Regional Water Plan

Prepared For

Region D – North East Texas Regional Water Planning Group

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Volume I - Final Report, Appendix A & B

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NORTH EAST TEXAS REGIONAL WATER PLANNING GROUP 2010

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LIST OF ACRONYMS

ac-ft	acre-feet
ac-ft/yr	acre-feet per year
BBEST	Basin and Bay Expert Science Team
BEG	Bureau of Economic Geology
BMP	Best Management Practice
BRAC	Base Realignment and Closure
cfs	cubic feet per second
CO	County Other
COG	Council of Governments
CWP	Consensus Water Planning
DFC	Desired Future Conditions
DO	Dissolved Oxygen
DOR	Drought of Record
DPC	Drought Preparedness Council
FCWD	Franklin County Water District
FWSD	Fresh Water Supply District
gpm	gallons per minute
gpcpd	gallons per capita per day
GAM	Groundwater Availability Models
GCD	Groundwater Conservation District
GMA	Groundwater Management Area
IPP	Initially Prepared Plan
LCWSD	Lamar County Water Supply District
MAG	Managed Available Groundwater
MCL	Maximum Contaminant Level
MGD	million gallons per day
mg/l	milligrams per liter
MTBE	Methyl Tertiary Butyl Ether
MUD	Municipal Utility District
NETMWD	Northeast Texas Municipal Water District
NETRWP	North East Texas Regional Water Plan
NETRWPG	North East Texas Regional Water Planning Group
NRCS	Natural Resources Conservation Service
NTMWD	North Texas Municipal Water District
PMF	Probable Maximum Flood
RRAD	Red River Army Depot
RRCP	Red River Commerce Park
RRRA	Red River Redevelopment Authority
RWP	Regional Water Planning

RWPG	Regional Water Planning Group
RWRD	Riverbend Water Resources District
PET	Potential Evapotranspiration
S.B.	Senate Bill
SRA	Sabine River Authority
SaRMWD	Sabine River Municipal Water District
SuRMWD	Sulphur River Municipal Water District
SUD	Special Utility District
TCEQ	Texas Commission on Environmental Quality
TDS	Total Dissolved Solids
TMDL	Total Maximum Daily Limits
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
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WAM	Water Availability Models
WCD	Water Conservation District
WSC	Water Supply Corporation
WUG	Water User Group
WWP	Wholesale Water Providers

EXECUTIVE SUMMARY

The North East Texas Regional Water Planning Group (NETRWPG) represents the North East Texas Regional Water Planning Area (here after referred to as the North East Texas Region). 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. This RWPG 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, 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 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. 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 summary provides an overview of the ten (10) chapters of the Initially Prepared Plan (IPP) for the North East Texas Region.

Chapter 1: Description of the Region

<u>The Planning Process</u>

The Texas Water Development Board (TWDB) has developed a set of ten tasks that the regional groups are to accomplish in the regional water plan. 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. Region D planning group voted to keep the population in this round of planning essentially the same as the 2006 Region D Water

Plan. The planning group also noted that the 2010 U.S. Census population numbers will be available after this round of planning, and recommended that they be used as a basis of population projection during the fourth round of regional water planning.

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

Chapter 4 of the report presents identified water 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. A strategy for solving each shortage is presented, along with a cost estimate and environmental analysis. This chapter also establishes criteria to be applied in the evaluation of water management strategies.

Chapter 5 of the plan addresses the impact of water management strategies on key parameters of water quality, and the impacts of moving water from rural and agricultural areas.

Chapter 6 presents the water conservation and drought management recommendations of the plan.

Chapter 7 provides a description of how the regional plan is consistent with long-term protection of the state's water resources, agricultural resources, and natural resources.

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, Texas Commission on Environmental Quality (TCEQ) regulations, and improvements to the regional water supply planning process.

Chapter 9 constitutes a report to the legislature on water infrastructure funding recommendations for the NETRWPG entities with identified shortages during the planning period.

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

Physical Description of the Region

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

Regional Entities

The North East Texas Region includes all or a part of the following counties (refer to Figure 1.2 for 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		

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 Northeast Texas. 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.

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 2000 U.S. Census identifies totals of ethnic categories, including black, white, and other (Asian, American Indian, Hispanic, etc.). The graph in Figure 1.13 illustrates ethnic percentages in the North East Texas Region compared to the state.

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. Tourism is a growth industry in the Region; tourists spent over $800,000 in the Region in 2005. 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 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, in the Sulphur Basin, 91 percent of the water used is surface water; 89 percent of water used 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, 88 percent of the water supply used is surface water.

Wholesale Water Providers

TWDB rules define a wholesale water provider as any person or entity that has contracts to sell more than 1000 acre-feet of wholesale water in any one year during the five years immediately preceding the adoption of the last Regional Water Plan.

Based upon this explanation, the NETRWPG identified 17 wholesale water providers, as follows:

Wholesale Water Provider	Municipal Water Suppliers
Cherokee Water Company	City of Emory
Commerce Water District	City of Greenville
Lamar County Water Supply District	City of Longview
Franklin County Water District	City of Marshall
Northeast Texas Municipal Water 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
Cash SUD	

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. Manufacturing is the predominant use category, exceeding all others combined.

In 2006, total reported usage in the North East Texas Region – both ground and surface – was 424,414 acre-feet. Manufacturing comprised 45 percent of the total, followed by municipal (31%), steam electric (13%), irrigation (6%), livestock (5%) and mining (<1%). By 2030, projections developed in this plan indicate usage will reach 653,207 ac-ft, a 55 percent increase.

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 and the City of Greenville. The Texas Water Development Board completed the development of Groundwater Availability Models of the northern part of the Carrizo-Wilcox, the Queen City, the Woodbine, the Nacatoch, and the Blossom aquifers.

Chapter 2: Population and Water Demand Projections

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. Texas Water Development Board's (TWDB) "Guidelines for Regional Water Plan Development (2007-2012)" state that population and water demand projections from the second round of regional water planning cycle will serve as default projections in the current round of planning. TWDB stated that the planning groups may request that the Board consider revisions to the 2006 Regional Water Plan and 2007 State Water Plan population and water demand projections if conditions in a given area have changed sufficiently to warrant revisions.

The 2007 population estimates from the Texas State Data Center (TSDC) were used as the primary standard to determine if changed conditions warrant any revisions to population projections. TWDB interpolated the population in the 2006 Region D Water Plan to arrive at a 2007 population. This 2007 population was then compared to the 2007 TSDC estimates. A comparison of the total Region D estimated population by the TSDC, for 1/1/2007, and the TWDB (interpolated) estimate for the same period shows a projection error of minus 0.23%. Given this small magnitude of difference between TSDC and TWDB estimates, the Region D planning group voted to keep the population in this round of planning essentially the same as the 2006 Region D Water Plan. The planning group also noted that the 2010 U.S. Census population numbers will be available after this round of planning, and recommended that they be used as a basis of population projection during the fourth round of regional water planning.

The total water demanded by county and river basin is a cumulative measure of all water demanded in the region for municipal, manufacturing, mining, steam electric, livestock and irrigation purposes. Total demand for the Region is expected to increase approximately 50% or 277,900 acre-feet over the 50 year planning period from 2010 to 2060. The increase in regional water demand is due largely to increases in steam electric, manufacturing and municipal water demand. Cass, Harrison, Morris and Titus Counties currently have and are projected to continue to have the highest overall water demand through 2060. Due to population growth (municipal demand), manufacturing and to a lesser extent steam electric power generation growth, the

Sabine River basin is projected to have the highest overall water demand of the six (6) River Basins within the region.

Approximately 20% of the total regional water demand is used for municipal purposes. Municipal water demand for the North East Texas Region is projected to increase by approximately 58,000 acre-feet, or 49% over the fifty year planning period (2010 to 2060). The average daily per capita water use for municipal purposes in the North East Texas Region during the year 2000 was 141 gallons per capita per day (gpcpd). The statewide average water use for the same baseline year was 173 gpcpd.

Over the fifty year period from 2010 to 2060, 50% to 52% of the total water demand in the North East Texas Region is projected to be manufacturing demand. Harrison, Cass and Morris counties currently have the greatest demand for water used for manufacturing purposes. These three counties are also projected to have the greatest incremental manufacturing water demand growth through 2060.

Annual steam electric water demand is projected to increase 154% from the year 2000 to 2060. The majority of this increase is expected to occur in Hunt, Harrison, Titus and Lamar counties as steam electric power generation facilities are expanded and additional facilities are anticipated to come on-line to supply the power generation needs of the North East Texas Region and surrounding Regions. In 2000, steam electric power generation represented approximately 15% of water demand for the North East Texas Region, by 2060 steam electric is anticipated to require 22% of the region's water demand.

Livestock, Irrigation and Mining water demand represent relatively small portions of water demanded within the region. They represent 5.4%, 3.2% and 1.5% of water demanded in the North East Texas Region in the year 2000, respectively. Livestock and Irrigation water demand is expected to remain relatively constant over the 50 year planning period, with a reduction in percentage of total water demanded to just over 3 % and 2% of Regional water demand, respectively. Annual water demand for mining purposes is anticipated to grow during the sixty year period from 2000 to 2060.

Chapter 3: Water Supply Analysis

A key task in the preparation of the water plan for the North East Texas Region is to determine the amount of water that is currently available to the Region. As part of the evaluation of current water supplies in the region, the water planning group was charged with updating the water availability numbers from the 2006 Regional Water Plan through the use of the newly completed Water Availability Models (WAM) for surface water and Groundwater Availability Models (GAM) for groundwater sources.

The North East Texas Regional Water Planning Area includes all or a portion of 19 counties that encompass major portions of four river basins: the Cypress Creek Basin, the Red River Basin, 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 North East Texas Region. Surface water sources within the region include rivers, streams, lakes, ponds, and tanks.

As required by TWDB rules, for the 2011 Regional Water Plan, TCEQ Water Availability Models (WAM) for reservoirs and river systems were utilized wherever available. 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.

Six aquifers were identified within the North East Texas Region. Major aquifers, as classified by the Texas Water Development Board, include the Carrizo-Wilcox and Trinity aquifers. The Blossom, Nacatoch, Queen City and Woodbine aquifers are four minor aquifers present in the North East Texas Region.

The North East Texas Regional Water Planning Group determined that it is in the best interest of the Region to maintain an acceptable level of aquifer sustainability during the 50-year planning window as well as for future generations beyond the 50-year planning period. Thus, where it was possible to estimate drawdown with a GAM, the ground-water availability for the planning period was defined as the amount of groundwater that could be withdrawn from aquifers over the next 50 years that would not cause more than 50 feet of water level decline (or more than a 10% decrease in the saturated thickness in outcrop areas) in the aquifers as compared to water levels in 2000.

Chapter 4: Identification, Evaluation, and Selection of Water Management Strategies

Based on Needs Summary

The objective of this chapter is to compare the water demands within the North East Texas Region, as discussed in Chapter 2, with water supplies, as discussed 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 in 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 the county where the highest percentage of the entity is located. Second, shortages are shown by river basin. WUG's will be listed in the river basin where the demands occur, rather than the basin where the supplies are located. If a WUG spans two or more river basins, it is divided proportionately between the appropriate basins. Finally, water shortages are divided among major water providers. If an entity obtains water from more than one major water provider, it is listed under each of its water sources.

Within the North East Texas Region, three strategies have been identified to meet water shortages. The first 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. The second strategy is for the WUG to enter into a new contract with a Major Water Provider to provide an adequate supply for the system. The third strategy is to drill a new well or multiple wells to meet the demand of the WUG.

Chapter 5: Impacts of Water Management Strategies on Key Parameters of Water Quality and Impacts of Moving Water from Rural and Agricultural Areas

The NETRWPG has identified 61 water user groups with shortages, which will require strategies in this plan. Twenty-one of these shortages will be resolved by simply extending existing water purchase contracts, and will not require capital expenditure or new sources of supply. Of the remaining 40, 31 shortages will be resolved with additional groundwater supplies, one with both groundwater and surface water, one will require TCEQ water right permit, and 13 will involve increasing the maximum quantity of taking under existing surface water purchase contracts. Four of these 13 will require additional surface water provided by the Toledo Bend Pipeline project of the Sabine River Authority.

The strategies recommended herein are primarily to address shortages in municipal suppliers. Municipal water suppliers are governed by regulations of the TCEQ, primarily Chapter 290 of the Texas Administrative Code. Key parameters of water quality are therefore those regulated by the TCEQ, and are summarized in Tables 5.1 through 5.4.

Impacts on Water Quality

The 33 strategies utilizing groundwater involve the drilling of additional wells by smaller systems, generally in the 50 to 200 gpm production range. Should over drafting 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 eight 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.

Four surface water strategies involve moving water by pipeline from Toledo Bend Reservoir in the lower Sabine River Basin to Lake Tawakoni or Lake Fork in the upper Sabine. By the end of the 50 year planning period, the NETRWPG area needs due to these strategies will total 32,682 ac-ft per year. The capacity of Toledo Bend Reservoir is 4,412,300 ac-ft. For planning purposes the annual withdrawal of 0.7% of the reservoir contents can be considered negligible.

The pipeline project could result in the addition of Toledo Bend water to Lake Fork and/or Lake Tawakoni. Detailed studies will be required to determine the water quality impacts. Table 5.5 compares key water quality parameters for the upper and lower basins, and shows no significant difference in water quality.

Impacts of Moving Water from Rural and Agricultural Areas

Chapter 357.7 rules require that the plan include an analysis of the impacts of strategies, which move water from rural and agricultural areas. As previously noted, strategies were identified for 40 entities in the NETRWPG area. 31 of these strategies involve drilling of wells for use in the immediate vicinity of the well. Nine of these strategies involve surface water, which is taken from a reservoir within the same proximity as the water user group.

The four remaining strategies move water from the Toledo Bend Reservoir, which would be considered a rural and agricultural area, to Lake Tawakoni and/or Lake Fork, for use in Hunt County which is also a rural and agricultural area. The water remains in the same river basin, and under control of the same river authority. The amount being moved for use in Region D is less than 0.7% of the capacity of Toledo Bend, and are in excess of the needs of Region I in which Toledo Bend is located. The impacts of moving the proposed quantity of water would be negligible on agricultural interests in the Toledo Bend area.

Socioeconomic Impacts of Unmet Needs

Section 357.7 of the regional water planning rules requires the planning groups to evaluate the social and economic impacts of failure to meet projected water shortages. At the request of the NETRWPG, the Texas Water Development Board provided technical assistance in the preparation of a socioeconomic impact assessment. This assessment is included in its entirety in the Appendix of this plan.

Quoting from the TWDB analysis:

"If drought of record conditions return and water supplies are not developed, study results indicate that Region D could suffer significant losses. If such conditions occurred 2010 lost income to residents in the region could approach $135 million with associated job losses of 1,060. State and local governments could lose $23 million in tax receipts. If such conditions occurred in 2060, income losses could run $321 million and job losses could be as high 2,595. Nearly $50 million worth of state and local taxes would be lost. The majority of impacts stem from projected water shortages for manufacturing firms. Reported figures are probably conservative because they are based on estimated costs for a single year; but in much of Texas, the drought of record lasted several years. For example, in 2030 models indicate that shortages would cost residents and businesses in the region $175 million in lost income. Thus, if shortages lasted for three years, total income losses related to unmet needs could easily approach $525 million."

Chapter 6: Water Conservation and Drought Management Recommendations

The 77th Texas Legislature amended the Water Code to require water conservation and drought management strategies in Regional Water Plans. The plan is to include water conservation strategies for each water user group to which Texas Water Code (TWC) 11.1271 applies, and must consider conservation strategies for each water user group with a need. The planning group must also consider drought management for each identified need.

