by USACE.

Comment 2-4: Mr. Barry Mahler, Chairman, and Mr. Rex Isom, Executive Director, of the Texas State Soil and Water Conservation Board (TSSWCB), requested Page 1-50 of the Region D IPP to be revised to more accurately reflect the offering of programs specifically from the TSSWCB. Language in the Final Region D Water Plan (Chapter 1, pg. 1-52) has been revised to more accurately reflect offerings of the Section 319 program from the Texas State Soil and Water Conservation Board. Additional information presented as part of the submitted comments regarding activities of the TSSWCB has been incorporated into Section 1.6.1 in the Final Report.

Comment 2-5: Texas Parks and Wildlife Department comments that threatened and endangered species are listed in Table 1.12. Please note there have been recent updates (March 30, 2020) to the list of federal and state listed species and Species of Greatest Conservation need. We recommend that you update Table 1.12 with the latest information that is available at: https://tpwd.texas.gov/huntwild/wild/wildlife_diversity/nongame/listed-species/. Table 1.14 (formerly Table 1.12) and associated text have been updated to reflect the latest available information, along with tables in Chapter 6.

Comment 2-6: Texas Parks and Wildlife Department comments that potential impacts to spring flows and spring ecosystems should also be addressed where additional groundwater development was identified as a water management strategy. TWDB planning rules require that groundwater supplies not exceed the Modeled Available Groundwater (MAG) values that were determined to meet the desired future conditions (DFCs) of the groundwater source. However, adopted DFCs for aquifers in Region D do not address protection of springs or groundwater surface water interaction. Ultimately TPWD would like to see DFCs adopted to protect these features. Section 8.14.13, Item 6, has been revised to include the following statement:

Such coordination could further consider the protection of springs and groundwater surface water interaction.

10.4 Texas Water Development Board Comments

The TWDB reviewed the IPP and submitted comments on their findings by letter to Mr. Jim Thompson, Chairman, North East Texas Regional Water Planning Group, dated June 18, 2020.

This letter (presented in Appendix C10—1) included thirty-two (32) Level 1 comments, and fourteen (14) Level 2 comments. A memorandum providing responses to each of these comments is included in Appendix C10-2.

10.5 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.

10.6 Attachments

The following attachments are included in Appendix C10 (see Table of Contents, Appendix C10, for specific locations) of the Final 2021 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.

10.7 Certification of Initially Prepared Plan

This document is the certified 2021 North East Texas Regional Water Plan, being complete and adopted by the North East Texas Regional Water Planning Group at its September 30, 2020 public meeting.

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Chapter 11

IMPLEMENTATION AND COMPARISON TO PREVIOUS REGIONAL WATER PLAN

11.1 Implementation of Previous Regional Water Plan

As a result of statutory requirements from SB 660 (82nd Legislative Session) the planning rules (31 TAC §357.45(a)) require that each region report the level of implementation of previously recommended WMSs meeting needs. The content of this required section in the plans is largely supported by data summaries based on information provided by Regional Water Planning Groups (RWPGs) through DB22 during the planning cycle.

11.1.1 Implementation Survey Process

Information needed to report on implementation of the previous 2016 Region D Regional Water Plan (RWP) was collected through a survey. The NETRWPG and their technical consultants contacted the project sponsors to fill in the data.

Additional methods considered for identifying implemented projects included:

1. Tracking changes since the last plan including:
    a. Changes in existing Water User Group (WUG) or Wholesale Water Provider (WWP) supplies (e.g., water provider reporting a previously recommended WMS as an existing supply in the 2021 RWP).
    b. Identifying WMSs that are not recommended in the latest plan, possibly due to implementation.
2. Use of Texas Water Development Board (TWDB) funding records to identify projects (Water Infrastructure Fund (WIF), State Participation, Drinking Water State Revolving Fund (DWSRF), Economically Distressed Areas Program (EDAP), etc.).
3. Conservation implementation reports submitted to TWDB (i.e., conservation volumes are higher from previous report).

11.1.2 Survey Content and Data Format

Surveys were distributed to all of the identified WUGs within the Region D RWPA. In addition to questions regarding existing supplies, the survey included questions regarding what, if any, changes to water supply sources occurred since the 2016 Region D Plan. A relatively small percentage of responses were received. An additional telephone survey was performed in an attempt to contact all WUGs with a WMS in the 2016 Region D Plan. The results of this survey are presented in Table 11.1 below, with more detailed results presented in Appendix C11.

Table 11.1 Projects Implemented since 2016 Region D Plan

WUG	Project Description
BI COUNTY WSC	Groundwater
BRINKER WSC	Renewed Contract
CANTON	Groundwater Indirect Reuse
CASH SUD	Conservation Revised Contract
CLARKSVILLE	Groundwater
CRYSTAL SYSTEMS INC	Groundwater
DEKALB	Renewed Contract
GILMER	Groundwater
HOOKS	Renewed Contract
LEIGH WSC	Groundwater
LINDALE	Groundwater
MACBEE SUD	Conservation
MACEDONIA	Renewed Contract
MANUFACTURING, BOWIE	New Contract
MAUD	Renewed Contract
NASH	Renewed Contract
NEW BOSTON	Renewed Contract
REDWATER	Renewed Contract
RIVERBEND WATER RESOURCES DISTRICT	Renewed Contract(s)
TEXAMERICAS CENTER	New Contract
TEXARKANA	Conservation Renewed Contract
TRI SUD	Renewed Contract
WAKE VILLAGE	Renewed Contract
WASKOM	Groundwater

11.2 Comparison to Previous Regional Water Plan

This section includes a brief summary demonstrating how the 2021 Region D Plan differs from the previous 2016 Region D RWP. Comparisons include summary tables and other graphics, as appropriate, that concisely convey the changes between plans for the North East Texas Region. Comparisons of the two RWPs are provided in the following categories:

- Water demand projections.
- Drought of record and the hydrologic and modeling assumptions on which the plans are based.
- Water availability at the sources.
- Existing water supplies of WUGs.

- WUG and WWP needs.
- Recommended and alternative Water Management Strategies (WMSs).
- Any other aspects of the plans that the RWPG chose to compare.

The comparisons include a brief explanation of the underlying reasons for the changes that occurred regarding each of the above categories, where appropriate. Note that for the purposes of the 2016 Region D Plan, the planning period analyzed was 2020 – 2070 and that entities were limited to their jurisdictional boundaries, whereas for the current 2021 Region D Plan the planning period analyzed is the same 2020 – 2070 but the basis for the plan is on a complete entity level not jurisdictional boundaries.

11.2.1 Water Demand Projections

Projected regional water demands within the North East Texas Region as presented in Chapter 2, Table 2.1, of this plan are represented in Table 11.2. As stated in Chapter 2, municipal demands will be the dominant water use in the region, accounting for roughly 32 percent of water demand at present and 42 percent of water demand in 2070. Projected regional water demands within the North East Texas Region as presented in Chapter 2, Table 2.1, of the 2016 RWP are presented in Table 11.3.

Table 11.2 2021 Population and Water Demand Projections Summary for the North East Texas Region

Total Regional Projection	2020	2030	2040	2050	2060	2070
Population	**831,469**	**907,531**	**988,859**	**1,089,197**	**1,211,979**	**1,370,438**
Water Demand (ac-ft)						
Municipal	129,308	137,442	147,334	161,229	179,350	202,860
Manufacturing	99,795	104,975	104,975	104,975	104,975	104,975
Irrigation	35,354	35,354	35,354	35,354	35,354	35,354
Steam Electric	94,174	94,174	94,174	94,174	94,174	94,174
Mining	7,115	7,748	7,670	7,280	6,914	6,795
Livestock	35,673	35,706	35,571	35,369	35,202	35,163
TOTAL WATER DEMAND (AC-FT)	**401,419**	**415,399**	**425,078**	**438,381**	**455,969**	**479,321**

Table 11.3 2016 Population and Water Demand Projections Summary for the North East Texas Region

Total Regional Projection	2020	2030	2040	2050	2060	2070
Population	**831,469**	**907,531**	**988,859**	**1,089,197**	**1,211,979**	**1,370,438**
Water Demand (ac-ft)						
Municipal	134,310	142,631	152,536	166,385	184,540	208,132
Manufacturing	332,070	355,072	377,273	396,249	425,638	457,217
Irrigation	40,866	40,737	40,442	39,913	39,413	39,138
Steam Electric	96,574	112,905	132,815	157,084	186,668	222,648
Mining	7,115	7,748	7,670	7,280	6,914	6,795
Livestock	23,237	23,281	23,220	23,116	23,036	23,042
TOTAL WATER DEMAND (AC-FT)	**634,172**	**682,374**	**733,956**	**790,027**	**866,209**	**956,972**

Comparisons of projected demands by decade for each WUG type are displayed in Figures 11.1 – 11.6. While these summaries of demands are informative, it should be noted that individually, significant differences exist between the two plans with respect to demands. Demands for small municipalities and rural areas are significantly less, given that for the past two rounds of planning a floor of 60 gpcd was established by the TWDB, rather than the 115 gpcd adopted by the NETRWPG in earlier rounds of planning.

The figures below demonstrate that the projected municipal demands for the 2021 Region D Plan are slightly less than those of the 2016 Plan (~3% by 2070). Manufacturing has seen the most dramatic change with projected demands decreased from the 2016 Region D Plan by as much as 77 percent by 2070. Projected steam-electric power generation demands have decreased by as much as 58 percent from the 2016 plan. The projected demands for irrigation marginally decrease by as much as 10 percent, whereas mining demands are unchanged from the previous round of planning. Projected livestock demands are the only category for which projected demands have increased from the previous round by as much as 53 percent by 2070. Differences in the projections for demands between the planning periods are likely due to a number of different factors, with the greatest impact being from changes in the methodologies for projecting non-municipal demands, although slight changes may also be due to water conservation practices and the availability of improved data.