In addition, the Regional Water Plan is to include a model water conservation plan for use by holders of water rights as required by TCEQ, and a model drought contingency plan for use by wholesale and retail public water suppliers and irrigation districts.

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 borrowing more than $500,000 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 or drought management 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.

Water Conservation Strategies

The planning group determined 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 – should be established at 140 gpcpd. The 140 gpcpd target was selected to coincide with recommendations of the TWDB's statewide water conservation taskforce. Using these concepts, a decision matrix was developed (Figure 6.1) to guide consideration of water conservation strategies.

For all municipal use entities, water savings are anticipated in the regional water plan 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 gpcpd were considered candidates for additional conservation strategies beyond plumbing code requirements. Additional strategies considered were based upon a report commissioned in 2001 by TWDB, performed by GDS Associates, Inc. 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

For each WUG with a shortage and consumption greater than 140 gpcpd, a water conservation strategy was considered, and a water conservation worksheet for the entity has been included in Chapter 4. Acre-foot savings from advanced conservation ranged from a low of 7 acre-feet/year to a high of 49 acre-feet/year. Costs per acre-foot saved ranged from $685/ac-ft to $730/ac-ft. These costs are relatively high due to the small size of the entities and the small amounts of water involved. The conservation savings were not adequate to alleviate the shortage for any of the entities.

Model Water Conservation and Drought Contingency Plan

The planning group has developed and provided herein:

1. A model water conservation plan for use by holders of 1000 acre feet or more of water rights.
2. A model drought contingency plan for use by wholesale water providers.
3. A model drought contingency plan for retail water providers.

Water Conservation and Drought Management Recommendations

The Regional Water Planning Group 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 gpcpd. Systems which experience a per capita usage greater than 140 gpcpd should perform a water audit to more clearly identify the source of the higher consumption. 140 gpcpd 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 3-page water audit worksheet has been prepared by the TWDB (http://www.twdb.state.tx.us/assistance/conservation/Municipal/Water_Audit/2008Water AuditWorksheet.pdf), and 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.state.tx.us/assistance/conservation/Municipal/Water_Audit/documents/WCITFBMPGuide.pdf).

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.

Chapter 7: Description of How the Regional Plan is Consistent with the Long-Term Protection of The State's Water Resources, Agricultural Resources and Natural Resources Summary

The primary purpose of Chapter 7 is to describe how the 2011 North East Texas Regional Water Plan is consistent with the long-term protection of the State's water resources, agricultural resources, and natural resources. Additionally, the chapter will specifically address consistency of the 2011 North East Texas Regional Water Plan with the State's water planning requirements.

The water resources in the North East Texas Regional Water Planning Group area include four river basins providing surface water and six aquifers providing groundwater. The four major river basins within the North East Texas Regional Water Planning Group area boundaries include the Cypress River Basin, the Red River Basin, the Sabine River Basin, and the Sulphur River Basin. The respective boundaries of these basins are depicted in Figure 1.19, 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. In the Sulphur River Basin, 91 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, 81 percent of the need is met by surface water. In the portion of the Red River Basin in the region, 88 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, 9 in the Sabine River Basin, and 6 in the Sulphur River Basin. There are no planned additional reservoirs by the North East Texas Regional Water Planning Group other than Prairie Creek Reservoir and the one contemplated in Van Zandt County. Currently, the majority of the available surface water supply in North East Texas Regional Water Planning Group comes from the Sabine River Basin.

The Carrizo-Wilcox Aquifer is the most important groundwater resource in North East Texas Regional Water Planning Group area, accounting for a total of 76% 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.

The WAMs indicate adequate availability of surface water for irrigation to ensure protection of the State's agricultural resources.

The North East Texas Regional Water Planning Group area 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.

This chapter will also address the impact of the Marvin Nichols I Reservoir on the long-term protection of the State's water resources, agricultural resources, and natural resources. The Marvin Nichols I Reservoir is a proposed water management strategy of Region C in the 2006 State Water Plan. The Marvin Nichols I Reservoir, if constructed, would be located in the North East Texas Regional Water Planning Group area. It is the position of the NETRWPG that inclusion of the Marvin Nichols I Reservoir is not consistent with the long-term protection of the State's water resources, agricultural resources, and natural resources.

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 2011 regional water plan or the 2012 State Water Plan. Accordingly, inclusion of the Marvin Nichols I Reservoir in any regional water plan would be inconsistent with the Region's efforts to ensure the long-term protection of the State's water resources, agricultural resources and natural resources, also violating Sections 16.051 and 16.053 of the Texas Water Code.

NOTE: In referencing Marvin Nichols I, the Region D plan incorporates Marvin Nichols I, Marvin Nichols IA, and any dam sites on the main stem of the Sulphur River.

Chapter 8: Unique Stream Segments/Reservoir Site/Legislative Recommendations

The Regional Water Planning Groups (RWPG) are to include legislative recommendations in the regional water plan 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.

Legislative Designation of Ecologically Unique Stream Segments

The NETRWPG, at the January 27, 2010 meeting, 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 Regional Water Planning Group 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 North East Texas Regional Water Planning Group has recommended that the following 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.

Reservoir Sites

The TWDB rules allow a Regional Water Planning Group 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 2007 State Water Plan and has reconsidered the 2001 North East Texas Regional Water Plan, specifically the information from the Reservoir Site Assessment

Study (Appendix B) of that plan and has commented on the reservoir sites identified in those documents. The 15 reservoir sites identified in those documents are as follows:

Cypress Creek Basin	**Red River Basin**
Little Cypress (Harrison)	Barkman (Bowie)
	Big Pine (Lamar and Red River)
	Liberty Hills (Bowie)
	Pecan Bayou (Red River)
Sabine River Basin	**Sulphur River Basin**
Big Sandy (Wood and Upshur)	George Parkhouse I (Delta and Hopkins)
Carl Estes (Van Zandt)	George Parkhouse II (Delta and Lamar)
Carthage (Harrison)	Marvin Nichols I (Red River & Titus)
Kilgore II (Gregg and Smith)	Marvin Nichols II (Titus)
Prairie Creek (Gregg and Smith)	
Waters Bluff (Wood)	

The NETRWPG recommends that any new reservoirs in NETRWPG area be pursued only after all other viable alternatives have been exhausted. The NETRWPG further recommends that no reservoir sites in this region be designated as unique in this plan or in the 2011 State Water Plan.

The NETRWPG recognizes that there are 15 locations, listed above, in NETRWPG area where the topography is such that the area could be classified as uniquely suitable as a reservoir site. The NETRWPG recognizes that the waters of the state of Texas belong to the citizens of Texas for their specific use, but it is also recognized that the properties rights belong to individuals. Local government should be recognized for the effect that major alterations to the local economy, such as the development of a unique reservoir site, will have on them. To address the issue of unique reservoirs and the accompanying property owners, industry, and local government concerns the NETRWPG recommended those issues of identification of a unique reservoir site; mitigation; compensation to property owners, local government, taxing agencies, and business; and future disposition of water resources be considered as early in the process as possible.

The development of reservoirs in the NETRWPG area as a future water source for other portions of the state would require interbasin transfer authorizations from the Texas Commission on Environmental Quality (TCEQ). Among its many provisions, S.B. 1 includes provisions (Texas Water Code, 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. S.B. 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 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. 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 NETWPG 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.

The North East Texas Regional Water Planning Group does not recommend protection for any of the potential reservoir sites in Region D.

Legislative Recommendations

TWDB rules for the 2010 regional water planning activities provide that regional water planning groups may include in their regional water plans recommendations to the legislature. The approved scope of work for the development of the regional water plan 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 2010 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. The North East Regional Water Planning Group recommends that these various potential Marvin Nichols Reservoir sites not be protected as Unique Reservoir sites.

The North East Texas Regional Water Planning Group was informed of the growth of Giant Salvinia in the region and made specific recommendations to Local and State government as well as the Federal government.

Other issues that were addressed by resolution were the Toledo Bend Reservoir and Pipeline; Oil and Gas Wells; Mitigation; Future Interbasin Transfers from Region D; Future Water needs; Economic and Environmental Impacts; Compensation in inter-regional discussions; Conversion of Public Water Supply from Groundwater to Surface Water; TCEQ Regulations; the Regional Water planning Process; Groundwater Management Areas; and Wright Patman Lake/Reservoir.

Recommendation: Marvin Nichols I Reservoir Site
The Marvin Nichols Reservoir Site in the Sulphur River Basin as designated in the 2007 plan has been of great concern in the meetings for the 2010 plan preparations. The NETRWPG recommends that this reservoir not be included in the 2011 state Water Plan. At issue were basic rights of the property owners and the local government entities. Subject to the comments in Chapter 7, the NETRWPG adopted recommendations that should apply to all reservoirs considered in NETRWPG area.

NOTE: In referencing Marvin Nichols I, the Region D Plan incorporates Marvin Nichols I, Marvin Nichols IA and any other dam site on the main stem of the reaches of the Sulphur River.

Recommendation: Concerning Mitigation

The North East Texas Regional Planning Group 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. 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: Groundwater Management Areas (GMA)

The North East Texas Regional Water Planning Group recommends that the representation on the Groundwater Management Area governing bodies be reconsidered.

Recommendation: Wright Patman Lake/Reservoir

The North East Texas Regional Water Planning Group 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.

Chapter 9: Infrastructure Financing Recommendations

The Infrastructure Financing Report (IFR) requirement was incorporated into the regional water planning process in response to Senate Bill 2 (77th Texas Legislature). It requires that regional water planning groups include a chapter describing the financing needed to implement the recommended water management strategies. The description shall include how local governments, regional authorities, and other political subdivisions propose to pay for the water management strategies that are included in the Regional Water Plans.

The North East Texas Regional Water Planning Group (NETRWPG) used the IFR survey form developed by the TWDB to gather information from the Water User Groups (WUGs) with water management strategies involving capital costs identified in the second round of planning. These were then compiled and reported.

For county aggregate WUGs (i.e. manufacturing, agriculture, etc.), which showed shortages during the planning period and where no political subdivision is responsible for providing water supplies, the RWPG determined probable funding mechanisms for meeting the water management strategies. These determinations were compiled into discussion paragraphs included in Chapter 9. County aggregate shortages in the North East Texas Region are steam electric in Harrison County, steam electric in Hunt County, steam electric in Lamar County, and steam electric in Titus County. Since steam electric generation facilities are normally owned by private companies that are not eligible for State or Federal assistance, financing for this water management strategy will likely come from private funding.

Of the 61 identified entities with water shortages, 21 entities had contractual shortages and four were county aggregate WUGs. Seventeen (17) WUGs were involved in the IFR survey process. The RPWG consultants contacted the 17 entities with water management strategies requiring capital costs by mailing out the TWDB survey form.

Once attempts had been made to contact all 17 WUGs, the survey results were compiled into an Excel spreadsheet, which was provided by TWDB. A breakdown of the capital costs, strategies, and implementations is included as Table 9.1. All 17 of the WUGs were successfully contacted regarding the IFR survey. Those WUGs had made arrangements for funding projects in a total amount of $28,874,182. Of these 17 groups, all have either completed or are in the process of completing water management strategies to meet water needs. The general consensus among those systems that do not intend to utilize State funding is that the State should provide assistance through grants or interest-free loans for smaller projects, anywhere from $40,000 to $300,000.

In addition to regional water supply needs and associated water management strategies, the NETRWPG also considered out of region needs having water management strategies within the region. One strategy includes construction of the Toledo Bend pipeline.

Chapter 10: Adoption of the Plan and Public Participation

The final plan is to be submitted to the TWDB by September 1, 2010. 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 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. There was held a public comment meeting to receive comments both oral and written and was well attended. Also there have been many news releases, a newsletter from 4-6 times a year, speaker's bureau, and public notices.

The subject that dominated the meeting comment segment and the Public comment meeting was the possible development of reservoir sites in the NETRWPG area, especially in the Sulphur River Basin.

After the Initially Prepared Plan was submitted and released, the NETRWPG conducted a public hearing to receive public comments on the IPP. 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 the final Water Plan for the NETRWPG.

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CHAPTER 1.0 DESCRIPTION OF THE REGION

1.1 INTRODUCTION

"We never know the worth of water till the well is dry."

– Benjamin Franklin

1.1(a) Overview of Texas Legislation

The population of Texas is growing rapidly and is expected to double from 2000 to 2060. As a result, water demand is expected to increase by almost 30 percent by 2060. 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.

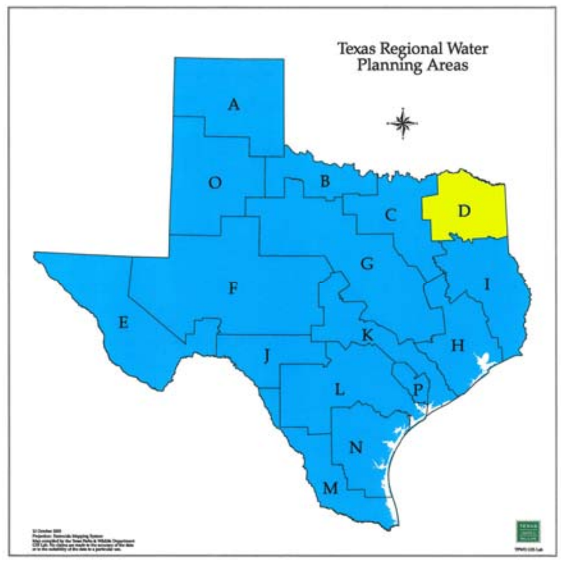
Increased awareness of Texas' vulnerability to drought, and an estimated one hundred percent increase in population over the next fifty years, caused the 75th Texas Legislature to consider several avenues in state water resource planning. In 1997, the Texas Legislature enacted Senate Bill 1, comprehensive 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 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, 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. Most recently, the 80th Legislature added Senate Bill 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 water planning group represents diverse realms of public interest including:

- Agriculture
- Counties
- Environment
- Industry
- Municipalities
- Small business
- River authorities
- Water utilities
- Water districts
- 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 Region 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 (RWPG) 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, located in Hughes Springs, Texas.



Source: Texas Parks & Wildlife Department

Figure 1.1

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 Regional Water Planning Groups 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(b) **The Planning Process**

The TWDB has developed the "General Guidelines for R.W.P. Development (2007-2012)" which includes a set of 10 tasks that the regional groups are to accomplish in the regional water plan, as follows:

Chapter 1 presents a description of the planning region.

Chapter 2 addresses population and water demand projections.

Chapter 3 is an evaluation of current water supplies in the North East Texas Region.

Chapter 4 presents identified water shortages and surpluses, and a strategy for solving each shortage. This chapter also establishes criteria to be applied in the evaluation of water management strategies.

Chapter 5 addresses the impact of water management strategies on key parameters of water quality, and the impacts of voluntary redistributions of water.

Chapter 6 presents water conservation and drought management recommendations.

Chapter 7 provides a description of how the regional plan is consistent with long-term protection of the State's water resources, agricultural resources, and natural resources.

Chapter 8 identifies policy recommendations, particularly regarding designation of unique reservoir sites and unique streams.

Chapter 9 constitutes a report to the legislature on water infrastructure funding recommendations for the NETRWPG area entities with identified shortages during the planning period.

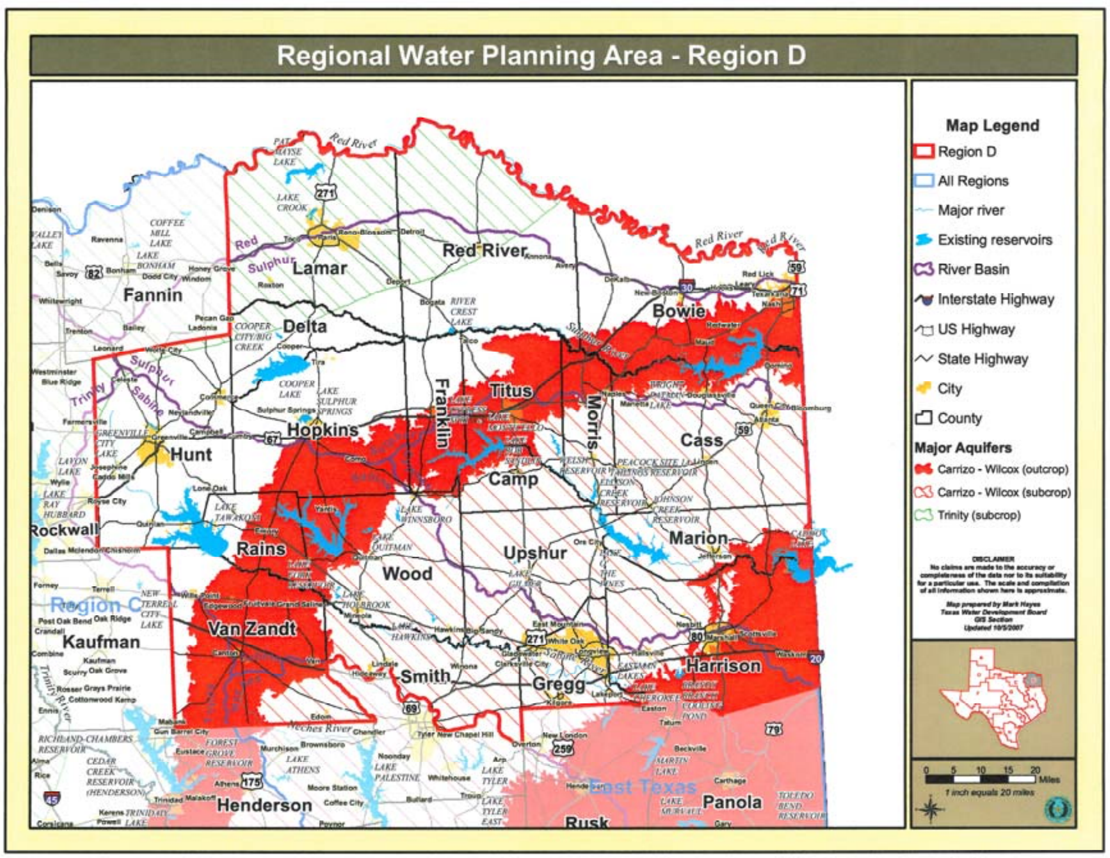
Chapter 10 consists of a summary of public involvement throughout the planning process, and the official adoption of the Plan.

1.2 PHYSICAL DESCRIPTION OF THE REGION

1.2.1 Regional Entities

The Region 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		



Map updated by Mark Hayes, Texas Water Development Board, Planning Division, GIS Section (10/07) L:\projects\RIO\TS\carchuleta\Maps_ArcGIS\MXDs\Regional Water Planning Area Maps

Figure 1.2

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
- Rural Development, USDA
- United States Army Corps of Engineers (USACE), Tulsa
- USACE, Fort Worth
- USACE, Vicksburg

The following table 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)	2000 County Census Population	2009 Texas State Data Center Projections	2010 TWDB Projections	Largest City
Bowie	923	89,306	91,469	96,953	Texarkana°
Camp	203	11,549	12,053	12,586	Pittsburg
Cass	960	30,438	30,245	30,990	Atlanta
Delta	278	5,327	5,317	5,728	Cooper
Franklin	295	9,458	9,475	11,533	Mount Vernon
Gregg	276	111,379	117,371	118,770	Longview°
Harrison	915	62,110	63,976	67,547	Marshall°
Hopkins	793	31,960	33,253	35,934	Sulphur Springs
Hunt	882	76,596	81,811	82,948	Greenville°
Lamar	932	48,499	49,621	52,525	Paris°
Marion	420	10,941	10,834	11,295	Jefferson
Morris	259	13,048	13,198	13,039	Daingerfield
Rains	259	9,139	9,164	11,173	Emory
Red River	1,058	14,314	14,256	14,251	Clarksville
Smith	433*	31,806*	36,373*	39,211*	Lindale*
Titus	426	28,118	30,508	31,158	Mount Pleasant
Upshur	593	35,291	36,508	38,372	Gilmer
Van Zandt	860	48,140	48,698	55,423	Wills Point
Wood	696	36,752	36,353	42,727	Mineola
TOTALS	**11,461**	**704,171**	**730,483**	**772,163**	

*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.

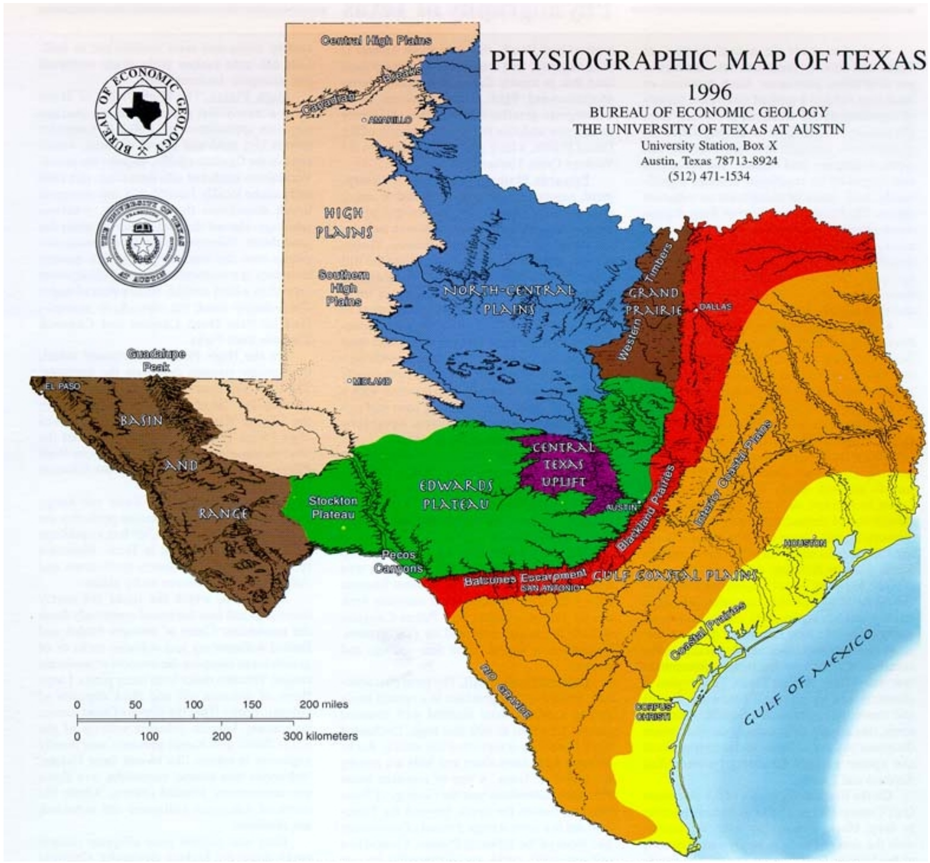


Figure 1.3

The Gulf Coastal Plains has been divided into several sub-areas. Within the NETRWPG, 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.

The Region has 24 surface water bodies with capacity of 5000 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 North East Texas Region 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 NETRWP area 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.

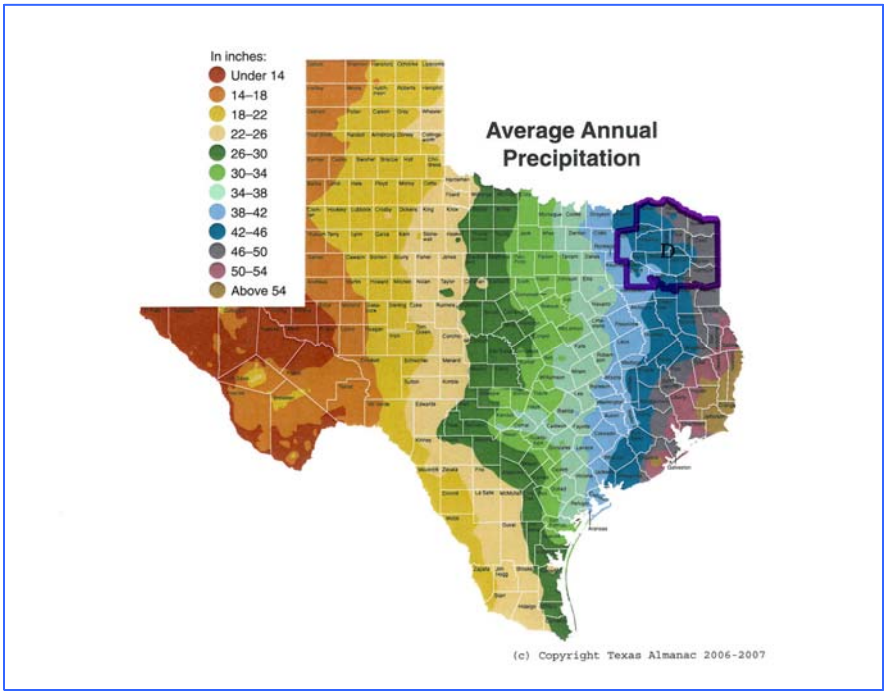


Figure 1.4

Average annual precipitation in the region is 43.7 inches, which is the highest precipitation in the state. Average annual lake surface evaporation over a five-year period, from 2003 to 2007, was 50.20 inches down from 50.81 inches from 1998 – 2002. Over the same period, the January average evaporation rate was 2.36 inches, and in August the rate was 6.41 inches. The Region experienced 11 recorded droughts from 1892 – 2006. Winter precipitation, such as snow, sleet and ice, occurs infrequently in northeast Texas and is generally short-lived.

Winds in northeast Texas 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.

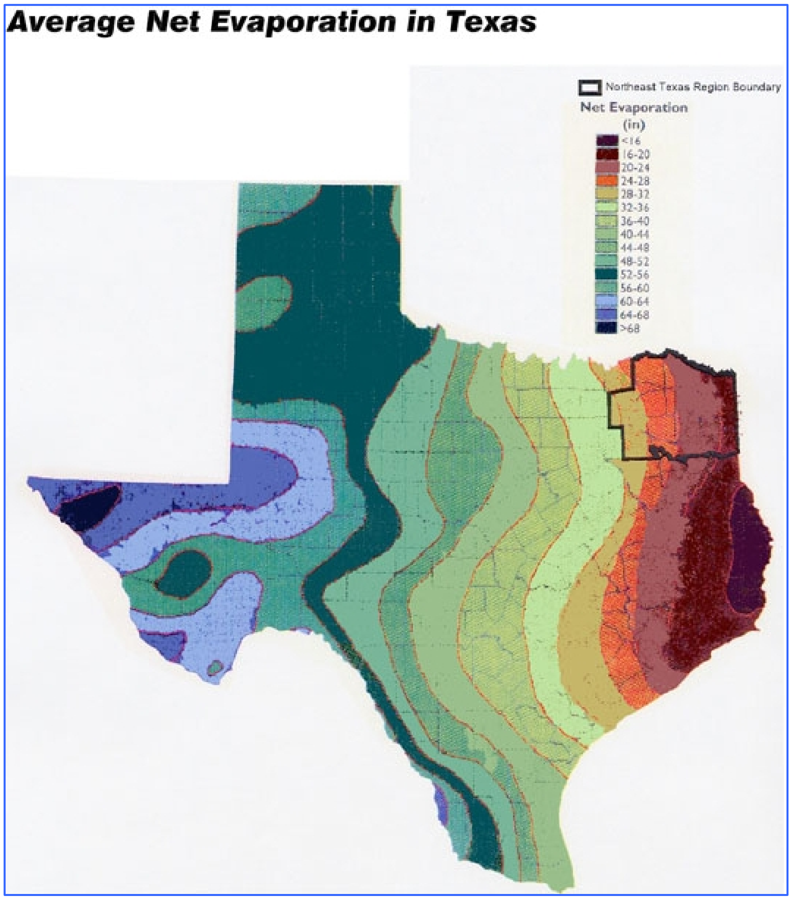


Figure 1.5 **Source: TWDB**

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 2008 – 2009 Texas Almanac, the Red River Valley, in the northern part of the Region, has the highest frequency of tornadoes in the state

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, acid 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 salt, which 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.

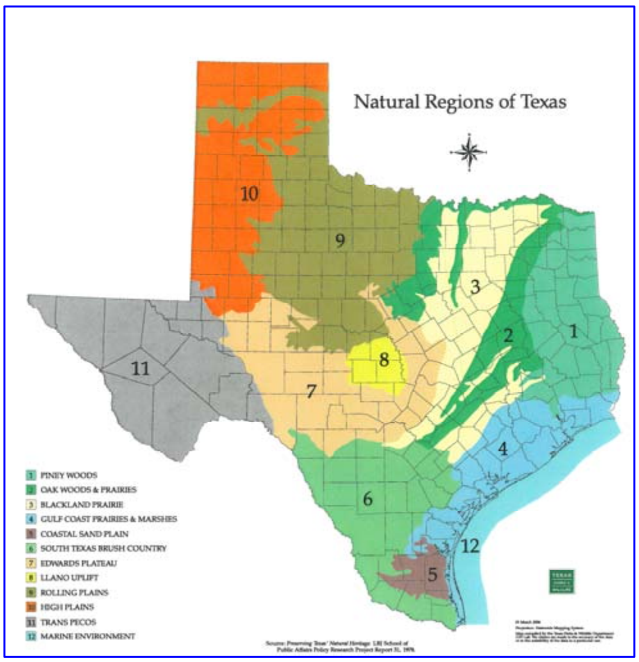


Figure 1.6

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 (1,562 acres), White Oak Creek (25,700 acres), Old Sabine Bottom (5,727 acres), and Caddo Lake (7,805). These areas are used for hunting, research, fishing, wildlife viewing, hiking, camping, bicycling, and horseback riding.

Air quality in Texas is monitored by the Texas Commission on Environmental Quality (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 Region, 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 1.7A).