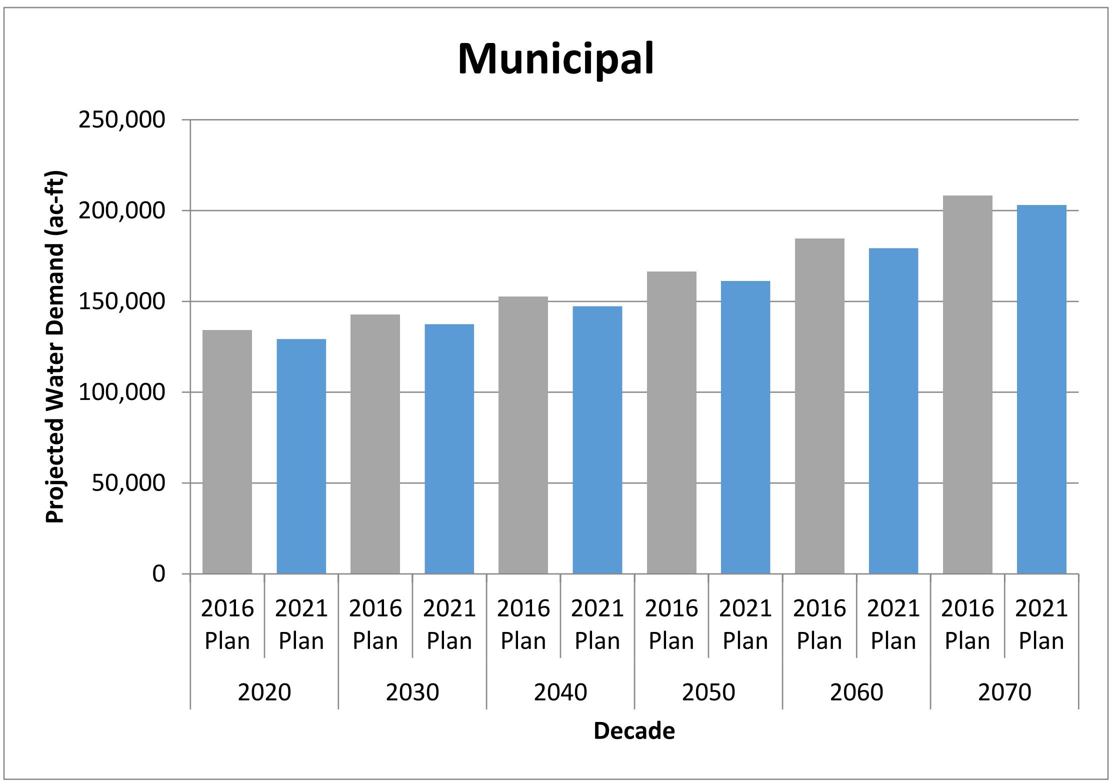

Figure 11.1 Comparison of Projected Municipal Demands in Region D by Decade

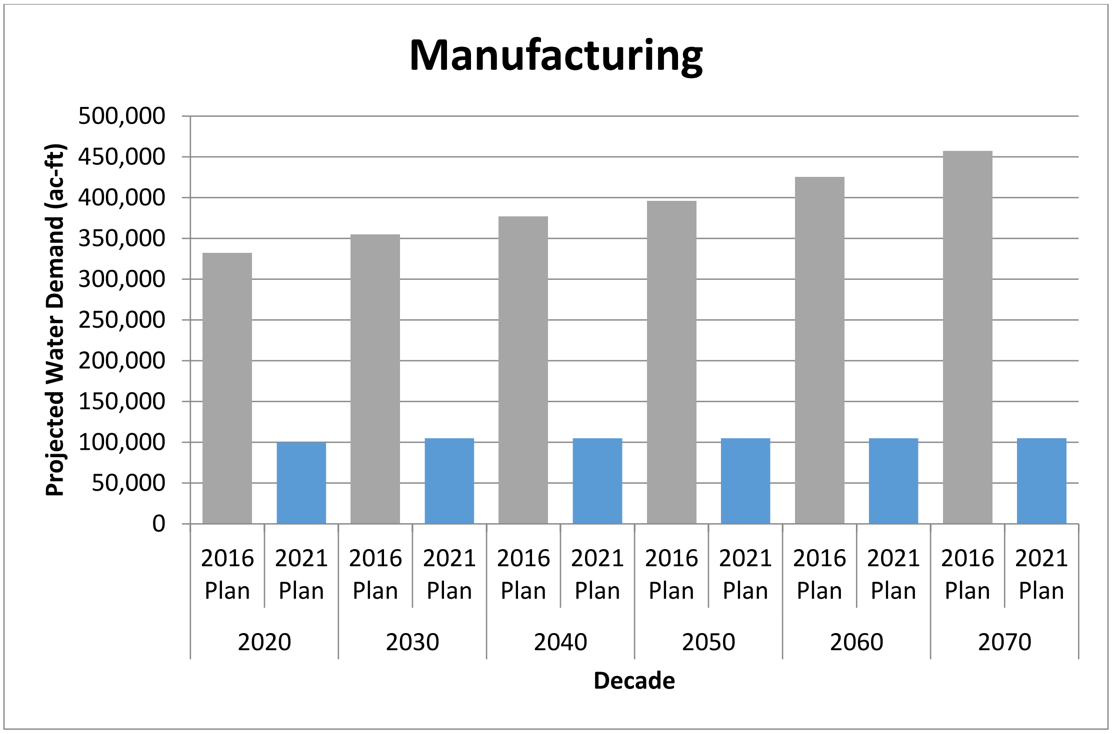

Figure 11.2 Comparison of Projected Manufacturing Demands in Region D by Decade

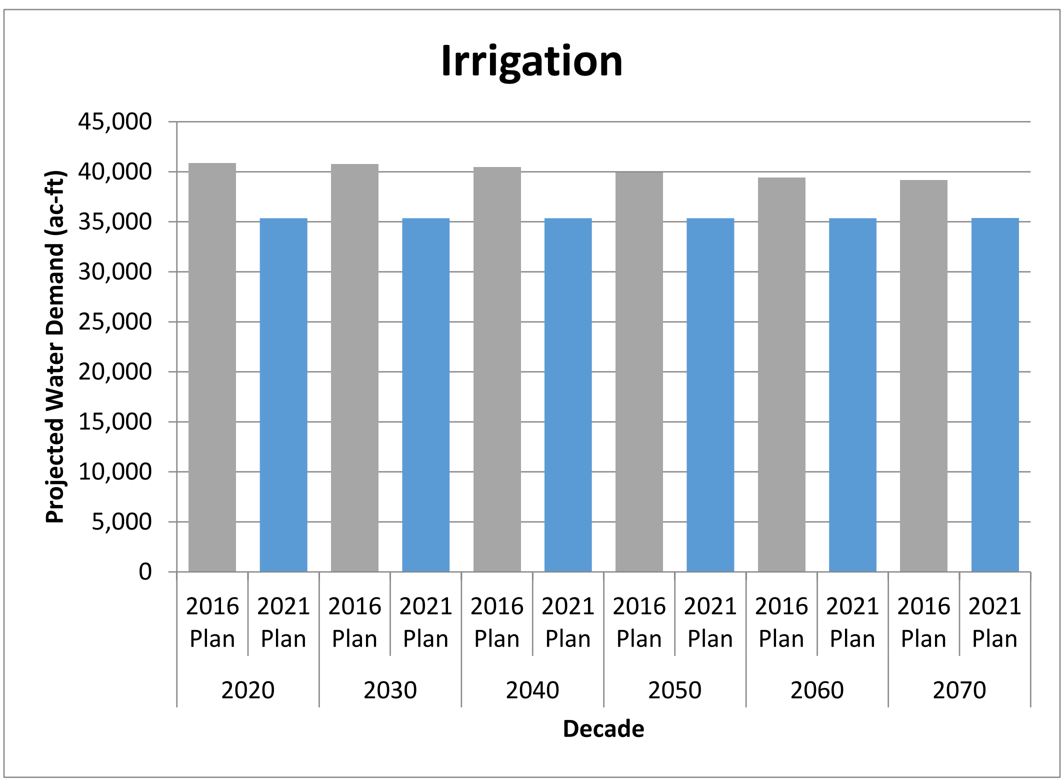

Figure 11.3 Comparison of Projected Irrigation Demands in Region D by Decade

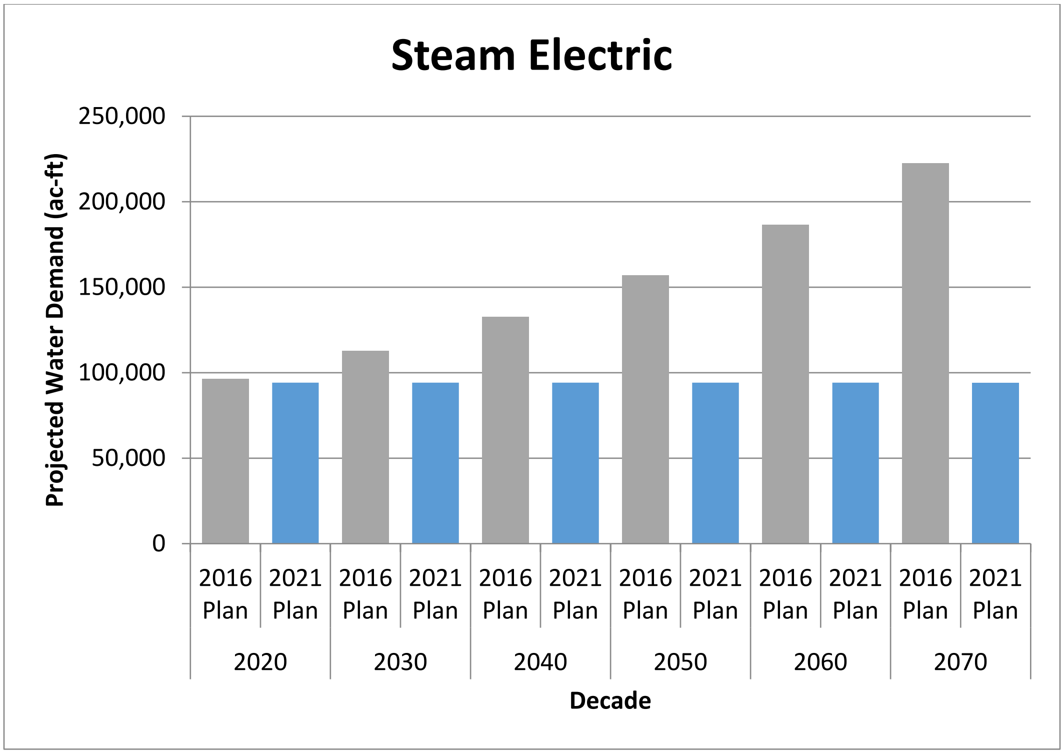

Figure 11.4 Comparison of Projected Steam Electric Demands in Region D by Decade

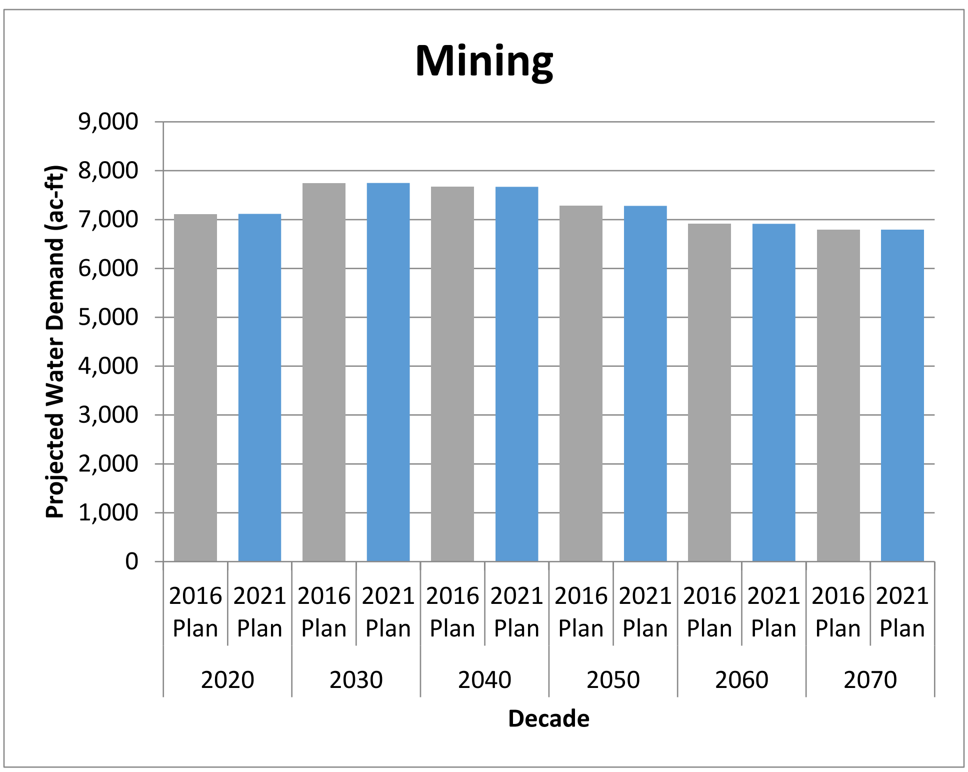

Figure 11.5 Comparison of Projected Mining Demands in Region D by Decade

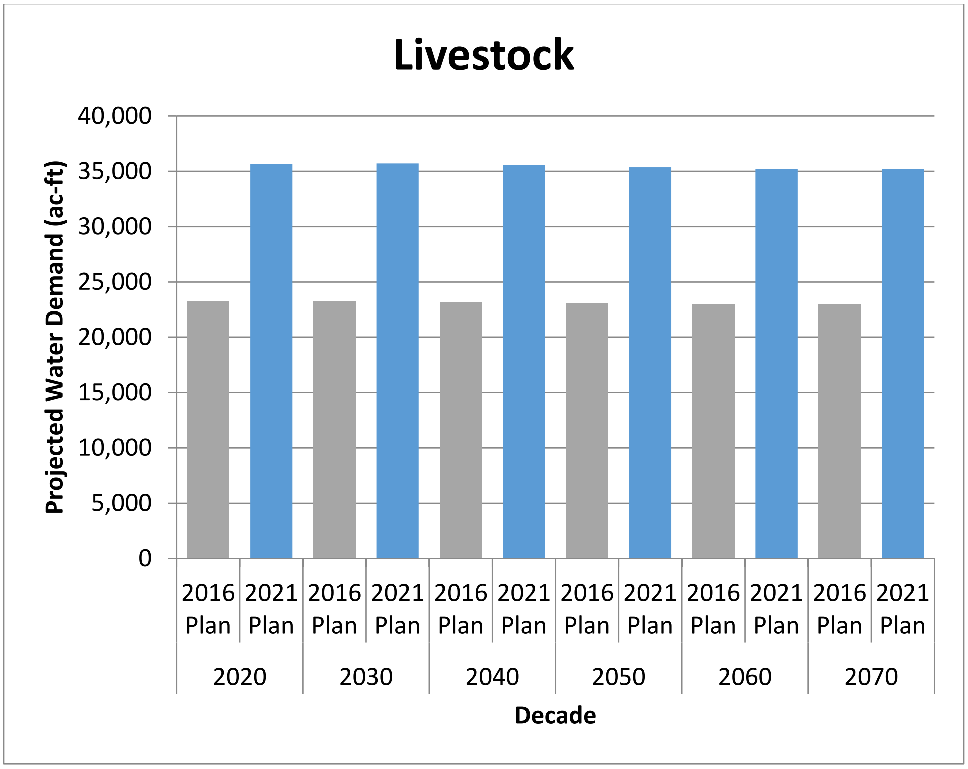

Figure 11.6 Comparison of Projected Mining Demands in Region D by Decade

11.2.2 Drought of Record and the Hydrologic and Modeling Assumptions

The 2016 Region D planning process introduced Regional Drought Planning, which essentially expanded the conceptualization and application of drought planning by specific entities to encompass the entire North East Texas Region. Chapter 7 herein contains a thorough discussion on this matter.

As stated in Chapter 7, for the purpose of the present planning cycle, the drought of the 1950s has been declared the Drought of Record (DOR). This drought is the key drought period represented and utilized in the official TCEQ Water Availability Models (WAMs) for the river basins within the North East Texas Region available to be employed for analyses herein. A more recent WAM for the Sulphur River Basin was developed by Riverbend Water Resources District and adopted as the official WAM by the TCEQ; however, that adoption occurred too late in this planning process to be incorporated into the analyses of water availability for the purposes of the 2021 Region D RWP. This more recent model, identifying a new drought of record for the Sulphur River Basin, will be employed in the next round of regional water planning for the consideration of firm supplies using the official WAMs.

The principal use of the WAM modeling performed for the 2021 Region D Plan was for the determination of firm, 100 percent reliable supplies in the region. Consistent with TWDB guidelines, the NETRWPG elected to use the available TCEQ's official WAM models (Run 3), reflecting full permitted demands (by priority) with the assumption of no return flows. With the exception of updates to the official WAMs, this was the same reported approach for the development of the 2016 Plan. Firm yields for Pat Mayse and Crook Reservoirs were utilized from a study performed by HDR for the City of Paris in the same manner as was done for the 2016 Region D Plan.