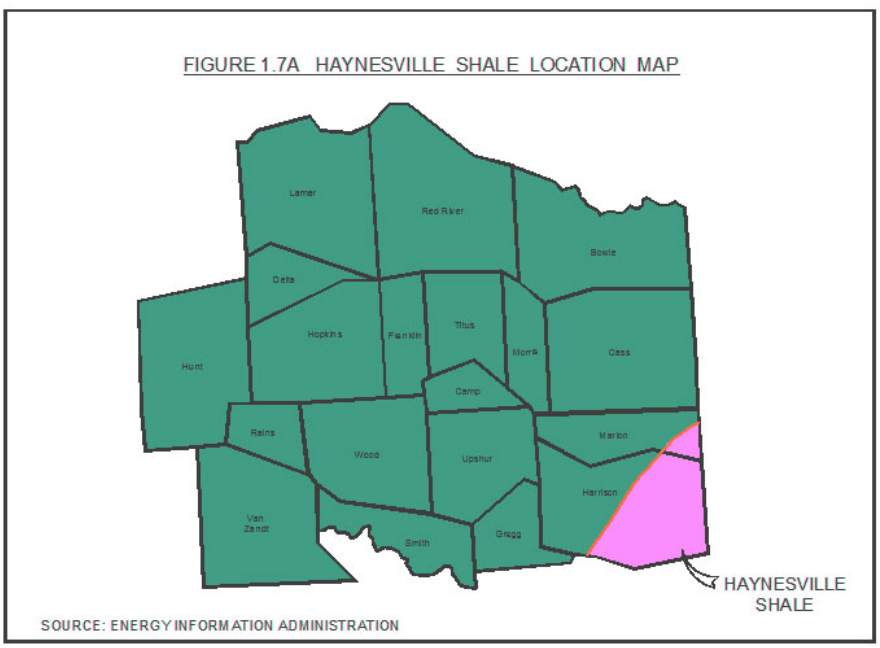
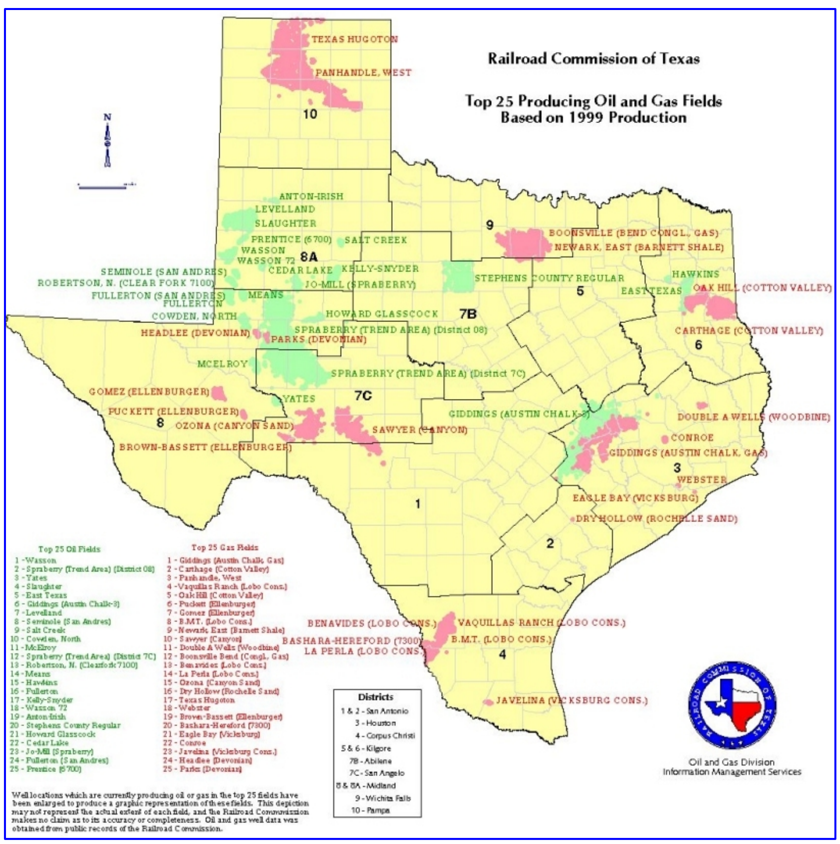


Figure 1.7A

The Haynesville Shale is considered a tight formation which requires that a technique called fracing be utilized to open up the shale and allow easier capture of the oil/gas. The water demand necessary to complete and frac 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 fracing 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 fracing 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 frac 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 1.7. Counties in the Region with the largest oil production in 2006 include Wood, Gregg, Harrison, and Smith. Table 1.2, taken from the 2008 – 2009 Texas Almanac, lists the amount of crude oil produced in the North East Texas Region in 2005 and 2006.



Source: RAILROAD COMMISSION OF TEXAS **Figure 1.7B**

Table 1.2 Regional Oil Production

County	Oil Production 2005 (barrels)	Oil Production 2006 (barrels)	Total Production from discovery to January 1, 2007
Bowie	105,035	81,786	6,592,242
Camp	230,684	261,637	29,460,771
Cass	327,717	318,325	114,776,911
Delta	0	0	65,089
Franklin	451,993	401,044	177,694,279
Gregg	2,954,383	2,924,531	3,291,530,089
Harrison	1,022,379	1,153,353	91,190,047
Hopkins	364,463	292,614	90,115,089
Hunt	0	0	2,024,660
Lamar	0	0	0
Marion	177,767	191,884	55,967,586
Morris	2,218	2,012	6,384
Rains	0	1	148,897
Red River	167,665	142,159	8,082,688
Smith	1,629,634	1,641,300	276,734,489
Titus	503,925	489,647	212,202,550
Upshur	670,287	663,271	288,612,959
Van Zandt	944,717	834,549	552,443,544
Wood	4,377,131	4,295,168	1,208,477,915

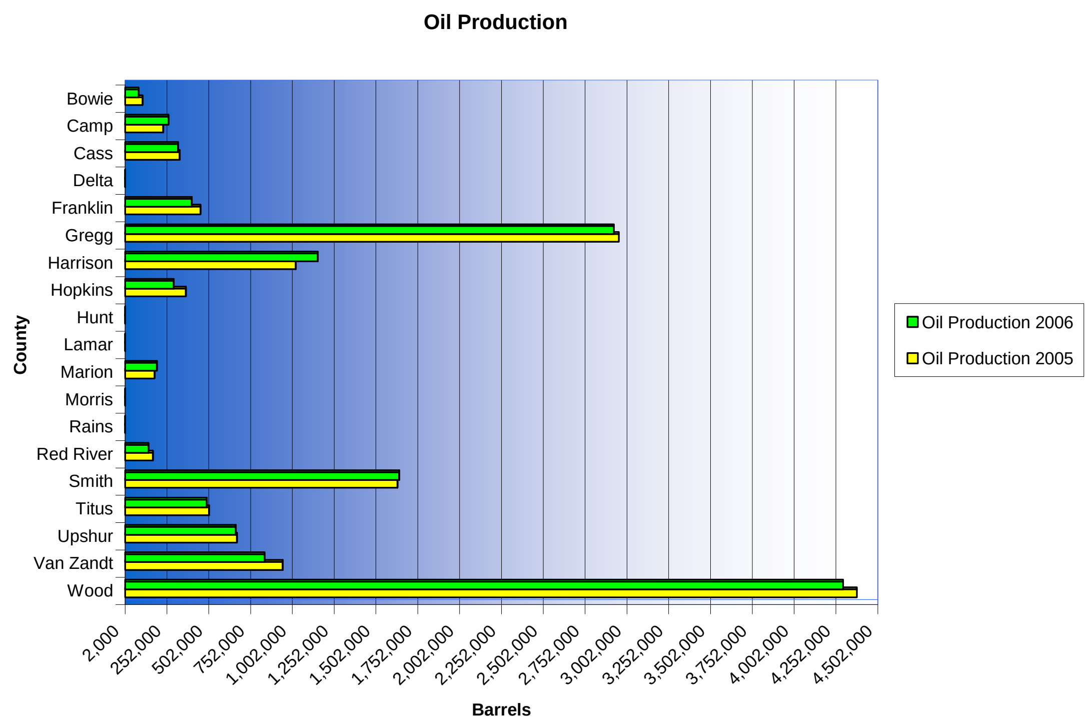
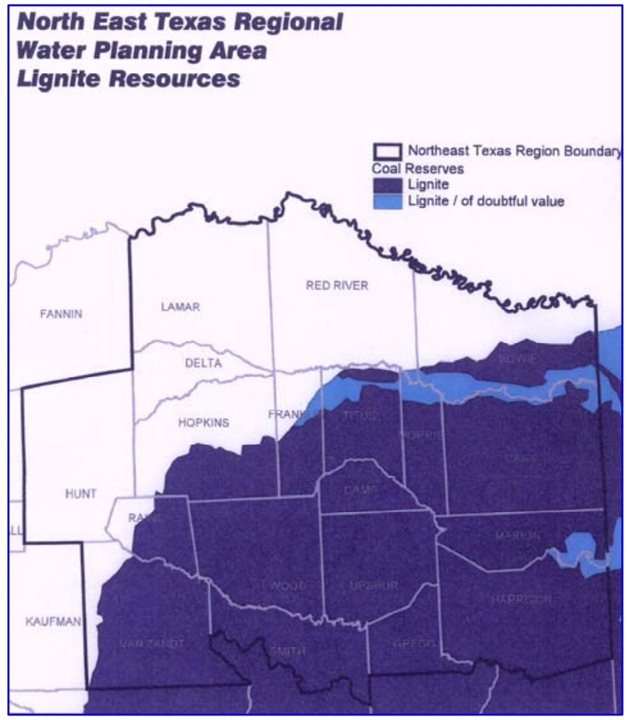


Figure 1.8

Figure 1.9



Lignite resources are also found in portions of northeast Texas (See Figure 1.9), 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.

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 1.10 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 2005 was $494.6 million, and the delivered value of timber was $839.6 million, both values up from 2004.

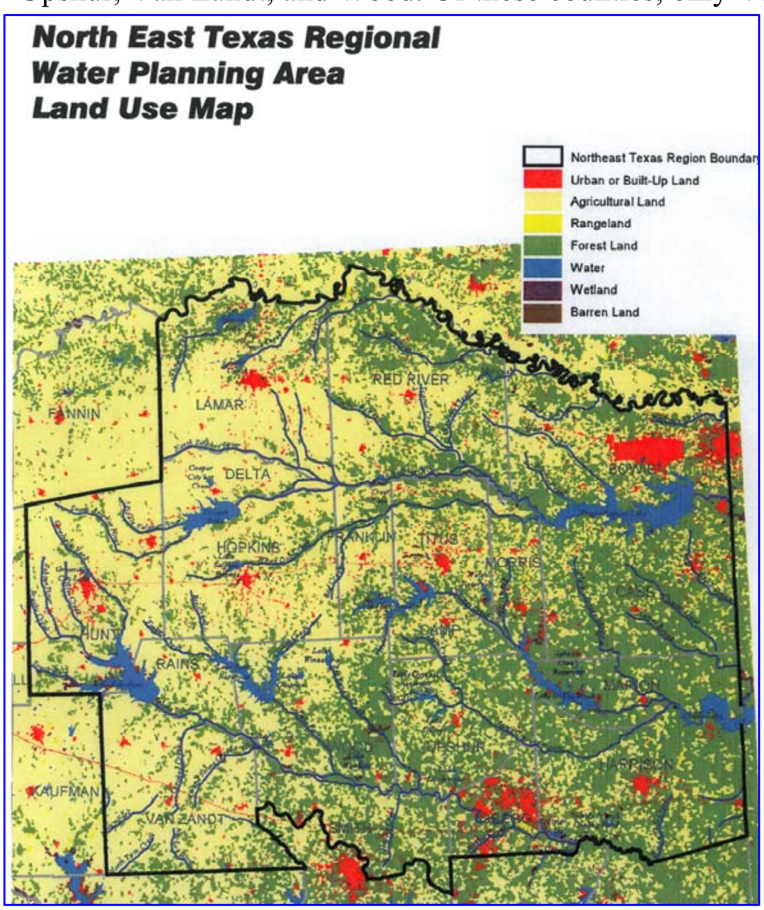
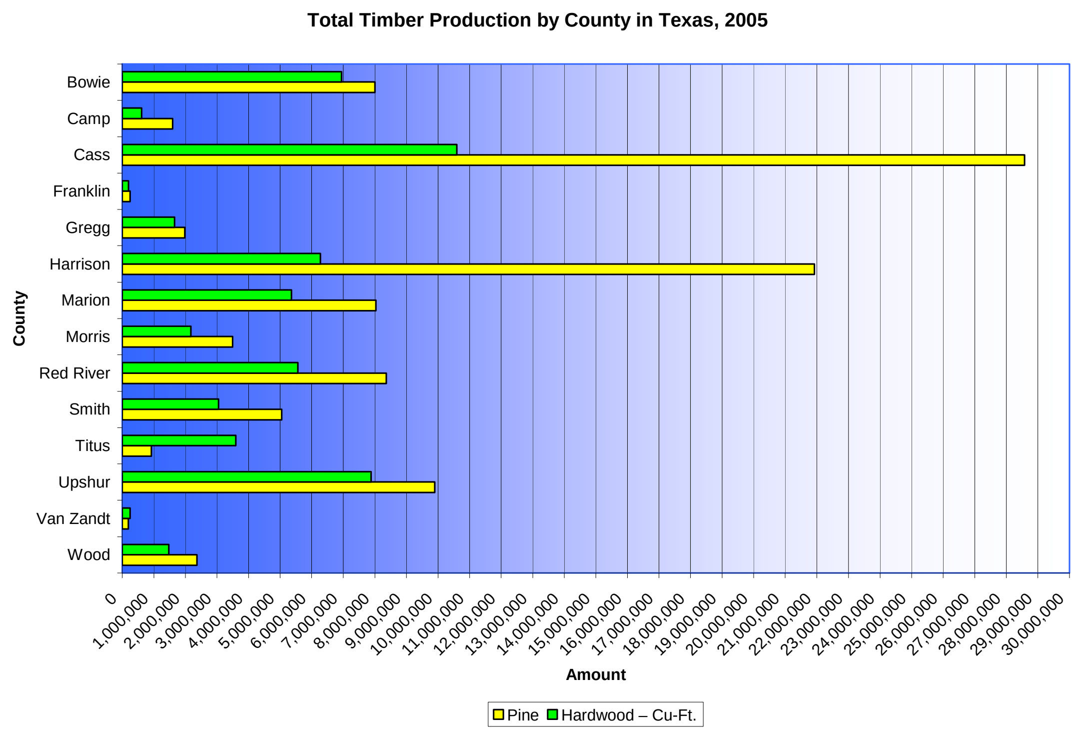
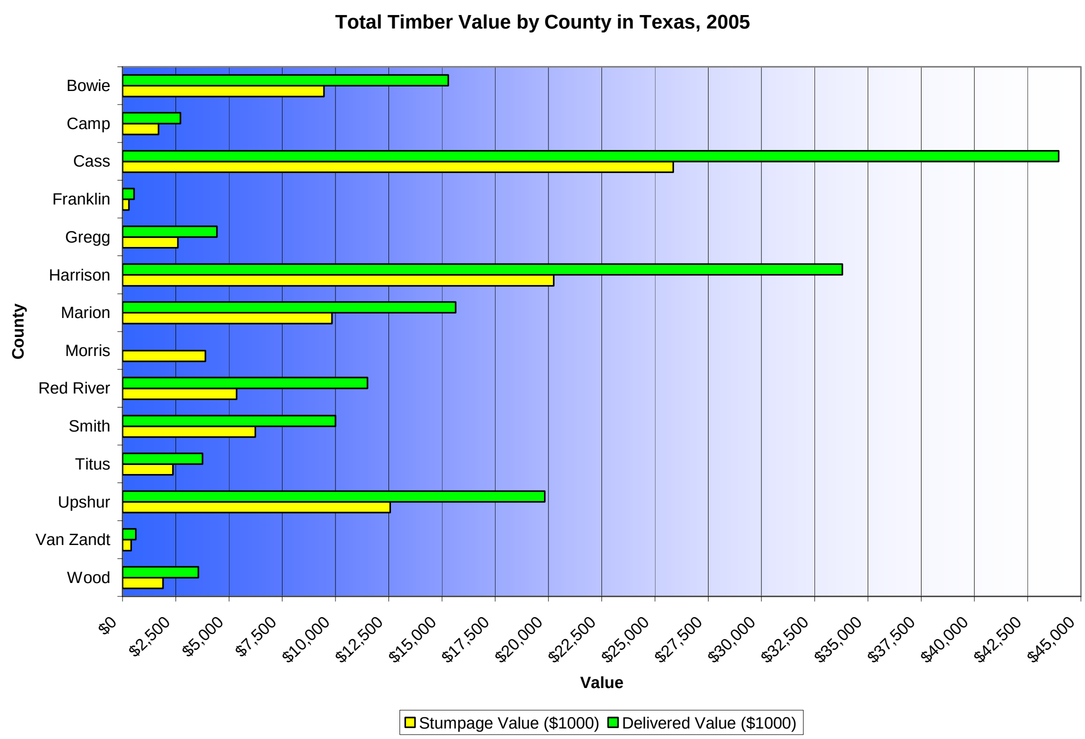


Figure 1.10
Source: TWDB

Data taken from the 2008 – 2009 Texas Almanac, show (Figure 1.11) the counties within the Region that are important timber producers.