11.2.3 Water Source Availability

For the 2021 Region D Plan, the surface water supply available to the region during drought-of-record hydrologic conditions is approximately 1.40 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 and other local sources). For the 2016 Plan, the surface water supply available to the region during drought-of-record hydrologic conditions was reported to be approximately 1.28 million ac-ft/yr (approximately 77 percent of the total amount of water characterized as available to the region at that time). A comparison of these differences in the earliest and latest comparable decades between plans is displayed in Figure 11.7. This increase in surface water availability is largely due to increased accuracy in the characterization of existing supplies available under current legal and infrastructure constraints, particularly the implementation of more refined modeled depictions of sedimentation effects to reservoirs in the region.

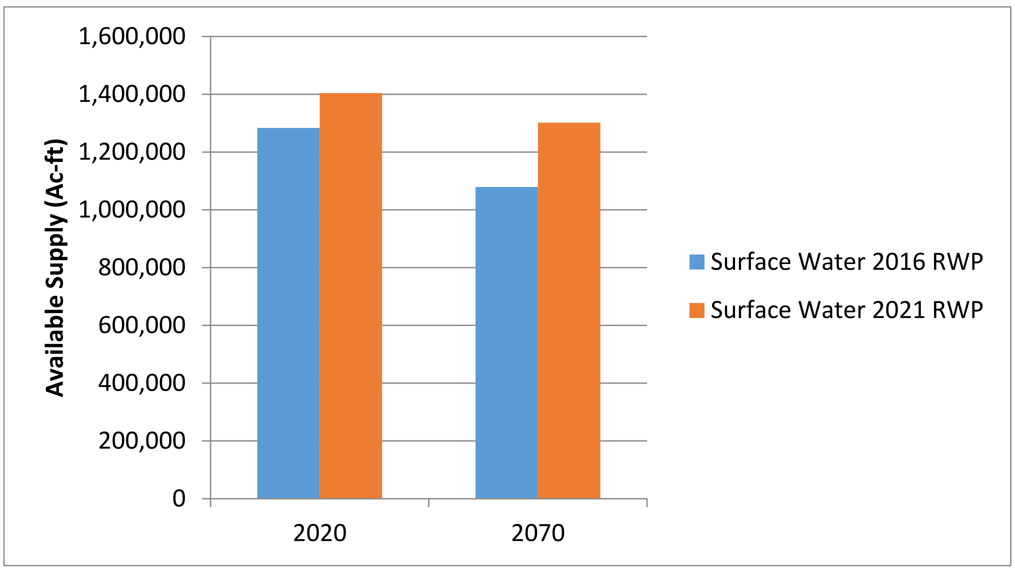

Figure 11.7 Comparison of Surface Water Supplies within Region D (2020 and 2070)

Nearly 307,000 ac-ft/yr of water supply, or 18 percent of the total water supply is estimated to be available from groundwater sources for the present 2021 Plan. For the 2016 Plan, the amount of estimated total groundwater supply was nearly 288,000 ac-ft/yr, or 23 percent of the total water supply. The decrease in the available groundwater supply in the 2016 Plan was largely due to the utilization of Modeled Available Groundwater (MAG) amounts as a limit to the amount of available groundwater supply in a region. Of particular concern in the 2016 Plan was that such a limit had no regulatory enforceability within Region D, as no Groundwater Conservation Districts exist within the planning area. As described in Chapter 3, for select instances the MAGs were increased in the 2021 Plan due to legislation which allowed further evaluation of supplies along with coordination of groundwater availability with TWDB staff.

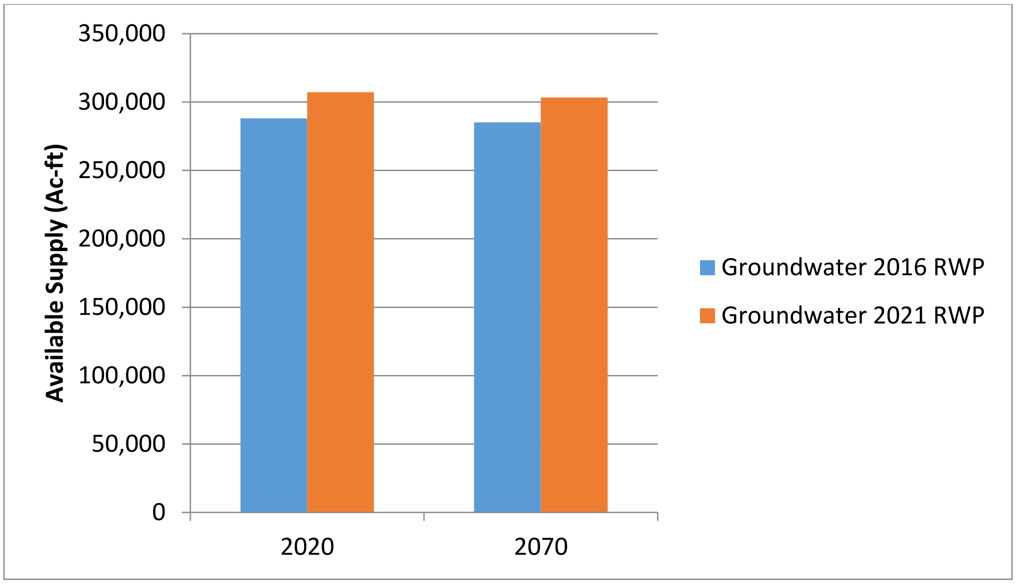

Figure 11.8 Comparison of Groundwater Supplies within Region D (2020 and 2070)

Supplies available from reuse remained relatively similar between the 2016 and 2021 Region D Plans, as demonstrated in Figure 11.9.

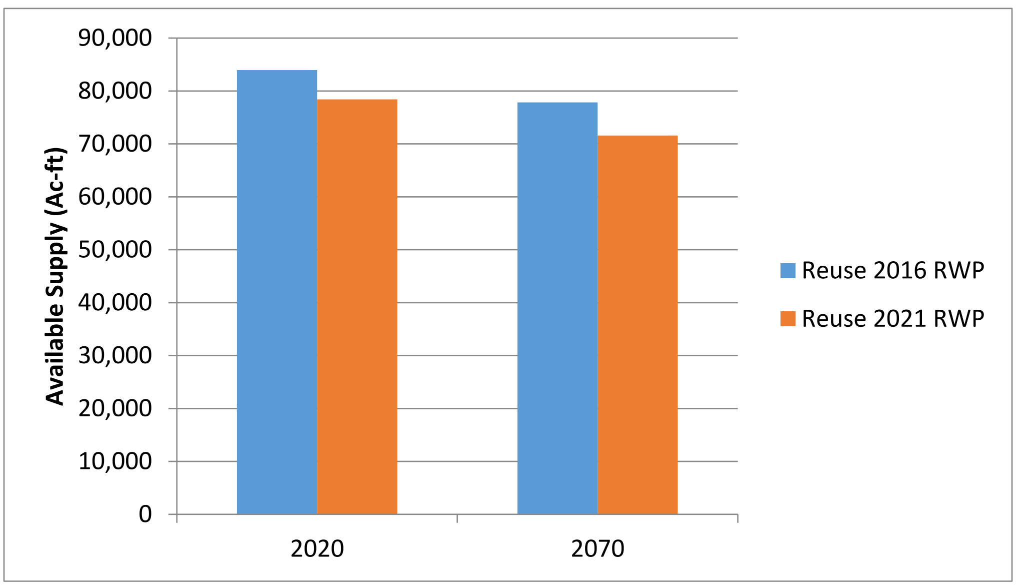

Figure 11.9 Comparison of Reuse Supplies within Region D (2020 and 2070)

11.2.4 Existing WUG Water Supplies

Region supplies summarized by use category from the 2021 Plan and the 2016 Plan are presented for comparison in Figure 11.10. A county by county comparison of municipal supplies for the 2021 and 2016 Region D Plans is presented in Table 11.4.

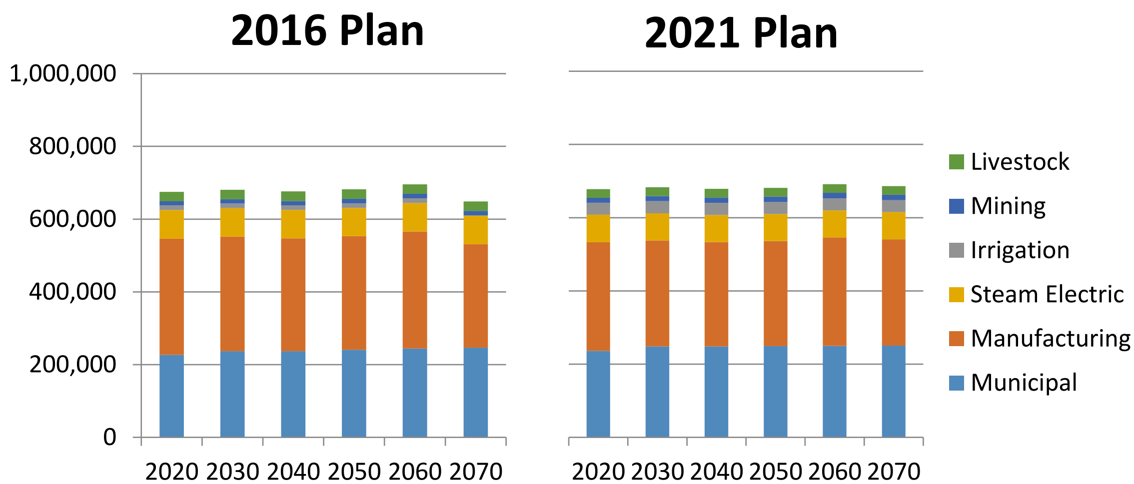

Figure 11.10 Comparison of Regional Supplies by Use Category

Table 11.4 Decadal Comparison of Municipal WUG Supplies by County

WUG Supply Comparison by County		2020	2030	2040	2050	2060	2070
BOWIE COUNTY	County Total - Round V	3,567	3,636	3,699	3,636	3,601	3,601
	County Total - Round IV	3,688	3,757	3,820	3,757	3,722	3,722
	Round V minus Round IV	-121	-121	-121	-121	-121	-121
CAMP COUNTY	County Total - Round V	3,246	3,258	3,267	3,275	3,283	3,292
	County Total - Round IV	3,194	3,206	3,215	3,257	3,264	3,270
	Round V minus Round IV	52	52	52	18	19	22
CASS COUNTY	County Total - Round V	4,888	4,946	5,006	5,079	5,076	5,076
	County Total - Round IV	5,740	5,800	5,859	5,933	5,931	5,993
	Round V minus Round IV	-852	-854	-853	-854	-855	-917
DELTA COUNTY	County Total - Round V	1,313	1,296	1,295	1,292	1,290	1,291
	County Total - Round IV	2,955	2,887	2,872	2,852	2,820	2,690
	Round V minus Round IV	-1,642	-1,591	-1,577	-1,560	-1,530	-1,399
FRANKLIN COUNTY	County Total - Round V	7,068	6,799	6,527	6,304	6,020	5,790
	County Total - Round IV	5,178	5,187	5,139	5,090	4,968	4,837
	Round V minus Round IV	1,890	1,612	1,388	1,214	1,052	953

WUG Supply Comparison by County		2020	2030	2040	2050	2060	2070
GREGG COUNTY	County Total - Round V	54,279	66,659	66,669	66,683	66,784	67,182
	County Total - Round IV	44,249	45,376	45,487	45,638	50,835	50,836
	Round V minus Round IV	10,030	21,283	21,182	21,045	15,949	16,346
HARRISON COUNTY	County Total - Round V	25,914	26,019	26,099	26,210	26,383	26,522
	County Total - Round IV	19,624	19,755	19,854	19,971	15,152	15,295
	Round V minus Round IV	6,290	6,264	6,245	6,239	11,231	11,227
HOPKINS COUNTY	County Total - Round V	10,095	10,064	10,041	9,974	9,948	9,949
	County Total - Round IV	23,014	22,661	22,231	22,044	21,571	21,196
	Round V minus Round IV	-12,919	-12,597	-12,190	-12,070	-11,623	-11,247
HUNT COUNTY	County Total - Round V	15,406	19,214	19,595	20,037	20,335	23,906
	County Total - Round IV	17,221	21,389	21,934	25,518	28,173	29,795
	Round V minus Round IV	-1,815	-2,175	-2,339	-5,481	-7,838	-5,889
LAMAR COUNTY	County Total - Round V	37,906	37,607	37,314	37,072	36,611	36,344
	County Total - Round IV	38,186	37,886	37,610	37,367	36,904	36,637
	Round V minus Round IV	-280	-279	-296	-295	-293	-293
MARION COUNTY	County Total - Round V	4,717	4,717	4,717	4,717	4,717	4,717
	County Total - Round IV	3,474	3,474	3,474	3,474	3,474	3,474
	Round V minus Round IV	1,243	1,243	1,243	1,243	1,243	1,243
MORRIS COUNTY	County Total - Round V	3,731	3,727	3,726	3,730	3,734	3,737
	County Total - Round IV	3,565	3,565	3,565	3,531	3,532	3,535
	Round V minus Round IV	166	162	161	199	202	202
RAINS COUNTY	County Total - Round V	3,049	3,523	3,513	3,505	3,496	3,450
	County Total - Round IV	2,733	3,952	3,946	3,932	3,917	3,905
	Round V minus Round IV	316	-429	-433	-427	-421	-455
RED RIVER COUNTY	County Total - Round V	1,889	1,882	1,878	1,878	1,878	1,878
	County Total - Round IV	2,237	1,989	1,325	1,325	1,325	1,325
	Round V minus Round IV	-348	-107	553	553	553	553
SMITH COUNTY	County Total - Round V	11,771	12,260	12,829	13,651	14,515	15,529
	County Total - Round IV	10,288	10,792	11,340	12,099	13,064	14,008
	Round V minus Round IV	1,483	1,468	1,489	1,552	1,451	1,521
TITUS COUNTY	County Total - Round V	21,123	20,265	20,103	20,010	19,708	19,520
	County Total - Round IV	8,539	8,369	8,075	7,849	8,438	9,067
	Round V minus Round IV	12,584	11,896	12,028	12,161	11,270	10,453
UPSHUR COUNTY	County Total - Round V	9,827	9,899	9,987	9,973	9,982	10,025
	County Total - Round IV	8,921	8,956	8,977	9,002	9,010	9,053
	Round V minus Round IV	906	943	1,010	971	972	972

WUG Supply Comparison by County		2020	2030	2040	2050	2060	2070
VAN ZANDT COUNTY	County Total - Round V	11,463	12,594	12,614	12,463	12,563	12,495
	County Total - Round IV	11,699	14,819	14,942	15,097	15,073	14,997
	Round V minus Round IV	-236	-2,225	-2,328	-2,634	-2,510	-2,502
WOOD COUNTY	County Total - Round V	14,123	14,774	14,687	14,608	14,514	14,435
	County Total - Round IV	12,263	13,014	13,003	12,986	12,969	12,954
	Round V minus Round IV	1,860	1,760	1,684	1,622	1,545	1,481
TOTAL	**County Total - Round V**	**245,375**	**263,139**	**263,566**	**264,097**	**264,438**	**268,739**
	County Total - Round IV	**226,768**	**236,834**	**236,668**	**240,722**	**244,142**	**246,589**
	Round V minus Round IV	18,607	26,305	26,898	23,375	20,296	22,150

As mentioned previously, changes in supplies between the last and present round of planning for Region D are largely attributable to MAG adjustments defining the available groundwater supply to the region, utilization of firm, 100% reliability under Drought-of-Record conditions through application of the official TCEQ WAM models for each river basin, and greater accuracy in the characterization of the legal and infrastructure capabilities of each WUG to accessing available sources.

11.2.5 WUG and WWP Needs

As discussed in Chapter 4 herein, an analysis of supply and demand for each user revealed that 79 WUGs within Region D are projected to experience shortages during the 2020 – 2070 planning period. For the 2016 Region D Plan, a similar analysis identified 71 entities with identified needs over the same period. A comparison of the identified needs, by WUG type, between the 2016 and 2021 Region D Plans is presented in Table 11.5.

Table 11.5 Comparison of Projected Needs by WUG Category

WUG Category	2016 RWP		2021 RWP	
	2020	2070	2020	2070
MUNICIPAL	-22,341	-52,900	-17,539	-51,120
MANUFACTURING	-61,557	-175,298	-2,914	-5,865
IRRIGATION	-30,763	-29,402	-13,188	-13,213
LIVESTOCK	0	0	-14,542	-14,491
MINING	-2,888	-1,395	-2,390	-1,039
STEAM ELECTRIC	-32,643	-152,800	-30,066	-33,083
TOTAL	**-150,192**	**-411,795**	**-80,639**	**-118,811**

Although the number of entities with projected needs are somewhat comparable between plans, as evidenced in Table 11.5, a significantly lesser amount of needs (28 percent by 2070) have been identified during the development of the 2021 Region D Plan.