Figure 1.11





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, constructing 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 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 economic base 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. The following table 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(a) Historical and Current Population

Population in the NETRWP area 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, and high-yield cotton-producing farms, as well as other types of farms. 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.

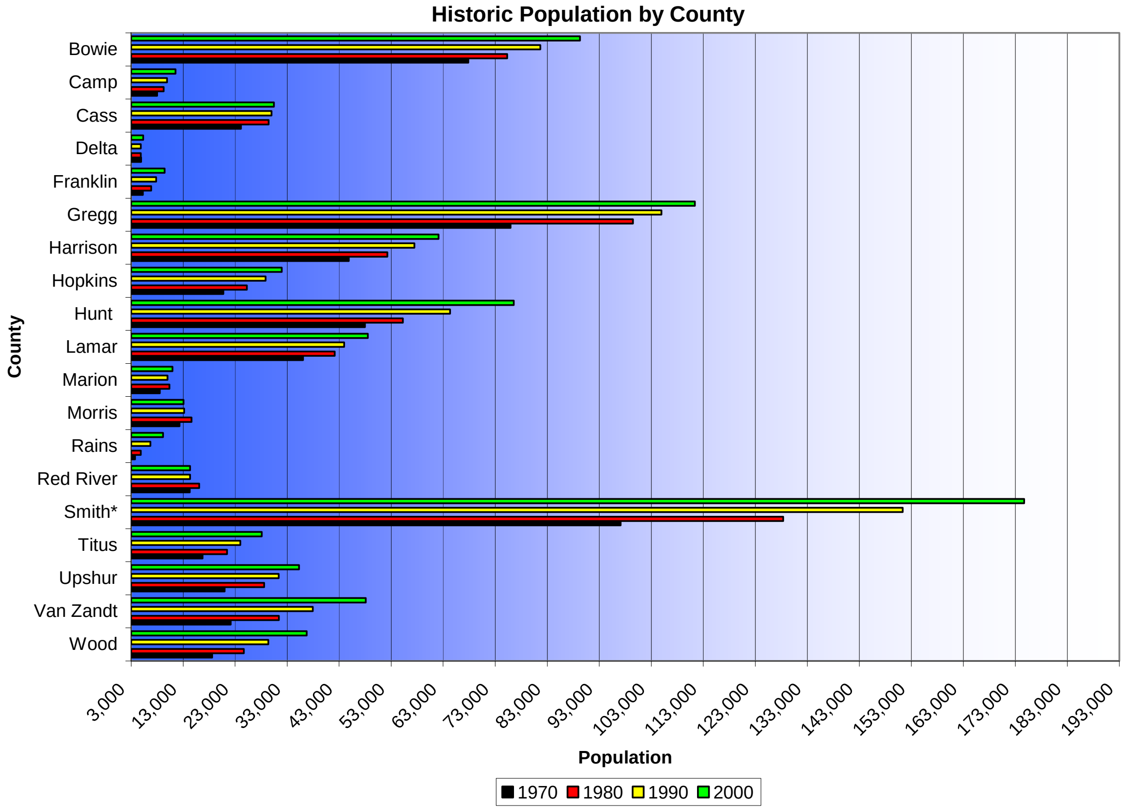
Table 1.4 presents the historical population of each county. These population counts are provided by the United States census. The graph shows that most of the counties have seen growth of over 25 percent. Several counties, including Franklin, Rains, Smith, Van Zandt and Wood, experienced growth of over 75 percent. The Region as a whole grew 54 percent from 1970 to 2000, compared to a 86 percent growth in Texas and a 38 percent growth in the United States.

Table 1.4 Historic Population by County

County	1970	1980	%Growth	1990	%Growth	2000	%Growth	30 Yr. Growth
Bowie	67,813	75,301	11.0%	81,665	8.5%	89,306	9.4%	31.7%
Camp	8,005	9,275	15.9%	9,904	6.8%	11,549	16.6%	44.3%
Cass	24,133	29,430	21.9%	29,982	1.9%	30,438	1.5%	26.1%
Delta	4,927	4,839	-1.8%	4,857	0.4%	5,327	9.7%	8.1%
Franklin	5,291	6,893	30.3%	7,802	13.2%	9,458	21.2%	78.8%
Gregg	75,929	99,487	31.0%	104,948	5.5%	111,379	6.1%	46.7%
Harrison	44,841	52,265	16.6%	57,483	10.0%	62,110	8.0%	38.5%
Hopkins	20,710	25,247	21.9%	28,833	14.2%	31,960	10.8%	54.3%
Hunt	47,948	55,248	15.2%	64,343	16.5%	76,596	19.0%	59.7%
Lamar	36,062	42,156	16.9%	43,949	4.3%	48,499	10.4%	34.5%
Marion	8,517	10,360	21.6%	9,984	-3.6%	10,941	9.6%	28.5%
Morris	12,310	14,629	18.8%	13,200	-9.8%	13,048	-1.2%	6.0%
Rains	3,752	4,839	29.0%	6,715	38.8%	9,139	36.1%	143.6%
Red River	14,298	16,101	12.6%	14,317	-11.1%	14,314	0.0%	0.1%
Smith*	97,096	128,366	32.2%	151,309	17.9%	174,706	15.5%	79.9%
Titus	16,702	21,442	28.4%	24,009	12.0%	28,118	17.1%	68.4%
Upshur	20,976	28,595	36.3%	31,370	9.7%	35,291	12.5%	68.2%
Van Zandt	22,155	31,426	41.8%	37,944	20.7%	48,140	26.9%	117.3%
Wood	18,589	24,697	32.9%	29,380	19.0%	36,752	25.1%	97.7%
TOTAL	**552,024**	**682,576**	**23.6%**	**753,984**	**10.5%**	**849,071**	**12.6%**	**53.8%**

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

Figure 1.12



1.3(b) **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. Cities with populations over 10,000 are listed in Table 1.5.

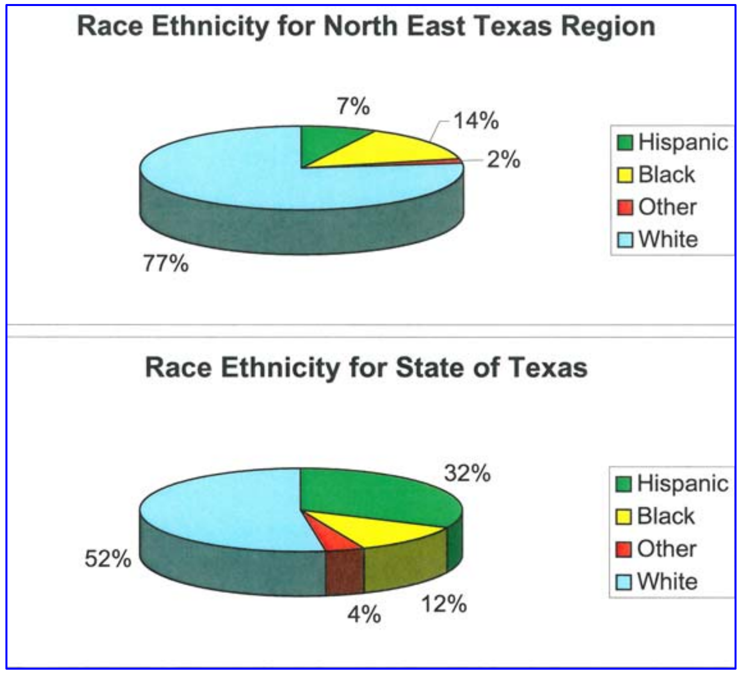
Table 1.5 Cities with 2000 Populations Over 10,000

City	2000 Census
Greenville	23,960
Longview	73,344
Marshall	23,935
Mount Pleasant	13,935
Paris	25,898
Sulphur Springs	14,551
Texarkana	34,782

Source: U.S. Census Bureau

The 2000 U.S. Census identifies totals of ethnic categories, including black, white, and other (Asian, American Indian, Hispanic, etc.). The graph in Figure 1.13 illustrates ethnic percentages in the Region compared to the state.

Incomes in the Region are earned through a variety of occupations, with many either directly or indirectly related to agriculture. The median household income in the Region, as reported by the 2000 census, is $32,063, which is lower than the state average of $39,927. Marion County reported the lowest median income of the Region, at $25,347, and Smith County reported the highest income at $37,148. Figure 1.14 shows the median family income by county. The average 2005 per capita income for the Region is $25,747 compared to the state average of $32,460. Marion County reported the lowest per capita income of $20,871 and Gregg County reported the highest, at $33,768.



Source: US Census Bureau 2000 Census **Figure 1.13**

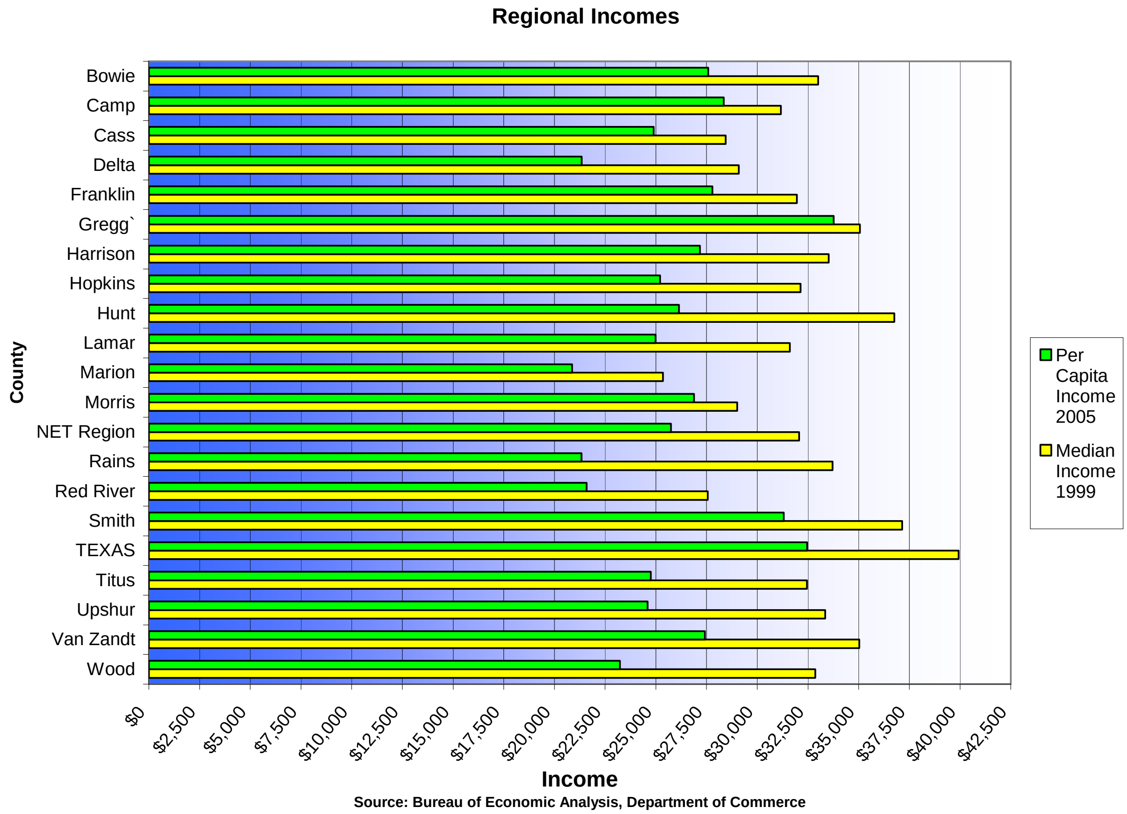

Regional Incomes
County
Bowie
Camp
Cass
Delta
Franklin
Gregg`
Harrison
Hopkins
Hunt
Lamar
Marion
Morris
NET Region
Rains
Red River
Smith
TEXAS
Titus
Upshur
Van Zandt
Wood
$0
$2,500
$5,000
$7,500
$10,000
$12,500
$15,000
$17,500
$20,000
$22,500
$25,000
$27,500
$30,000
$32,500
$35,000
$37,500
$40,000
$42,500
Income
Per Capita Income 2005
Median Income 1999
Source: Bureau of Economic Analysis, Department of Commerce

Figure 1.14

1.3(c) 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. Tourism is a growth industry in the Region; tourists spent over $800,000 in the Region in 2005. 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-Fort Worth Metroplex.

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(a) 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:

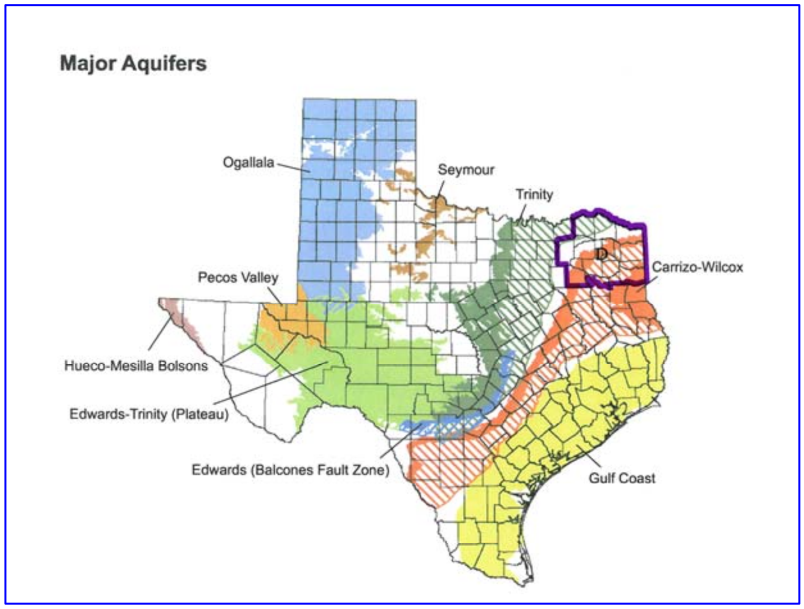
- Blossom
- Nacatoch
- Queen City
- Woodbine

The total groundwater usage in the Region was 52,606 ac-ft during 2003. Sixty-five percent of that groundwater was used for municipal purposes. About twenty percent of the groundwater was used for livestock purposes and the rest of the groundwater was used for manufacturing, mining, irrigation, and steam electric.

(1) Major Aquifers

a) Carrizo-Wilcox Aquifer

Figure 1.15
Source: TWDB



The Carrizo-Wilcox Aquifer is the most heavily utilized aquifer in the Region, producing approximately 76 percent of the total groundwater. 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 is common in some areas of the Region.

TWDB analyzed 331 Carrizo-Wilcox groundwater samples during its 2005-2006 groundwater monitoring program, and determined that most samples complied with primary and secondary drinking standards; however some of the samples exceeded limits for nitrate, lead, fluoride, chloride, sulfate, iron, manganese, and dissolved solids (Water Quality in the Carrizo-Wilcox Aquifer, 1990-2006, TWDB).

Total groundwater pumpage from the Carrizo-Wilcox Aquifer in the North East Texas Region was 40,214 ac-ft during 2003. TWDB completed a groundwater availability model (GAM) in 2003, which can be used to determine available supply. As of March 1, 2010 there have been no final determinations of desired future conditions for this aquifer.

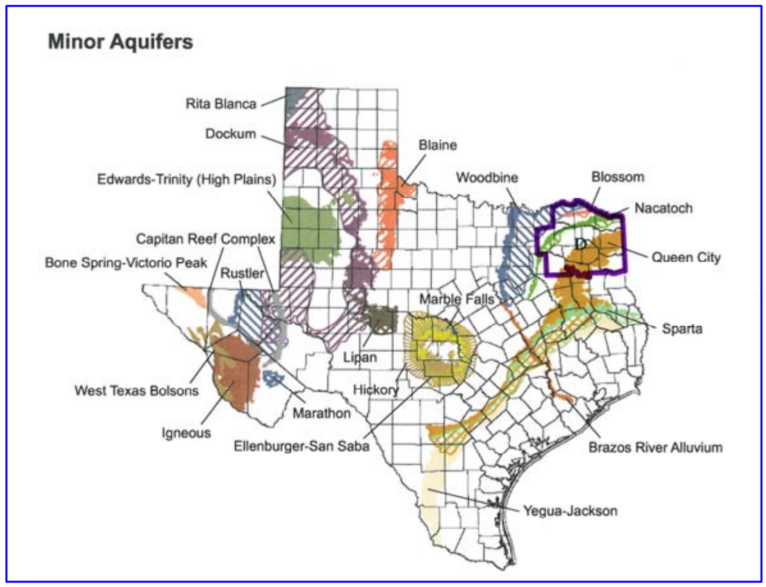
b) Trinity Aquifer

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 2003 in the Region was 566 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. The March 2008 Managed Available Groundwater (MAG) can be used to determine available supply in this aquifer.

(2) Minor Aquifers

a) Queen City Aquifer

Figure 1.16
Source: 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 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 2003 in the region was 6,673 ac-ft. TWDB completed a new groundwater availability model (GAM) for the Queen City Aquifer in 2004, which can be used to determine available supply, as there have been no Desired Future Conditions (DFCs) prepared by March 1, 2010.

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 2003 was 666 ac-ft. TWDB completed a Managed Available Groundwater (MAG) in May 2008, which can be used to determine available supply.

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.

Annual availability, equivalent to annual effective recharge, for the Nacatoch Aquifer is estimated to be 3,030 ac-ft. Recharge to the aquifer occurs mainly from precipitation on the outcrop. Aquifer water levels have been significantly lowered in some areas as a result of pumpage exceeding the effective recharge. For example, long term municipal pumpage in past years has resulted in water level declines around the City of Commerce in Delta and Hunt counties. Fortunately, these declines have been stabilized with conjunctive use of available surface water supplies. During 2003, pumpage from the aquifer totaled 2,636 ac-ft. Groundwater Management Area 8 has provided new Desired Future Conditions for the Nacatoch, but not in enough time for a new MAG to be prepared for this round of planning. A new MAG is necessary, as the Region has recommended additional wells in the Nacatoch as a source of supply.

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 2003, the total pumpage in the Region was 1,027 ac-ft from the Blossom Aquifer. Annual availability for the Blossom Aquifer is equal to the annual effective recharge, which occurs mainly through infiltration of rainfall on the outcrop. TWDB is currently developing a new MAG with the latest DFCs, which will aid in determining available supply in the aquifer.

(3) Other Aquifers

Some groundwater pumpage from "other aquifers" is registered in the TWDB database in Bowie, Delta, Hopkins, Hunt, Lamar, Rains, Red River, Titus, and Van Zandt counties. The total reported from these aquifers in 2003 was 824 ac-ft.

(4) 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.

(5) 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.

(6) Groundwater Management Areas

A Groundwater Management Area (GMA) is defined as an area suitable for the management of groundwater resources. Groundwater Management Areas 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 (GDCs) within the GMA area. A key part of the aforementioned joint planning is determining "desired future conditions" (DFC), conditions of the aquifer that are used to calculate "Managed Available Groundwater (MAG)" values. These conditions and numbers 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 is managed by the Clearwater Underground Water Conservation District and includes 10 Groundwater Conservation Districts (GDCs), none of which are located within Region D. GMA 8 has created desired future conditions (DFCs) for all of its aquifers, and Managed Available Groundwater reports have been created by TWDB for 5 of the aquifers. In Region D, DFCs for the Blossom and Nacatoch aquifers were given, but not in time for the deadline in order to have the MAG ready for this round of planning. The Woodbine does have a MAG.

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 not prepared DFCs for its aquifers as of March 1, 2010.

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 is being controlled by entities in different regions, sometimes hundreds of miles away.

1.4(b) **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, in the Sulphur Basin, 91 percent of the water used is surface water; 89 percent of water used 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, 88 percent of the water supply used is surface water. These major river basins are shown in Figure 1.17.

Within the Region, a number of surface water reservoirs greater than 500 surface acres exist as shown in Table 1.6. The larger of these reservoirs are illustrated on Figure 1.18.

Figure 1.17

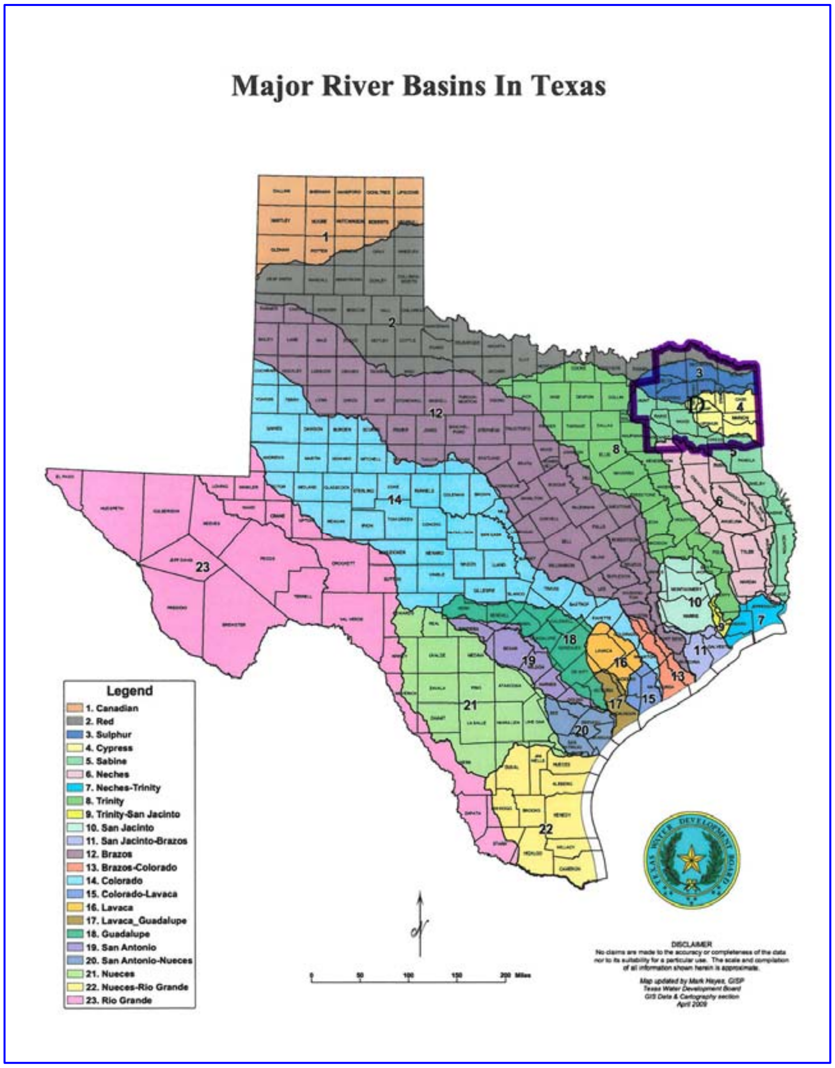
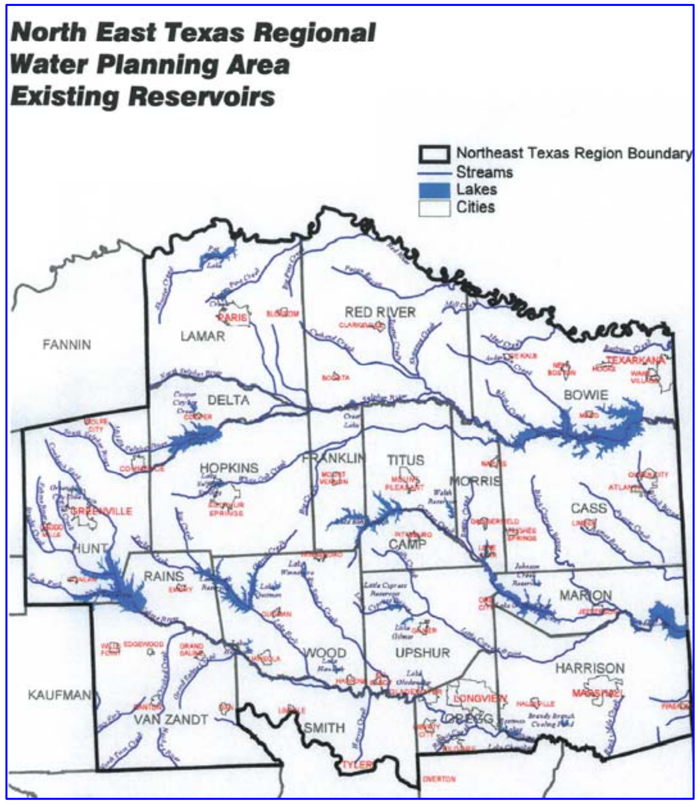


Table 1.6 Existing Reservoirs

			Conservation Pool			
Lake/Reservoir	County	Built	Area (acres)	Capacity (ac-ft)	Firm Yield (ac-ft)	Volumetric Survey Date
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	1,518	
Cooper**	Delta	1991	19,280	310,000	127,983	
Rivercrest***	Red River	1953	555	7,000	8,624	
Langford Creek Lake	Red River	1966	162	2,334	488	
Lake Sulphur Springs	Hopkins	1974	1,557	14,370	9,800	
Lake Wright Patman*	Bowie/Cass	1956	18,994	110,900	363,000	2003
Elliott Creek Lake	Bowie				1,928	
Sulphur Turkey Creek Lakes	Fannin/Hunt				140	
Sabine Edgewood City Lake	Van Zandt				110	
Big Sandy Creek Lake					3,361	
Loma Lake					600	
Sabine Mill Creek	Van Zandt				706	
Cypress Creek Basin						
Lake Bob Sandlin	Wood/Titus/Franklin	1975	9,004	204,678	60,430	(1998) Pub.2003
Caddo Lake	Marion/Harrison	1971	26,800	129,000	10,000	
Cypress Springs	Franklin	1971	3,252	66,756	10,737	2007
Ellison Creek	Morris	1943	1,516	24,700	13,857	
Lake Gilmer	Upshur	1998	895	12,720	6,180	
Johnson Creek Reservoir	Marion	1961	650	10,100	0	
Lake O' the Pines	Marion/Upshur	1958	16,919	241,081	174,960	1999
Monticello Lake	Titus	1973	2,001	34,740	2,439	1998
Tankersley Lake	Titus		na	na	6,672	
Welsh Reservoir	Titus	1975	1,269	20,242	4,476	2002
Sabine River Basin						
Brandy Branch Reservoir	Harrison	1983	1,242	29,513	0	
Lake Cherokee	Gregg	1948	3,467	43,737	29,120	2003
Lake Gladewater	Upshur	1952	481	4,738	2,125	2000
Greenville Lakes	Hunt	na	na	6,864	3,486	
Lake Fork**	Wood/Rains	1980	27,264	636,133	173,035	2001
Lake Hawkins	Wood	1962	776	11,890	0	
Lake Holbrook	Wood	1962	653	7,990	0	
Lake Quitman	Wood	1962	814	7,440	0	
Lake Winnsboro	Wood	1962	806	8,100	0	
Lake Tawakoni**	Rains/Van Zandt/Hunt	1960	37,879	888,140	229,807	(1997) 2003

Source: 2002 – 2003 Texas Almanac, TWDB Reservoir Volumetric Surveys and Chapter 3 of this plan.
*Firm yield at operating level 228.64 was reported by Freese & Nichols, Inc., 2003, "System Operation Assessment of Lake Wright Patman and Lake Jim Chapman" as 363,000 ac-ft/yr. Permitted yield is currently 180,000 ac-ft/yr.
**Firm yield goes partly to Region C.
***Includes permitted diversion from Sulphur River

Surface water reservoirs in the 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 8925 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.



Source: TWDB **Figure 1.18**

Three major agreements, which affect surface water availability in the 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 Region have been the subject of recent volumetric surveys by the TWDB. In each case, as shown on the next page in Table 1.7, 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.

Table 1.7 Capacity of Reservoirs with Recent Volumetric Surveys

	Previously Reported Capacity at Conservation Pool – (ac-ft)	Date of Previous Report	Recent Capacity at Conservation Pool – (ac-ft)	Study Date	Percent Reduction
Lake Bob Sandlin	213,350	1975	204,678	2001	4.1
Lake Cherokee	46,700	1948	43,737	2003	6.3
Lake Cypress Springs	72,800	1971	66,756	2007	8.3
Lake Monticello	40,100	1973	34,740	1998	13.4
Lake O' The Pines	254,900	1958	241,081	1998	5.4
Lake Tawakoni	936,200	1960	888,140	1997	5.1
Wright Patman Lake	145,300	1956	110,900	1997	23.7
Lake Gladewater	6,950	1952	4,738	2000	31.8
Lake Fork	675,819	1980	636,133	2001	5.9
Welsh Reservoir	23,587	1975	20,242	2001	14.2
Lake Crook	9,664	1923	9,210	2009	4.7
Pat Mayse Lake	124,500	1967	117,844	2009	5.3

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. 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 not yet exercised. Several entities in Hunt County import water from Region C via the North Texas Municipal Water District. These are further identified in Table 1.8.

Table 1.8 Imported and Exported Water

Entity	Imported From	Exported To
Ables Springs WSC	—	Region C Kaufman County
Ben Wheeler WSC	—	Region I Smith County
Bethel-Ash WSC	—	Region C and Region I Henderson County
BHP WSC	Region C (NTMWD)	Region C Rockwall County
Blackland WSC	Region C (NTMWD)	Region C Rockwall County
Caddo Basin Special Utility District	Region C (NTMWD)	Region C Collin County
Cash SUD	Region C (NTMWD)	Region C Rockwall County
Commerce, City of	—	Region C Denton County
Edom WSC	—	Region I Henderson County
Elderville WSC	—	Region I Rusk County
Elysian Field WSC	—	Region I Panola County
Gill WSC	—	Region I Panola County
Hickory Creek Special Utility District	—	Region C – Fannin County and Collin County
Josephine, City of	Region C (NTMWD)	Region C Collin County

Entity	Imported From	Exported To
Kilgore, City of	—	Region I Rusk County
Longview	Region I (Lake Cherokee)	—
MacBee WSC	—	Region C Kaufman County
North Hunt WSC	Region C (Fannin County-Groundwater)	—
Poetry WSC	—	Region C Kaufman County
RMP WSC	—	Region I Henderson and Smith Counties
Terrell, City of	—	Region C Kaufman County
Texarkana Water Utilities	Arkansas (Millwood Reservoir)	Arkansas
Van, City of	—	Region I Smith County
West Gregg WSC	—	Region I Rusk County
City of Wolfe City	Region C (Fannin County Groundwater)	—

1.4(c) Surface Water Quality

The Texas Commission on Environmental Quality (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 2008 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 2008 303(d) list is the most recent list available from TCEQ. Table 1.9 presents a summary of segment impairments within the North East Texas Region area on TCEQ's 2008 Draft 303(d) list:

Table 1.9 2008 Texas Surface Water Segments on 303(d) List

Segment		Pollutant	Category
0201A	Mud Creek	bacteria depressed dissolved oxygen	5c
0202G	Smith Creek	bacteria	5c
0302	Wright Patman Lake	pH depressed dissolved oxygen	5a
0303B	White Oak Creek	depressed dissolved oxygen bacteria	5b 5c
0304A	Swampoodle Creek	impaired fish community impaired macrobenthic community	5c

Segment		Pollutant	Category
0304B	Cowhorn Creek	impaired fish community impaired macrobenthic community	5c
0305	North Sulphur River	impaired fish community impaired macrobenthic community	5b
0306	Upper South Sulphur River	pH	5b
0307	Cooper Lake	pH	5b
0401	Caddo Lake	mercury in edible tissue depressed dissolved oxygen pH	5c
0401A	Harrison Bayou	depressed dissolved oxygen	5c
0402	Big Cypress Creek Below Lake O' the Pines	pH mercury in edible tissue	5b 5c
0402A	Black Cypress Bayou	depressed dissolved oxygen bacteria mercury in edible tissue	5b 5c 5c
0404	Big Cypress Creek Below Lake Bob Sandlin	bacteria	5a
0404A	Ellison Creek Reservoir	PCBs in edible tissue toxicity in sediment	5c
0404B	Tankersley Creek	bacteria	5a
0404C	Hart Creek	bacteria	5a
0404N	Lake Daingerfield	mercury in edible tissue	5c
0405	Lake Cypress Springs	depressed dissolved oxygen	5c
0406	Black Bayou	depressed dissolved oxygen pH	5b
0407	James' Bayou	depressed dissolved oxygen pH bacteria	5b 5b 5c
0409	Little Cypress Bayou	bacteria depressed dissolved oxygen	5c 5b
0409B	South Lilly Creek	bacteria	5c
0505	Sabine River Above Toledo Bend	bacteria	5a

Segment		Pollutant	Category
	Reservoir		
0505B	Grace Creek	bacteria depressed dissolved oxygen	5c
0505G	Wards Creek	depressed dissolved oxygen	5c
0506A	Harris Creek	depressed dissolved oxygen	5b
0506G	Little White Oak Creek	toxicity in water	5c
0507	Lake Tawakoni	pH	5c
0507G	South Fork of Sabine River	bacteria	5c
0512A	Running Creek	bacteria	5c
0512B	Elm Creek	bacteria	5c
0514	Big Sandy Creek	bacteria	5c
0606	Neches River Above Lake Palestine	bacteria depressed dissolved oxygen zinc in water	5c
0606A	Prairie Creek	bacteria	5c

1.4(d) **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(e) **Wholesale 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 has contracts to sell more than 1000 acre-feet of water wholesale in any one year during the five years immediately preceding the adoption of the last Regional Water Plan ."