The NETRWPG has identified 18 Major Water Providers (MWPs)/Wholesale Water Providers (WWPs) and WUG Sellers, as follows:

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

For the present 2021 Plan, four MWPs/WWPs/WUG Sellers were identified as having a need (Riverbend WRD/City of Texarkana, Cash SUD, and the City of Greenville), and a total of two WUG Sellers (Greenville and Texarkana) are projected to have insufficient available supplies to meet customer demands. In the 2016 Plan, three MWPs/WWPs were projected to have insufficient available supplies: Greenville, Marshall, and Texarkana.

The changes in overall needs between the 2016 and 2021 Region D Plans are due to a number of factors. With the significantly lower amounts of projected demands (e.g., manufacturing), a decrease in identified needs is to be expected.

11.2.6 Recommended and Alternative Water Management Strategies

The methodological approach adopted by the NETRWPG for the evaluation of Water Management Strategies (WMSs) between plans was the same. All potentially feasible strategies were considered for each WUG with an identified need, per TWDB guidelines. This approach ultimately focused upon four predominant categories of WMSs for Region D WUGs, namely:

- Advanced Water Conservation.
- Water Reuse.
- New or additional Groundwater wells.
- Additional Surface Water supplies utilizing existing sources.

A total of 111 strategies have been recommended in the 2021 Plan, a significant increase from the 65 strategies recommended in the 2016 Plan, largely due to the methodology used in livestock for the present round of planning. A comparison between the two Region D Plans between the recommended WMSs by source type and county is presented in Table 11.6.

The 2016 Region D Plan presented 19 alternative strategies, whereas 9 alternative strategies have been identified for the 2021 Plan. A relatively new strategy representing the potential use of groundwater supplies in Wood County was developed for the purposes of the 2021 Region D Plan, representing a possible regional water management strategy for potentially twenty-two (22) entities with identified needs.

It is noted that significant progress has been recently made in the North East Texas RWPA where it comes to cooperation between water user groups for the purpose of achieving economies of scale and incentivizing regionalization strategies, as evidenced by the work of the Riverbend Water Resources District for its Member Entities and their customers representing WUGs throughout Bowie, Cass, and Red River Counties.

Numerous other WWPs and WUG Sellers have similarly identified opportunities for regional approaches and are at various levels of planning in this regard. These efforts are a good example of the benefits of regional water planning that are supported by the NETRWPG.

Table 11.6 Comparison of Recommended WMS Amounts by County and Type

County	Source Type	2016 RWP		2021 RWP	
		2020	2070	2020	2070
BOWIE	Surface Water	16,652	19,291	13,971	117,517
	Groundwater	5,240	4,276	4,803	4,550
CAMP	Surface Water	0	0	0	0
	Groundwater	0	269	3,962	3,962
CASS	Surface Water	11,508	30,116	80	80
	Groundwater	151	151	2,473	2,473
DELTA	Surface Water	0	0	0	0
	Groundwater	0	0	262	250
FRANKLIN	Surface Water	0	0	0	0
	Groundwater	0	0	1,934	1,934
GREGG	Surface Water	0	0	0	0
	Groundwater	280	393	27	27
HARRISON	Surface Water	61,501	114,079	0	0
	Groundwater	2,058	1,872	2,591	3,455
HOPKINS	Surface Water	1,306	1,335	0	112
	Groundwater	820	1,020	5,943	6,625
HUNT	Surface Water	11,425	29,306	4,396	37,576
	Groundwater	225	5,005	423	1,349
LAMAR	Surface Water	18,993	26,574	2,289	2,329
	Groundwater	0	120	0	0
MARION	Surface Water	0	0	0	0
	Groundwater	432	648	432	654
MORRIS	Surface Water	9,757	12,295	60	60
	Groundwater	0	0	1,127	1,127
RAINS	Surface Water	0	0	0	0
	Groundwater	0	0	0	0
RED RIVER	Surface Water	94	577	0	0
	Groundwater	0	391	2,629	2,629
SMITH	Surface Water	317	435	0	0
	Groundwater	1,610	5,167	430	4,088
TITUS	Surface Water	29,896	80,247	30,066	34,777
	Groundwater	45	45	1,939	2,005

County	Source Type	2016 RWP		2021 RWP	
		2020	2070	2020	2070
UPSHUR	Surface Water	0	0	0	0
	Groundwater	754	1,613	483	699
VAN ZANDT	Surface Water	1	3	323	684
	Groundwater	699	1,005	398	609
WOOD	Surface Water	0	0	34	34
	Groundwater	0	0	2,258	2,739
	TOTAL	**173,764**	**336,233**	**83,333**	**232,344**
	TOTAL SURFACE WATER	**161,450**	**314,258**	**51,219**	**193,169**
	TOTAL GROUNDWATER	**12,314**	**21,975**	**32,114**	**39,175**

11.2.7 Recommended and Alternative Water Management Strategy Projects

A total of 103 WMS projects have been recommended in the 2021 Plan, an increase from the 94 projects recommended in the 2016 Plan, largely due to the methodology used in livestock and manufacturing. The 2021 plan has an increase in livestock WMS projects because in previous rounds supply was generally set equal to demand with the assumption that local supplies would be used or the demand would be reduced as ranchers would sell livestock if local water supply was not available. The 2021 Plan has a change in the magnitude of manufacturing WMS projects because the manufacturing demands were reduced due to a change in projection methods employed by TWDB. A comparison between the 2016 and 2021 Plans' recommended WMS projects is presented in Table 11.7.

A comparison of alternative WMS projects between the two plans is presented in Table 11.8. The 2016 Plan presented 21 alternative WMS projects, whereas 26 alternative WMS projects have been identified in the 2021 Plan.

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Table 11.7 Comparison of Recommended WMS Projects from 2016 and 2021 Region D Water Plans

2017 SWP Project Sponsors	2017 SWP Project Name	2017 SWP Online Decade	2017 SWP Capital Cost	RWP DB22 Project Sponsors	RWP DB22 Project Name	RWP DB22 Online Decade	RWP DB22 Capital Cost
BI COUNTY WSC	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, CAMP, 2060)	2060	$1,320,000				
BI COUNTY WSC	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, CAMP, 2070)	2070	$912,000				
BI COUNTY WSC	DRILL NEW WELLS (BI COUNTY WSC, QUEEN, CYPRESS, UPSHUR, 2060)	2060	$510,000				
BRINKER WSC	INCREASE EXISTING CONTRACT (BRINKER WSC, SULPHUR)	2060	$0				
CADDO BASIN SUD	NEW CONTRACT (CADDO BASIN SUD, SABINE)	2020	$0				
CADDO BASIN SUD	NEW CONTRACT (CADDO BASIN SUD, SULPHUR)	2050	$0				
CADDO MILLS	INCREASE EXISTING CONTRACT (CADDO MILLS, SABINE)	2030	$0				
CANTON	CANTON INDIRECT REUSE	2020	$6,803,000	CANTON	CANTON INDIRECT REUSE	2020	$8,381,000
CANTON	DRILL NEW WELLS (CANTON, CARRIZO-WILCOX, SABINE)	2020	$863,000	CANTON	DRILL NEW WELLS (CANTON, CARRIZO-WILCOX, SABINE)	2020	$716,000
CELESTE	DRILL NEW WELLS (CELESTE, WOODBINE, SABINE, 2050)	2050	$1,275,000	CELESTE	DRILL NEW WELLS (CELESTE, WOODBINE, TRINITY, 2020)	2020	$694,000
CELESTE	DRILL NEW WELLS (CELESTE, WOODBINE, SABINE, 2070)	2070	$1,275,000	CELESTE	DRILL NEW WELLS (CELESTE, WOODBINE, TRINITY, 2040)	2040	$509,000
				CELESTE	DRILL NEW WELLS (CELESTE, WOODBINE, TRINITY, 2060)	2060	$509,000
				CELESTE	NEW CONTRACT WITH GREENVILLE AND PIPELINE TO CELESTE	2070	$3,342,000
CLARKSVILLE	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB (CLARKSVILLE, SULPHUR)	2040	$10,053,000				
				CLARKSVILLE	DRILL NEW WELLS (Blossom, Red River)	2020	$10,537,000
				COUNTY-OTHER, CASS	DRILL NEW WELLS (COUNTY OTHER, CASS, CARRIZO, CYPRESS)	2020	$1,973,000
				COUNTY-OTHER, CASS	DRILL NEW WELLS (COUNTY OTHER, CASS, CARRIZO, SULPHUR)	2020	$1,324,000
COUNTY-OTHER (HUNT)	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2030)	2030	$2,396,000				
COUNTY-OTHER (HUNT)	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2040)	2040	$2,396,000				
COUNTY-OTHER (HUNT)	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2050)	2050	$2,396,000				
COUNTY-OTHER (HUNT)	DRILL NEW WELLS (COUNTY-OTHER HUNT, NACATOCH, SABINE, 2060)	2060	$2,396,000				
COUNTY-OTHER (HUNT)	GREENVILLE TIE-IN PIPELINE (COUNTY-OTHER HUNT, SABINE)	2070	$25,670,000				

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2017 SWP Project Sponsors	2017 SWP Project Name	2017 SWP Online Decade	2017 SWP Capital Cost	RWP DB22 Project Sponsors	RWP DB22 Project Name	RWP DB22 Online Decade	RWP DB22 Capital Cost
COUNTY-OTHER (HUNT)	INCREASE EXISTING CONTRACT WITH POETRY WSC (FORK)	2060	$0				
COUNTY-OTHER (HUNT)	INCREASE EXISTING CONTRACT WITH POETRY WSC (TAWAKONI)	2040	$0				
COUNTY-OTHER (LAMAR)	INCREASE EXISTING CONTRACT (COUNTY-OTHER LAMAR, RED)	2020	$0				
COUNTY-OTHER (RED RIVER)	RENEW EXISTING CONTRACT (RED RIVER COUNTY-OTHER, SULPHUR)	2020	$0				
CRYSTAL SYSTEMS INC	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2020)	2020	$2,330,000	CRYSTAL SYSTEMS TEXAS	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, CARRIZO, NECHES)	2040	$2,531,000
CRYSTAL SYSTEMS INC	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2040)	2040	$1,212,000	CRYSTAL SYSTEMS TEXAS	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, CARRIZO, SABINE)	2040	$2,531,000
CRYSTAL SYSTEMS INC	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2050)	2050	$2,330,000				
CRYSTAL SYSTEMS INC	DRILL NEW WELLS (CRYSTAL SYSTEMS INC, QUEEN, SABINE, 2070)	2070	$1,212,000				
CUMBY	DRILL NEW WELLS (CUMBY, NACATOCH)	2030	$772,000	CUMBY	DRILL NEW WELLS (CUMBY, HOPKINS, NACATOCH, SABINE, 2020)	2020	$480,000
				CUMBY	DRILL NEW WELLS (CUMBY, HOPKINS, NACATOCH, SABINE, 2070)	2070	$480,000
DE KALB	RENEW EXISTING CONTRACT (DEKALB)	2020	$0				
				EDOM WSC	DRILL NEW WELL (EDOM WSC, VAN ZANDT, CARRIZO, NECHES, 2020)	2020	$403,000
				EDOM WSC	DRILL NEW WELL (EDOM WSC, VAN ZANDT, CARRIZO, NECHES, 2050)	2050	$358,000
				EDOM WSC	DRILL NEW WELL (EDOM WSC, VAN ZANDT, CARRIZO, NECHES, 2070)	2070	$344,000
GILMER	DRILL NEW WELLS (GILMER, QUEEN, CYPRESS)	2030	$1,051,000	GILMER	DRILL NEW WELLS (GILMER, CARRIZO, CYPRESS)	2040	$801,000
GREENVILLE	CHAPMAN RAW WATER PIPELINE AND NEW WTP (GREENVILLE, SULPHUR)	2050	$193,438,000	GREENVILLE	NEW WTP GREENVILLE	2070	$81,786,000
GREENVILLE	TOLEDO BEND TIE-IN PIPELINE (GREENVILLE, SABINE)	2070	$42,470,000				
GREENVILLE	WTP EXPANSION (GREENVILLE, SABINE)	2020	$36,074,000	GREENVILLE	WTP EXPANSION 2030 (GREENVILLE, SABINE)	2030	$43,955,000
				HARLETON WSC	INCREASE EXISTING CONTRACT (HARLETON, CYPRESS)	2020	$4,928
HICKORY CREEK SUD	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2050)	2050	$1,607,000				
HICKORY CREEK SUD	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2060)	2060	$1,607,000				
HICKORY CREEK SUD	DRILL NEW WELLS (HICKORY CREEK SUD, TRINITY, TRINITY, 2070)	2070	$1,607,000				