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 North East Texas RWPG selected 17 wholesale water providers, as follows:

Wholesale Water Providers

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

Table 1.10 shows the wholesale activities of each of these entities:

Table 1.10 Wholesale Providers of Municipal and Manufacturing Water Supply

Wholesale Water Provider	Available 2010 (ac-ft) Supply	Wholesale Customers	
Cash SUD	6,857	Aqua Texas, Inc. Quinlan, City of	Lone Oak, City of
Cherokee Water Company	18,000	Longview, City of Southwestern Electric Power Company (SWEPCO)	
Commerce, City of	8,065	Gafford Chapel WSC Maloy WSC North Hunt WSC	West Delta WSC Texas A&M University
Emory, City of	1,901	East Tawakoni, City of	South Rains WSC
Franklin County Water District	10,737	Cypress Springs SUD Winnsboro, City of	Mt. Vernon, City of Mt. Pleasant, City of
Greenville, City of	24,001	Caddo Mills, City of Jacobia WSC Shady Grove WSC	Manufacturing Mining
Lamar County Water Supply District	18,795	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	82,618	Elderville WSC Gum Springs WSC	Hallsville, City of White Oak, City of (raw water)
Marshall, City of	25,000	Cypress Valley WSC Gill WSC	Leigh WSC Talley WSC
Mt. Pleasant, City of	16,598	Tri Water SUD Lake Bob Sandlin State Park	Manufacturing Winfield, City of
Northeast Texas Municipal Water District	193,869	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	66,960	Lamar County WSD Manufacturing	MJC WSC Steam Electric
Sabine River Authority	402,842	Ables Springs WSC Cash SUD Combined Consumers SUD Commerce, City of Eastman Chemicals Edgewood, City of Emory, City of Greenville, City of Henderson, City of Bright Star-Salem	Kilgore, City of Longview, City of Mac Bee SUD Point, City of Quitman, City of Release from TXU South Tawakoni WSC West Tawakoni, City of Wills Point, City of
Sulphur River MWD	33,255	Commerce, City of Sulphur Springs, City of	Cooper, City of

Wholesale Water Provider	Available 2010 (ac-ft) Supply	Wholesale Customers	
Sulphur Springs, City of	22,537	Brashear WSC Brinker WSC Gafford Chapel WSC Martin Springs WSC Livestock	North Hopkins WSC Pleasant Hill WSC Shady Grove WSC #2 Manufacturing
Texarkana, City of	180,000	Annona, City of Atlanta, City of Avery, City of Central Bowie WSC DeKalb, City of Domino, City of Hooks, City of Macedonia Eylau MUD Manufacturing – Cass County Federal Correctional Institution	Manufacturing – Bowie County Maud, City of Nash, City of New Boston, City of Oak Grove WSC Queen City, City of Red River Water Corp. Redwater, City of Wake Village, City of
Titus County FWD #1	48,500	Mt. Pleasant, City of	Luminant

1.5 DESCRIPTION OF WATER DEMAND IN THE REGION

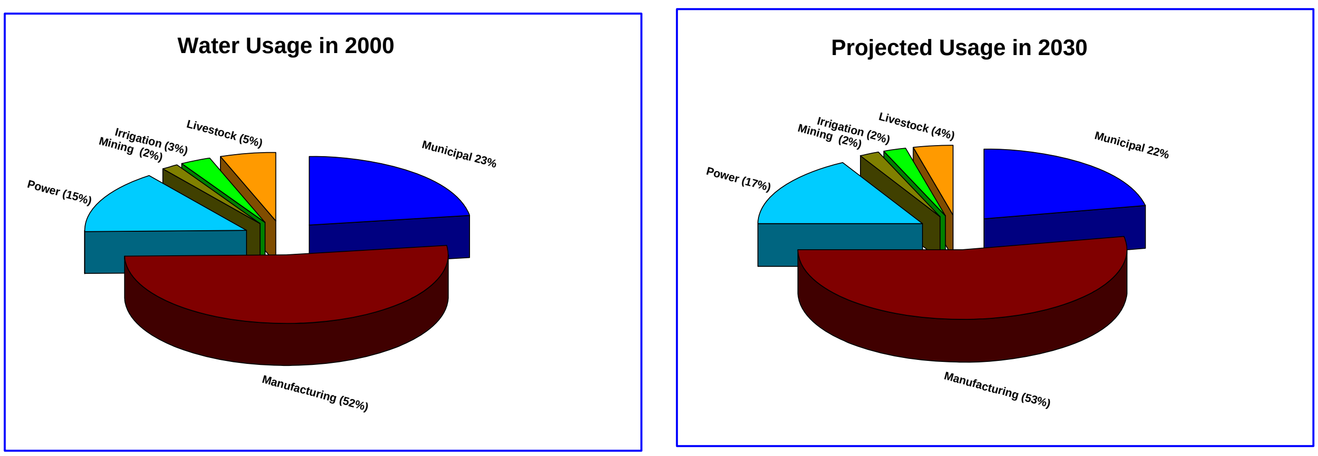
1.5(a) Historical and Current Water Use

Historical and current uses in the North East Texas Region include municipal, manufacturing, recreation, irrigation, mining, power generation and livestock. According to Figure 1.20, manufacturing is the predominant use category. Mining and irrigation are relatively insignificant water uses in the Region; however, Table 1.11 indicates that mining use has increased by 34% since 1990.

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.

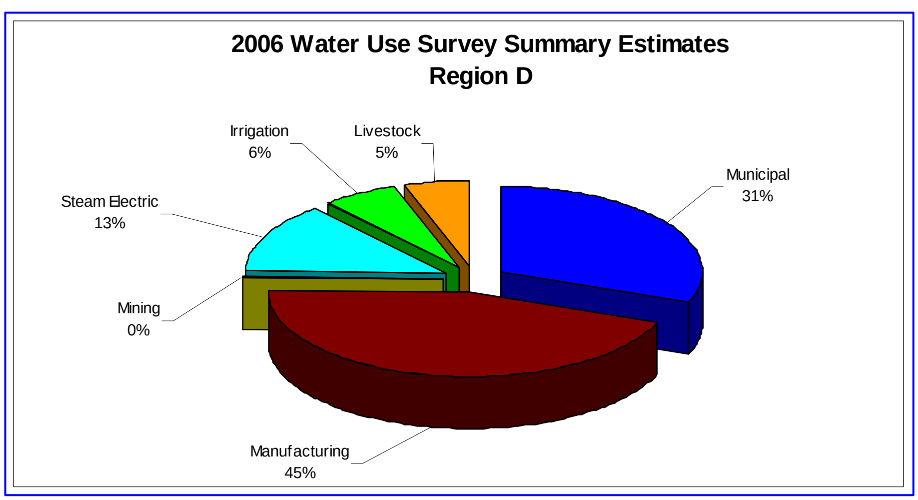
The North East Texas Region utilizes both ground and surface water supplies. Figure 1.19 shows a total percent water usage in 2000 and a projected usage in 2030.

Figure 1.19



Source: TWDB

In 2006, total reported usage in the North East Texas Region – both ground and surface – was 424,414 acre-feet, distributed as shown in Figure 1.20. By 2030, projections developed in this plan indicate usage will reach 659,871 ac-ft, a 55 percent increase from 2006.



Source: TWDB **Figure 1.20**

Table 1.11 Water Use by County and Category

County	Municipal			Manufacturing			Power			Mining			Irrigation			Livestock			Total		
	1990	2000	2004	1990	2000	2004	1990	2000	2004	1990	2000	2004	1990	2000	2004	1990	2000	2004	1990	2000	2004
Bowie	10052	39434	16406	1736	1900	1342	0	0	0	29	46	23	3959	2204	3694	1571	1439	1205	17347	45023	22670
Camp	1429	1590	1861	0	37	36	0	0	0	71	24	24	87	0	0	688	930	952	2275	2581	2873
Cass	4445	4405	4443	81743	92584	106650	0	0	0	787	704	924	0	6	0	833	834	749	87808	98533	112766
Delta	587	801	791	0	0	0	0	0	0	0	0	0	2000	585	425	770	11903	312	3357	13289	1528
Franklin	1652	1904	1610	0	0	0	0	0	0	706	1343	1422	33	0	47	1303	1122	1026	3694	4369	4105
Gregg	17666	25696	21638	14634	1918	1147	465	1475	194	124	42	97	0	0	34	230	239	156	33119	29370	23266
Harrison	7773	9259	9726	75039	16639	16830	4869	15437	10310	351	365	479	100	106	236	991	875	790	89123	42681	38371
Hopkins	4890	6387	6182	591	640	729	0	0	0	123	145	145	0	50	26	5990	4856	4340	11594	12078	11422
Hunt	12000	12012	12137	521	362	606	834	0	80	0	67	67	271	1938	100	1127	1120	1016	14753	15499	14006
Lamar	10692	9183	8660	4635	4598	3672	0	0	0	20	0	22	4417	5768	4428	1526	830	1579	21290	20379	18361
Marion	1341	1423	1267	0	16	0	1953	2794	1426	68	196	99	0	68	0	162	1085	126	3524	5582	2918
Morris	1500	1807	1657	126770	74999	56576	8	64	246	7	39	39	192	0	0	423	485	626	128900	77394	59144
Rains	1096	1493	1527	0	2	2	0	0	0	0	0	0	20	0	0	790	675	546	1906	2170	2075
Red River	1893	2298	2195	5	5	7	1494	738	2	0	0	0	100	3751	4827	1183	1610	1447	4675	8402	8478
Smith	3348	5111	7121	229	355	900	0	0	0	555	70	105	63	65	260	495	131	214	4690	5732.8	8600
Titus	4135	7104	6538	2252	2174	3723	36406	51186	* 15026	1711	2727	3261	0	0	1608	1174	1007	850	45678	64198	31006
Upshur	4592	4309	3689	192	160	62	0	0	0	0	1	1	0	240	3	1325	1530	1419	6109	6240	5174
Van Zandt	5356	5465	5785	223	317	362	0	0	0	836	1412	1319	50	33	415	2213	2435	2412	8678	9662	10293
Wood	4250	4838	5614	41	101	315	0	0	0	3162	282	1417	354	373	533	1816	2063	2028	9623	7657	9907
NE TX Region	98697	144519	120851	308611	196807	194963	46029	71694	29288	8550	7463	11448	11646	15187	18640	24610	35169	23797	498143	470840	398987

Source: TWDB

* This total is askew due to incomplete reporting.

1.5(b) **Major Demand Centers**

Major water demand centers include:

City	2006 Use*
Longview	6,143 MG/YR
Texarkana, Texas	4,059 MG/YR
Paris	2,976 MG/YR
Greenville	1,951 MG/YR
Marshall	1,759 MG/YR

*From TWDB 2006 Water Use Survey Summary Estimates by Cities in Texas (Municipal water use).

1.5(c) **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(d) **Navigation**

The lack of perennial streams limits the viability of navigation projects in northeast Texas. However, two potential projects are worth noting.

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 Corps 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 U.S. Army Corps of Engineers 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 additional analysis. It is estimated that this analysis will be complete in 2010.

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.

1.5(e) **Environmental Water Demands**

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 80^{th} Texas Legislature created the Environmental Flows Advisory Group.

The Environmental Flows Advisory Group will conduct public hearings and study 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 their study, this Advisory Group will look at items including granting permits for instream flows dedicated to environmental needs or bay and estuary inflows, use of the Texas Water Trust, and any other issues that the advisory group determines have importance and relevance to the protection of environmental flows. In July 2008, the Advisory Group appointed a stakeholders group to the Science Advisory Committee on Environmental Flows for the Sabine-Neches Estuary and Lower Tidal Sabine River. This group subsequently assembled a science team, and together they are studying the environmental flow needs of their appointed area. Another ongoing study is the Cypress Basin Flows Project, initiated in 2004, which is a voluntary effort by the non-profit Caddo Lake Institute and The Nature Conservancy in partnership with the U.S. Army Corps of Engineers and others. This project is studying the environmental flow needs of the Cypress Basin as they impact Caddo Lake and its surrounding wetlands.

1.6 EXISTING WATER PLANNING IN THE REGION

1.6(a) 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. Currently, the Region D administrator reports that 113 water conservation and drought contingency plans have been prepared within the Region. 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. As required by HB 3338, TWDB sent water loss audit forms to all suppliers in the State in 2005 to be completed and returned. According to the water loss audit responses sent in from 113 Region D entities, total water loss is estimated at 2,413 million gallons for the year 2005 at an estimated cost of $10,680,284, or an average of one dollar for every 226 gallons lost. Because this is the first water loss summary of this kind, it is difficult to know if numbers were reported correctly, and if all utilities measured water loss in the same way. It is hoped that using an official method of gathering data, the Water Audit Method, and by requiring systems to complete an audit every five years, the data will improve. A table of TWDB's summarized water loss data for Region D can be found in the Appendix.

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 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.

1.6(b) **Existing Local Water Plans**

A listing of local water plans pertinent to the North East Texas Region is included in Appendix A. 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.