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2017 SWP Project Sponsors	2017 SWP Project Name	2017 SWP Online Decade	2017 SWP Capital Cost	RWP DB22 Project Sponsors	RWP DB22 Project Name	RWP DB22 Online Decade	RWP DB22 Capital Cost
HICKORY CREEK SUD	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2040)	2040	$1,705,000				
HICKORY CREEK SUD	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2050)	2050	$1,705,000				
HICKORY CREEK SUD	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2060)	2060	$1,705,000				
HICKORY CREEK SUD	DRILL NEW WELLS (HICKORY CREEK SUD, WOODBINE, SABINE, 2070)	2070	$3,210,000				
HIDEAWAY	INCREASE EXISTING CONTRACT (HIDEAWAY, QUEEN, SABINE)	2070	$0				
				HOLLY SPRINGS WSC	INCREASE EXISTING CONTRACT (HOLLY SPRINGS, CYPRESS)	2020	$130,000
HOOKS	RENEW EXISTING CONTRACT (HOOKS)	2020	$0				
IRRIGATION (BOWIE)	DRILL NEW WELLS (BOWIE IRRIGATION, CARRIZO-WILCOX, SULPHUR)	2020	$2,021,000	IRRIGATION, BOWIE	DRILL NEW WELLS (BOWIE IRRIGATION, CARRIZO-WILCOX, SULPHUR)	2020	$10,597,000
IRRIGATION (BOWIE)	DRILL NEW WELLS (BOWIE IRRIGATION, NACATOCH, RED)	2020	$1,466,000				
IRRIGATION (HARRISON)	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX, CYPRESS)	2020	$1,092,000	IRRIGATION, HARRISON	DRILL NEW WELLS (IRRIGATION HARRISON, QUEEN CITY, CYPRESS)	2020	$577,000
IRRIGATION (HARRISON)	DRILL NEW WELLS (IRRIGATION HARRISON, CARRIZO-WILCOX, SABINE)	2020	$377,000	IRRIGATION, HARRISON	DRILL NEW WELLS (IRRIGATION HARRISON, QUEEN CITY, SABINE)	2020	$193,000
IRRIGATION (HOPKINS)	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, CYPRESS)	2020	$33,000	IRRIGATION, HOPKINS	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE, 2040)	2040	$1,030,000
IRRIGATION (HOPKINS)	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE)	2020	$681,000	IRRIGATION, HOPKINS	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE, 2060)	2060	$1,802,000
IRRIGATION (HOPKINS)	SULPHUR SPRINGS RAW WATER PIPELINE (IRRIGATION HOPKINS, SULPHUR)	2020	$4,758,000	IRRIGATION, HOPKINS	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SULPHUR)	2020	$10,927,000
IRRIGATION (HUNT)	DRILL NEW WELLS (IRRIGATION HUNT, NACATOCH, SABINE)	2020	$282,000	IRRIGATION, HUNT	DRILL NEW WELLS (IRRIGATION HUNT, NACATOCH, SABINE)	2020	$1,249,000
IRRIGATION (LAMAR)	PAT MAYSE RAW WATER PIPELINE (IRRIGATION LAMAR, RED)	2020	$3,717,000	IRRIGATION, LAMAR	PAT MAYSE RAW WATER PIPELINE (IRRIGATION LAMAR, RED)	2020	$12,021,000
				IRRIGATION, RED RIVER	DRILL NEW WELLS (IRRIGATION, RED RIVER, NACATOCH, SULPHUR)	2020	$6,551,000
IRRIGATION (VAN ZANDT)	DRILL NEW WELLS (IRRIGATION VAN ZANDT, QUEEN, NECHES)	2020	$227,000	IRRIGATION, VAN ZANDT	DRILL NEW WELLS (IRRIGATION VAN ZANDT, QUEEN, NECHES)	2020	$1,683,000
				LEIGH WSC	DRILL NEW WELLS (LEIGH, QUEEN CITY, CYPRESS)	2040	$1,973,000
LINDALE	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2020)	2020	$3,470,000	LINDALE	DRILL NEW WELLS (LINDALE, CARRIZO, NECHES)	2020	$7,592,000
LINDALE	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2030)	2030	$1,278,000				
LINDALE	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2040)	2040	$1,278,000				
LINDALE	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2050)	2050	$1,278,000				
LINDALE	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2060)	2060	$2,395,000				

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2017 SWP Project Sponsors	2017 SWP Project Name	2017 SWP Online Decade	2017 SWP Capital Cost	RWP DB22 Project Sponsors	RWP DB22 Project Name	RWP DB22 Online Decade	RWP DB22 Capital Cost
LINDALE	DRILL NEW WELLS (LINDALE, QUEEN, SABINE, 2070)	2070	$1,278,000				
				LITTLE HOPE MOORE WSC	DRILL NEW WELL (LITTLE HOPE MOORE WSC, VAN ZANDT, CARRIZO, NECHES	2050	$371,000
				LIVESTOCK, BOWIE	DRILL NEW WELLS (LIVESTOCK BOWIE , NACATOCH, RED)	2020	$1,630,000
				LIVESTOCK, BOWIE	DRILL NEW WELLS (LIVESTOCK, BOWIE, CARRIZO-WILCOX, SULPHUR)	2020	$2,423,000
				LIVESTOCK, CAMP	DRILL NEW WELLS (LIVESTOCK, CAMP, QUEEN, CYPRESS)	2020	$4,401,500
				LIVESTOCK, CASS	DRILL NEW WELLS (LIVESTOCK, CASS, QUEEN CITY, CYPRESS)	2020	$1,037,000
				LIVESTOCK, CASS	DRILL NEW WELLS (LIVESTOCK, CASS, QUEEN CITY, SULPHUR)	2020	$1,037,000
				LIVESTOCK, DELTA	DRILL NEW WELLS (LIVESTOCK, DELTA, NACATOCH, SULPHUR)	2020	$1,929,000
				LIVESTOCK, FRANKLIN	DRILL NEW WELLS (LIVESTOCK, FRANKLIN, CARRIZO, CYPRESS)	2020	$865,000
				LIVESTOCK, FRANKLIN	DRILL NEW WELLS (LIVESTOCK, FRANKLIN, CARRIZO, SULPHUR)	2020	$1,211,000
				LIVESTOCK, HOPKINS	DRILL NEW WELLS (LIVESTOCK HOPKINS, HOPKINS, CARRIZO, SULPHUR, 2020)	2020	$4,961,000
				LIVESTOCK, HOPKINS	DRILL NEW WELLS (LIVESTOCK HOPKINS, HOPKINS, CARRIZO, SULPHUR, 2060)	2060	$924,000
				LIVESTOCK, HUNT	DRILL NEW WELL (LIVESTOCK HUNT, TRINITY, SABINE)	2020	$407,000
				LIVESTOCK, LAMAR	NEW CONTRACT AND PIPELINE TO LAMAR CO WSD FOR LAMAR LIVESTOCK	2020	$14,574,000
				LIVESTOCK, MORRIS	DRILL NEW WELLS (LIVESTOCK, MORRIS, QUEEN CITY, CYPRESS)	2020	$767,000
				LIVESTOCK, MORRIS	DRILL NEW WELLS (LIVESTOCK, MORRIS, QUEEN CITY, SULPHUR)	2020	$539,000
				LIVESTOCK, RED RIVER	DRILL NEW WELLS (LIVESTOCK RED RIVER, BLOSSOM, RED)	2020	$425,000
				LIVESTOCK, RED RIVER	DRILL NEW WELLS (LIVESTOCK RED RIVER, TRINITY AQUIFER, SULPHUR)	2020	$1,436,000
				LIVESTOCK, TITUS	DRILL NEW WELLS (LIVESTOCK TITUS, CARRIZO, CYPRESS, 2020)	2020	$767,000
				LIVESTOCK, TITUS	DRILL NEW WELLS (LIVESTOCK TITUS, CARRIZO, CYPRESS, 2030)	2030	$684,000
				LIVESTOCK, TITUS	DRILL NEW WELLS (LIVESTOCK TITUS, CARRIZO, SULPHUR)	2020	$5,215,000

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2017 SWP Project Sponsors	2017 SWP Project Name	2017 SWP Online Decade	2017 SWP Capital Cost	RWP DB22 Project Sponsors	RWP DB22 Project Name	RWP DB22 Online Decade	RWP DB22 Capital Cost
				LIVESTOCK, UPSHUR	DRILL NEW WELLS (LIVESTOCK, UPSHUR, QUEEN CITY, CYPRESS)	2020	$172,000
				LIVESTOCK, UPSHUR	DRILL NEW WELLS (LIVESTOCK, UPSHUR, QUEEN CITY, SABINE)	2020	$172,000
				LIVESTOCK, WOOD	DRILL NEW WELL (LIVESTOCK, WOOD, QUEEN CITY, SABINE)	2020	$1,210,000
LONE OAK	INCREASE EXISTING CONTRACT (LONE OAK)	2070	$0				
MACEDONIA-EYLAU MUD #1	RENEW EXISTING CONTRACT (MACEDONIA)	2020	$0				
MFG (CASS)	ADVANCED WATER CONSERVATION (MANUFACTURING CASS)	2020	$0				
MFG (CASS)	DRILL NEW WELLS (MANUFACTURING CASS, CARRIZO-WILCOX , CYPRESS)	2020	$894,000				
MFG (CASS)	INCREASE EXISTING CONTRACT (MANUFACTURING CASS, SULPHUR)	2060	$0				
MFG (HARRISON)	ADVANCED WATER CONSERVATION (MANUFACTURING HARRISON, SABINE)	2020	$0				
MFG (HARRISON)	TOLEDO BEND INTAKE AND RAW WATER PIPELINE (MANUFACTURING HARRISON, SABINE)	2020	$498,773,000				
MFG (LAMAR)	ADVANCED WATER CONSERVATION (MANUFACTURING LAMAR, RED)	2020	$0				
MFG (LAMAR)	DRILL NEW WELLS (MANUFACTURING LAMAR, BLOSSOM, RED)	2070	$76,000				
MFG (MORRIS)	ADVANCED WATER CONSERVATION (MANUFACTURING MORRIS, CYPRESS)	2020	$0				
MFG (RED RIVER)	DRILL NEW WELLS (MANUFACTURING RED RIVER, TRINITY, SULPHUR)	2040	$136,000				
MFG (TITUS)	ADVANCED WATER CONSERVATION (MANUFACTURING TITUS, CYPRESS)	2020	$0				
MFG (TITUS)	DRILL NEW WELLS (MANUFACTURING TITUS, QUEEN, CYPRESS)	2020	$113,000				
MFG (TITUS)	INCREASE EXISTING CONTRACT (MANUFACTURING TITUS, CYPRESS)	2020	$0				
MFG (UPSHUR)	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN, CYPRESS, 2020)	2020	$2,151,000	MFG, UPSHUR	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN CITY, CYPRESS)	2020	$172,000
MFG (UPSHUR)	DRILL NEW WELLS (MANUFACTURING UPSHUR, QUEEN, CYPRESS, 2060)	2060	$703,000				
MFG (VAN ZANDT)	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, NECHES, 2020)	2020	$489,000	MFG, VAN ZANDT	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, TRINITY, 2020)	2020	$1,043,000
MFG (VAN ZANDT)	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, NECHES, 2050)	2050	$245,000	MFG, VAN ZANDT	DRILL NEW WELLS (MANUFACTURING VAN ZANDT, CARRIZO-WILCOX, TRINITY, 2030)	2030	$1,355,000
				MFG, WOOD	DRILL NEW WELLS (MANUFACTURING, WOOD, QUEEN CITY, SABINE)	2020	$1,210,000
MARSHALL	INCREASE EXISTING CONTRACT (MARSHALL, CYPRESS)	2060	$4,738,000				

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2017 SWP Project Sponsors	2017 SWP Project Name	2017 SWP Online Decade	2017 SWP Capital Cost	RWP DB22 Project Sponsors	RWP DB22 Project Name	RWP DB22 Online Decade	RWP DB22 Capital Cost
MARTIN SPRINGS WSC	DRILL NEW WELLS (MARTIN SPRINGS WSC, CARRIZO-WILCOX, SABINE, 2060)	2060	$922,000				
MARTIN SPRINGS WSC	DRILL NEW WELLS (MARTIN SPRINGS WSC, CARRIZO-WILCOX, SABINE, 2070)	2070	$922,000				
MAUD	RENEW EXISTING CONTRACT (MAUD)	2020	$0				
				MILLER GROVE WSC	DRILL NEW WELLS (MILLER GROVE WSC, HOPKINS, CARRIZO-WILCOX, SULPHUR, 2020)	2020	$459,000
				MILLER GROVE WSC	DRILL NEW WELLS (MILLER GROVE WSC, HOPKINS, CARRIZO-WILCOX, SULPHUR, 2070)	2070	$459,000
MINING (GREGG)	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, CYPRESS)	2020	$377,000	MINING, GREGG	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE)	2020	$117,000
MINING (GREGG)	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE, 2020)	2020	$1,045,000				
MINING (GREGG)	DRILL NEW WELLS (MINING GREGG, CARRIZO-WILCOX, SABINE, 2030)	2030	$524,000				
MINING (HARRISON)	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2020)	2020	$526,000	MINING, HARRISON	DRILL NEW WELLS (MINING HARRISON, QUEEN CITY, CYPRESS)	2020	$384,000
MINING (HARRISON)	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2030)	2030	$526,000	MINING, HARRISON	DRILL NEW WELLS (MINING HARRISON, QUEEN CITY, SABINE)	2020	$1,555,000
MINING (HARRISON)	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, CYPRESS, 2040)	2040	$526,000				
MINING (HARRISON)	DRILL NEW WELLS (MINING HARRISON, CARRIZO-WILCOX, SABINE)	2020	$5,994,000				
				MINING, HOPKINS	DRILL NEW WELLS (MINING HOPKINS, HOPKINS, CARRIZO, SULPHUR, 2020)	2020	$1,528,000
				MINING, HOPKINS	DRILL NEW WELLS (MINING HOPKINS, HOPKINS, CARRIZO, SULPHUR, 2050)	2050	$428,000
				MINING, HOPKINS	DRILL NEW WELLS (MINING HOPKINS, HOPKINS, CARRIZO, SULPHUR, 2060)	2060	$924,000
MINING (HUNT)	DRILL NEW WELLS (MINING HUNT, NACATOCH , SABINE)	2020	$254,000	MINING, HUNT	DRILL NEW WELLS (MINING HUNT, TRINITY, SABINE)	2020	$766,000
MINING (MARION)	DRILL NEW WELLS (MINING MARION, QUEEN CITY, CYPRESS, 2020)	2020	$1,043,000	MINING, MARION	DRILL NEW WELLS (MINING MARION, QUEEN CITY, CYPRESS)	2020	$767,000
MINING (MARION)	DRILL NEW WELLS (MINING MARION, QUEEN CITY, CYPRESS, 2030)	2030	$526,000				
MINING (SMITH)	DRILL NEW WELLS (MINING SMITH, QUEEN, SABINE)	2060	$607,000				
MINING (UPSHUR)	DRILL NEW WELLS (MINING UPSHUR, QUEEN , CYPRESS/SABINE, 2020)	2020	$2,785,000				
MINING (UPSHUR)	DRILL NEW WELLS (MINING UPSHUR, QUEEN , CYPRESS/SABINE, 2030)	2030	$2,785,000				
NASH	RENEW EXISTING CONTRACT (NASH)	2020	$0				

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2017 SWP Project Sponsors	2017 SWP Project Name	2017 SWP Online Decade	2017 SWP Capital Cost	RWP DB22 Project Sponsors	RWP DB22 Project Name	RWP DB22 Online Decade	RWP DB22 Capital Cost
NEW BOSTON	RENEW EXISTING CONTRACT (NEW BOSTON)	2020	$0				
				NORTH HARRISON WSC	DRILL NEW WELLS (NORTH HARRISON, QUEEN CITY, CYPRESS)	2060	$612,000
NORTH HUNT SUD	DELTA COUNTY PIPELINE (NORTH HUNT SUD, SULPHUR)	2060	$1,774,000	NORTH HUNT SUD	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2020)	2020	$1,493,000
NORTH HUNT SUD	INCREASE EXISTING CONTRACT (NORTH HUNT SUD, SULPHUR)	2030	$0	NORTH HUNT SUD	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2030)	2030	$1,054,000
				NORTH HUNT SUD	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2040)	2040	$1,054,000
				NORTH HUNT SUD	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2050)	2050	$1,998,000
				NORTH HUNT SUD	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2060)	2060	$2,932,000
				NORTH HUNT SUD	DRILL NEW WELLS (NORTH HUNT SUD, HUNT, NACATOCH, SABINE, 2070)	2070	$2,902,000
				PANOLA-BETHANY WSC	DRILL NEW WELLS (PANOLA BETHANY, QUEEN CITY, SABINE)	2030	$2,399,000
REDWATER	RENEW EXISTING CONTRACT (REDWATER)	2020	$0				
R-P-M WSC	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2020)	2020	$959,000	R P M WSC	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2030)	2030	$895,000
R-P-M WSC	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2030)	2030	$959,000	R P M WSC	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2040)	2040	$370,000
R-P-M WSC	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2050)	2050	$959,000	R P M WSC	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2050)	2050	$753,000
R-P-M WSC	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2060)	2060	$959,000	R P M WSC	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2060)	2060	$784,000
				R P M WSC	DRILL NEW WELLS (R-P-M WSC, CARRIZO-WILCOX, NECHES, 2070)	2070	$774,000
				RIVERBEND WRD	RIVERBEND STRATEGY CASS NEW WTP AND TRANSMISSION LINE	2030	$22,807,000
				RIVERBEND WRD	RIVERBEND WMS INTERIM TO ULTIMATE STORAGE CONVERSION	2020	$20,550,000
				RIVERBEND WRD	RIVERBEND WMS NEW RAW WATER INTAKE 120 MGD 2030	2030	$13,282,000
				RIVERBEND WRD	RIVERBEND WMS NEW RAW WATER PIPELINE 32 MGD 2050	2050	$61,647,000
				RIVERBEND WRD	RIVERBEND WMS NEW WTP 25 MGD 2030	2030	$127,811,000
				RIVERBEND WRD	RIVERBEND WMS PUMP STATION EXPANSION 18 MGD 2050	2050	$11,603,000
				RIVERBEND WRD	RIVERBEND WMS PUMP STATION EXPANSION 30 MGD 2060	2060	$22,130,000
				RIVERBEND WRD	RIVERBEND WMS PUMP STATION EXPANSION 6 MGD 2040	2040	$4,326,000

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2017 SWP Project Sponsors	2017 SWP Project Name	2017 SWP Online Decade	2017 SWP Capital Cost	RWP DB22 Project Sponsors	RWP DB22 Project Name	RWP DB22 Online Decade	RWP DB22 Capital Cost
				RIVERBEND WRD	RIVERBEND WMS RAW WATER PIPELINE 72 MGD 2030	2030	$36,061,000
				RIVERBEND WRD	RIVERBEND WMS RAW WATER PUMP STATION 66 MGD 2030	2030	$45,041,000
				RIVERBEND WRD	RIVERBEND WMS WATER RIGHT AMENDMENT	2020	$103,000
				RIVERBEND WRD	RIVERBEND WMS WTP EXPANSION 10 MGD 2050	2050	$33,348,000
				RIVERBEND WRD	RIVERBEND WMS WTP EXPANSION 5 MGD 2040	2040	$19,745,000
				SCOTTSVILLE	DRILL NEW WELLS (SCOTTSVILLE, QUEEN CITY, CYPRESS)	2020	$1,429,000
				SMITH COUNTY MUD 1	DRILL NEW WELLS (SMITH COUNTY MUD 1, QUEEN CITY, SABINE)	2040	$3,948,000
				STAR MOUNTAIN WSC	DRILL NEW WELLS (STAR MOUNTAIN, QUEEN CITY, SABINE)	2020	$1,521,000
				STARRVILLE-FRIENDSHIP WSC	DRILL NEW WELLS (STARRVILLE FRIENDSHIP, CARRIZO, SABINE)	2060	$761,000
STEAM ELEC PWR (HUNT)	ADVANCED WATER CONSERVATION (STEAM ELECTRIC POWER HUNT, SABINE)	2020	$0				
STEAM ELEC PWR (LAMAR)	INCREASE EXISTING CONTRACT (STEAM ELECTRIC LAMAR, RED)	2030	$0				
STEAM ELEC PWR (TITUS)	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS, CYPRESS, NETMWD REALLOCATE HARRISON)	2070	$0				
STEAM ELEC PWR (TITUS)	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS, CYPRESS, NETMWD REALLOCATE MARION)	2070	$0				
STEAM ELEC PWR (TITUS)	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS, CYPRESS, NETMWD, BOB SANDLIN)	2030	$0				
STEAM ELEC PWR (TITUS)	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS, CYPRESS, NETMWD, LOTP)	2040	$0				
STEAM ELEC PWR (TITUS)	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER TITUS, CYPRESS, TITUS COUNTY FWD)	2020	$0				
TEXAMERICAS CENTER	RENEW EXISTING CONTRACT (TEXAMERICAS CENTER)	2020	$0				
TEXARKANA	DREDGE WRIGHT PATMAN (TEXARKANA)	2050	$205,862,000				
TEXARKANA	RIVERBEND STRATEGY (TEXARKANA)	2020	$117,116,000				
TRI SUD	RENEW AND INCREASE EXISTING CONTRACT (TRI SUD, CYPRESS)	2020	$0				
WAKE VILLAGE	RENEW EXISTING CONTRACT (WAKE VILLAGE)	2020	$0				
WASKOM	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2020)	2020	$445,000	WASKOM	DRILL NEW WELLS (WASKOM, QUEEN CITY, CYPRESS)	2020	$2,399,000

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2017 SWP Project Sponsors	2017 SWP Project Name	2017 SWP Online Decade	2017 SWP Capital Cost	RWP DB22 Project Sponsors	RWP DB22 Project Name	RWP DB22 Online Decade	RWP DB22 Capital Cost
WASKOM	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2050)	2050	$445,000				
WASKOM	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2060)	2060	$445,000				
WASKOM	DRILL NEW WELLS (WASKOM, CARRIZO-WILCOX, CYPRESS, 2070)	2070	$445,000				
WINONA	DRILL NEW WELLS (WINONA, QUEEN, SABINE)	2050	$695,000	WINONA	DRILL NEW WELLS (WINONA, CARRIZO-WILCOX, SABINE)	2050	$761,000
WOLFE CITY	DRILL NEW WELLS (WOLFE CITY, TRINITY, TRINITY, 2070)	2070	$1,155,000	WOLFE CITY	NEW CONTRACT WITH GREENVILLE AND PIPELINE TO WOLFE CITY	2050	$7,124,000
WOLFE CITY	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2050)	2050	$1,155,000				
WOLFE CITY	DRILL NEW WELLS (WOLFE CITY, WOODBINE, SULPHUR, 2060)	2060	$2,066,000				
	TOTAL 2017 SWP CAPITAL COST FOR RECOMMENDED WMS PROJECTS:		**$1,241,050,000**		**TOTAL RWP DB 22 CAPITAL COST FOR RECOMMENDED WMS PROJECTS:**		**$730,725,428**

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Table 11.8 Comparison of Alternative WMS Projects from 2016 and 2021 Region D Water Plans

2017 SWP Project Sponsors	2017 SWP Project Name	2017 SWP Online Decade	2017 SWP Capital Cost	RWP DB22 Project Sponsors	RWP DB22 Project Name	RWP DB22 Online Decade	RWP DB22 Capital Cost
				B H P WSC	ALT WOOD COUNTY PIPELINE TIE-IN (B H P, CADDO BASIN SUD, POETRY WSC)	2020	$1,038,000
				BRINKER WSC	ALT WOOD COUNTY PIPELINE TIE-IN (BRINKER WSC)	2050	$3,567,000
BRINKER WSC	DRILL NEW WELLS (BRINKER WSC, CARRIZO-WILCOX, SULPHUR)	2060	$344,000	BRINKER WSC	DRILL NEW WELLS (BRINKER WSC, CARRIZO-WILCOX, SULPHUR)	2050	$1,405,000
				CADDO BASIN SUD	ALT WOOD COUNTY PIPELINE TIE-IN (B H P, CADDO BASIN SUD, POETRY WSC)	2020	$3,860,000
CANTON	ALT CANTON GRAND SALINE RESERVOIR	2020	$45,373,000	CANTON	ALT CANTON GRAND SALINE RESERVOIR	2020	$45,373,000
				CASH SUD	ALT WOOD COUNTY PIPELINE TIE-IN (CASH SUD)	2040	$1,926,000
				CELESTE	ALT WOOD COUNTY PIPELINE TIE-IN (CELESTE)	2020	$5,076,000
CLARKSVILLE	ALT CLARKSVILLE TREATED PIPELINE PAT MAYSE WATER	2040	$10,506,000	CLARKSVILLE	ALT CLARKSVILLE TREATED PIPELINE PAT MAYSE WATER	2020	$12,255,000
CLARKSVILLE	ALT DRILL NEW WELLS (CLARKSVILLE, NACATOCH, SULPHUR)	2040	$7,878,000	CLARKSVILLE	CONTRACT WITH TEXARKANA AND TREATED WATER PIPELINE TO DEKALB (CLARKSVILLE, SULPHUR)	2020	$11,702,000
CLARKSVILLE	DIMPLE RESERVOIR	2040	$33,906,000	CLARKSVILLE	DIMPLE RESERVOIR	2020	$38,489,000
				COUNTY-OTHER, WOOD	ALT WOOD COUNTY PIPELINE AND REGIONAL WELL FIELD	2020	$232,728,000
				CUMBY	ALT WOOD COUNTY PIPELINE TIE-IN (CUMBY)	2020	$4,809,000
GREENVILLE	ALT TOLEDO BEND TIE-IN PIPELINE (GREENVILLE)	2050	$78,477,000				
				HICKORY CREEK SUD	ALT WOOD COUNTY PIPELINE TIE-IN (HICKORY CREEK SUD)	2020	$11,862,000
				HICKORY CREEK SUD	NEW CONTRACT WITH GREENVILLE AND PIPELINE TO HICKORY CREEK SUD	2020	$8,553,000
IRRIGATION (HOPKINS)	ALT DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SABINE)	2020	$817,000	IRRIGATION, HOPKINS	ALT WOOD COUNTY PIPELINE (IRRIGATION HOPKINS)	2020	$13,522,000
IRRIGATION (HOPKINS)	DRILL NEW WELLS (IRRIGATION HOPKINS, CARRIZO-WILCOX, SULPHUR)	2020	$372,000				
IRRIGATION (HOPKINS)	DRILL NEW WELLS (IRRIGATION HOPKINS, NACATOCH, SULPHUR)	2020	$2,064,000				
IRRIGATION (RED RIVER)	ALT DRILL NEW WELLS (IRRIGATION RED RIVER, NACATOCH, SULPHUR)	2020	$2,293,000	IRRIGATION, RED RIVER	ALT DRILL NEW WELLS (IRRIGATION RED RIVER, TRINITY AQ, SULPHUR)	2020	$425,000
IRRIGATION (RED RIVER)	ALT DRILL NEW WELLS (IRRIGATION RED RIVER, WOODBINE, RED)	2020	$1,227,000				
IRRIGATION (VAN ZANDT)	ALT DRILL NEW WELLS (IRRIGATION VAN ZANDT, CARRIZO-WILCOX, NECHES)	2020	$376,000				
				LIVESTOCK, HOPKINS	ALT WOOD COUNTY PIPELINE TIEIN (HOPKINS LIVESTOCK)	2020	$8,273,000
				LIVESTOCK, WOOD	ALT WOOD COUNTY PIPELINE TIE-IN (WOOD CO LIVESTOCK)	2020	$2,479,000

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2017 SWP Project Sponsors	2017 SWP Project Name	2017 SWP Online Decade	2017 SWP Capital Cost	RWP DB22 Project Sponsors	RWP DB22 Project Name	RWP DB22 Online Decade	RWP DB22 Capital Cost
MANUFACTURING (TITUS)	ALT DRILL NEW WELLS (MANUFACTURING TITUS, CARRIZO-WILCOX, CYPRESS)	2020	$571,000				
MANUFACTURING (TITUS)	ALT INCREASE EXISTING CONTRACT (MANUFACTURING TITUS)	2020	$0				
				MFG, WOOD	ALT WOOD COUNTY PIPELINE TIE-IN (WOOD CO MANUFACTURING)	2020	$2,722,000
				MARTIN SPRINGS WSC	WOOD COUNTY PIPELINE TIEIN (MARTIN SPRINGS)	2070	$1,574,000
				MILLER GROVE WSC	ALT WOOD COUNTY PIPELINE TIEIN (MILLER GROVE WSC)	2020	$1,587,000
				MINING, HOPKINS	ALT WOOD COUNTY PIPELINE TIE-IN (HOPKINS MINING)	2020	$5,367,000
				MINING, HUNT	ALT WOOD COUNTY PIPELINE TIE-IN (HUNT CO MINING)	2020	$560,000
NORTH HUNT SUD	DRILL NEW WELLS (NORTH HUNT SUD, WOODBINE , SULPHUR, 2060)	2060	$1,683,000	NORTH HUNT SUD	ALT WOOD COUNTY PIPELINE TIE-IN (NORTH HUNT SUD)	2020	$6,777,000
NORTH HUNT SUD	DRILL NEW WELLS (NORTH HUNT SUD, WOODBINE , SULPHUR, 2070)	2070	$3,275,000				
				POETRY WSC	ALT WOOD COUNTY PIPELINE TIE-IN (B H P, CADDO BASIN SUD, POETRY WSC)	2020	$1,055,000
R-P-M WSC	ALT DRILL NEW WELLS (R-P-M WSC, QUEEN CITY, NECHES, 2020)	2020	$356,000				
R-P-M WSC	ALT DRILL NEW WELLS (R-P-M WSC, QUEEN CITY, NECHES, 2030)	2030	$356,000				
R-P-M WSC	ALT DRILL NEW WELLS (R-P-M WSC, QUEEN CITY, NECHES, 2050)	2050	$477,000				
R-P-M WSC	ALT DRILL NEW WELLS (R-P-M WSC, QUEEN CITY, NECHES, 2060)	2060	$356,000				
STEAM ELEC PWR (HUNT)	INCREASE EXISTING CONTRACT (STEAM ELECTRIC POWER HUNT)	2020	$0				
TEXAMERICAS CENTER	NEW RAW WATER INTAKE AND PIPELINE (TEXAMERICA)	2020	$42,178,000				
				WOLFE CITY	ALT WOOD COUNTY PIPELINE TIE-IN (WOLFE CITY)	2040	$7,124,000
	TOTAL 2017 SWP CAPITAL COST FOR ALTERNATIVE WMS PROJECTS:		**$232,885,000**		**TOTAL RWP DB 22 CAPITAL COST FOR ALTERNATIVE WMS PROJECTS:**		**$434,108,000**

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In association with:

TEXAS REGISTERED ENGINEERING FIRM F-1465

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