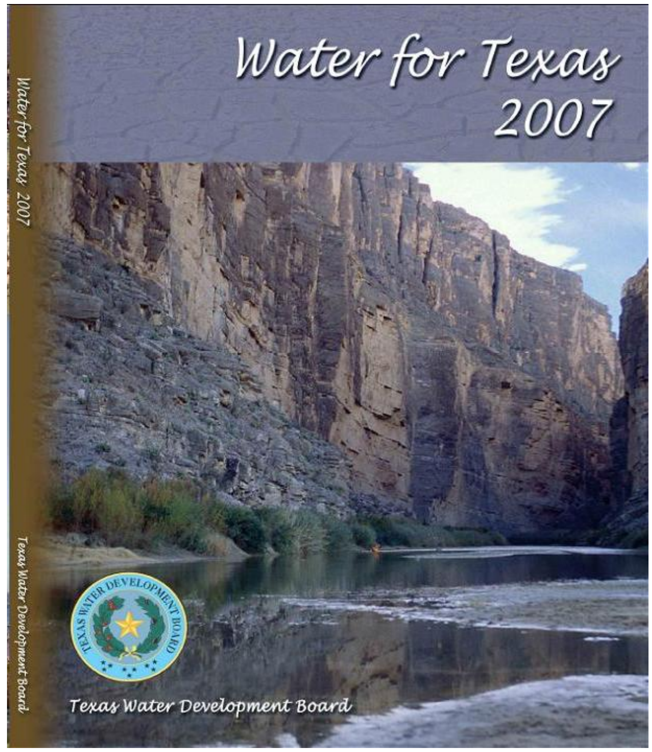
1.6(c) **Existing Regional Water Plans**

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. Longview prepared a water supply study in 1982, and Paris is in the midst of a water supply study at the current time, in conjunction with the City of Irving. In addition, Northeast Texas Municipal Water District 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. A Comprehensive Water Study is available for the City of Greenville. The Texas Water Development Board 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.

Major steam electric users were involved in the development of the steam electric projections. The planning group is not aware of any other agricultural, manufacturing, or commercial water users in the North East Texas Region with publicly available plans of a magnitude sufficient to impact the Regional Plan.

1.6(d) Summary of Recommendations from the 2007 State Water Plan



The 2007 Texas Water Plan "Water for Texas" gave a summary of North East Texas Region based on the 2006 Water Plan prepared for the NETRWPG – Region D.

The State Plan noted that the North East Texas Region is affected by issues of water quality and distribution. Due to the nature of the Region, with many small, individual systems, surface water systems are not always economically feasible, and groundwater in portions of the Region must be treated for iron and manganese. These are issues the Region continues to contend with. In addition, the State Plan notes that the NETRWPG does not support the proposed Marvin Nichols Reservoir because it does not consider it to protect the state's water, agricultural, and natural resources.

Policy recommendations in the State Plan for Region D include developing additional state and federal guidelines to compensate for the economic and environmental impacts of reservoir construction. In addition, the Region encourages the Railroad Commission of Texas to review practices and regulations for groundwater protection in drilling and plugging oil and gas wells. The Region suggests improving estimates of groundwater availability that consider obstacles to its use, such as depth and water quality. Finally, the Region recommends pursuing new reservoirs only after all other viable alternatives have been exhausted.

There is a 2010 water need in the Region of 10,764 acre-feet, with steam electric needs making up about 80% of that total. By 2060, the need is projected at 93,727 acre-feet. Region D 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 108,742 acre-feet at a total capital cost of $32,579,707.

1.7 THREATS TO AGRICULTURAL AND NATURAL RESOURCES

1.7(a) 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.

1.7(b) 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. 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 Natural Resources Conservation Service in Conjunction with the Texas State 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 less than four years ago. 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.

1.7(c) **Groundwater**

In areas where good quality and quantity groundwater is available in northeast Texas, it is utilized. Groundwater, like surface water, is threatened in 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.

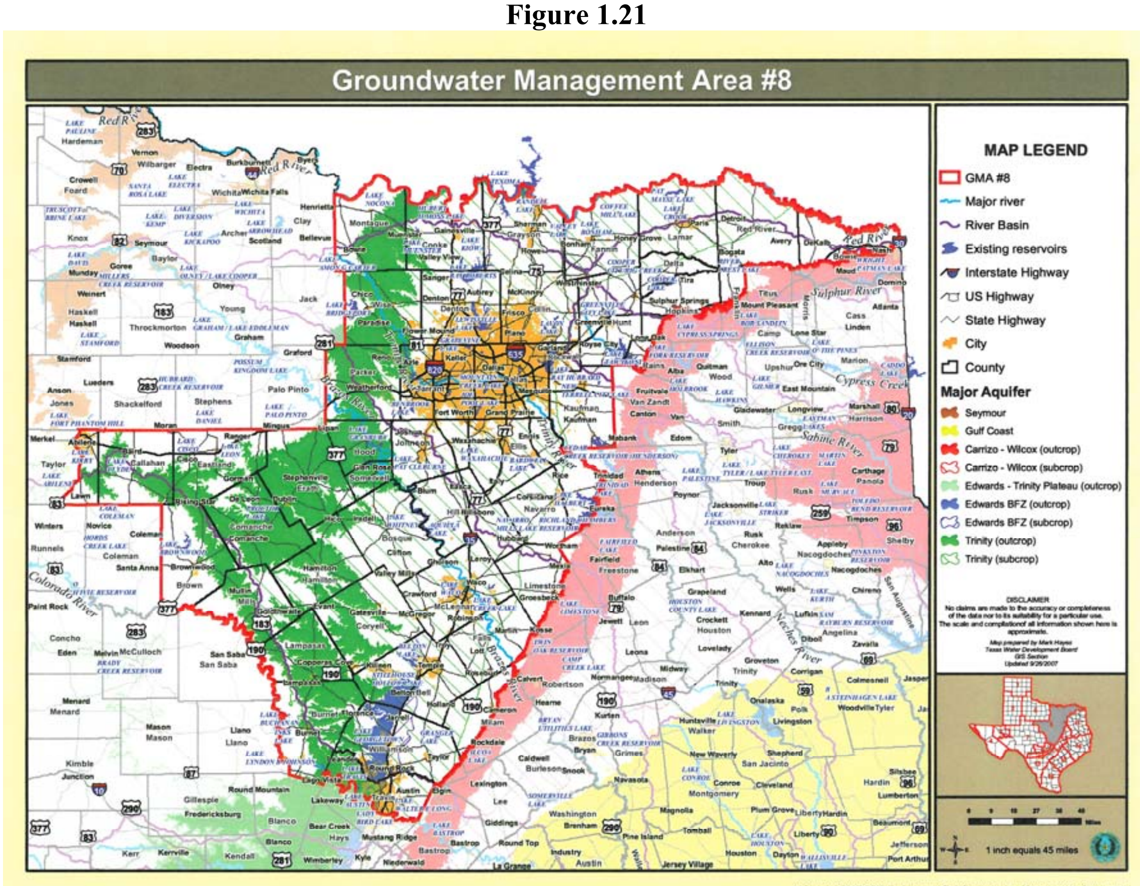
In Hunt County, for example, usage of the Woodbine Aquifer is decreasing as larger regional systems absorb and/or contract with smaller groundwater entities. The larger regional systems such as Cash SUD rely on surface water from Lake Tawakoni and/or other regions. In Bowie, Hopkins, and Hunt counties,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

Groundwater Management Areas (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 Figures 1.21 and 1.22). These GMAs contain Groundwater Conservation Districts (GCDs), which work together to protect local groundwater resources. GMA 8 released "desired future conditions" of the Woodbine aquifer in 2007, the Trinity aquifer in 2008, and the Blossom and Nacatoch aquifers in 2009. GMA 11 has not released desired future conditions as of 2009.

There is controversy over GMAs 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. In Region D, there are no confirmed 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 is concern that the Region's interests might not be represented. The State continues to study this issue, though no new legislation has been passed in recent legislative sessions.

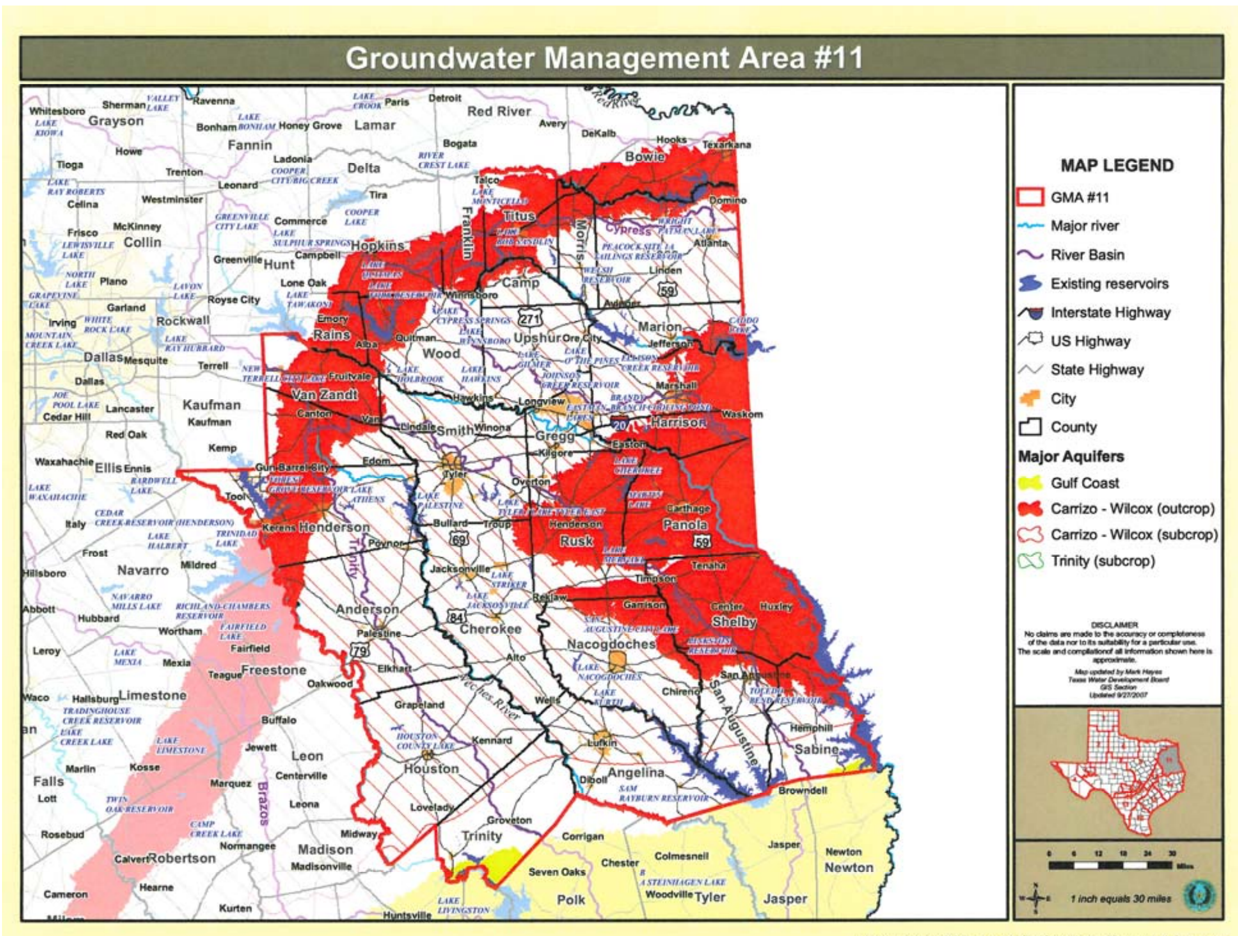
Figure 1.21



1.7(d) **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 152 plant and animal species on the Texas threatened and endangered species list, and 30 of those species can be found in the planning region. See Table 1.12 for a regionally specified listing of endangered species as supplied by the Texas Parks and Wildlife Department in 2009. 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.

Figure 1.22



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 the proposed reservoir construction.

1.7(e) **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.

1.7(f) **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. 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.

1.7(g) **Wetlands**

The U.S. Corps of Engineers defines wetlands as, "these 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.

Table 1.12 Texas Parks and Wildlife Department Listed Threatened and Endangered Species in the North East Texas Region

Source: Texas Biological and Conservation Data System. Texas Parks and Wildlife Department, Endangered Resources Branch. County Lists of Texas' Special Species, 2009.

Birds

American Peregrine Falcon	*Falco Peregrinus Anatum*
Arctic Peregrine Falcon	*FalcoPeregrinus Tundrius*
Bachman's Sparrow	*Aimophila Aestivalis*
Bald Eagle	*Haliaeetus Leucocephalus*
Brown Pelican	*Pelecanus Occidentalis*
Eskimo Curlew	*Numenius Borealis*
Interior Least Tern	*SternaAntillarum Athalassos*
Peregrine Falcon	*Falco Peregrinus*
Piping Plover	*Charadrius Melodus*

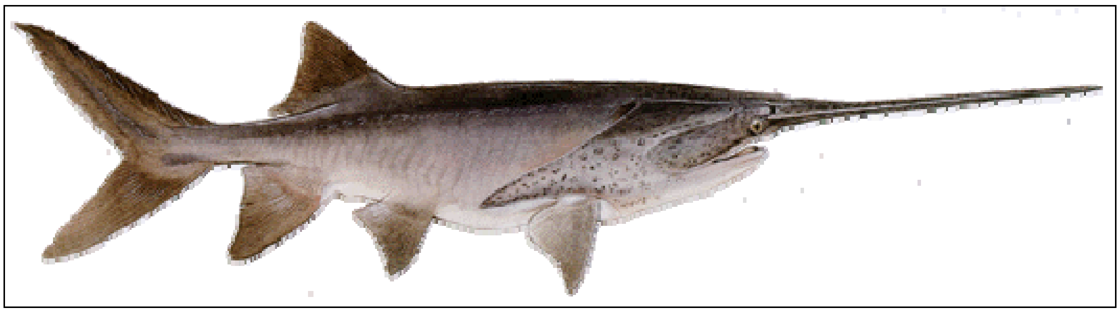
Eskimo Curlew

Source: Wikipedia.org

Reddish Egret	*Egretta Rufescens*
White-Faced Ibis	*Plegadis Chihi*
Whooping Crane	*Grus Americana*
Wood Stork	*Mycteria Americana*

Fishes

Blue Sucker	*Cycleptus Elongatus*
Blackside Darter	*Percina Maculata*
Bluehead Shiner	*Notropis Hubbsi*
Creek Chubsucker	*Erimyzon Oblongus*
Paddlefish	*Polyodon Spathula*
Shovelnose Sturgeon	*Scaphirhynchus Platorynchus*



Texas Paddlefish
Source: TPWD

Mammals

Black Bear	*Ursus Americanus*
Louisiana Black Bear	*Ursus Americanus Luteolus*
Rafinesque's Big-Eared Bat	*Corynorhinus Rafinesquii*
Red Wolf	*Canis Rufus*

Reptiles

Alligator Snapping Turtle	*Macroclemys Temminckii*
Creek Chubsucker	*Erimyzon Oblongus*
Louisiana Pine Snake	*Pituophis Melanoleucus Ruthveni*
Northern Scarlet Snake	*Cemophora Coccinea Copei*
Scarlet Snake	*Cemophora Coccinea*
Texas Horned Lizard	*Phrynosoma Cornutum*
Timber/Canebrake Rattlesnake	*Rotalus Horridus*

CHAPTER 2.0 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. Texas Water Development Board's (TWDB) "Guidelines for Regional Water Plan Development (2007-2012)" state that population and water demand projections from the second round of regional water planning cycle will serve as default projections in the current round of planning. TWDB stated that the planning groups may request that the Board consider revisions to the 2006 Regional Water Plan and 2007 State Water Plan population and water demand projections if conditions in a given area have changed sufficiently to warrant revisions.

The 2007 population estimates from the Texas State Data Center (TSDC) were used as the primary standard to determine if changed conditions warrant any revisions to population projections. TWDB interpolated the population in the 2006 Region D Water Plan to arrive at a 2007 population. This 2007 population was then compared to the 2007 TSDC estimates. A comparison of the total Region D estimated population by the TSDC, for 1/1/2007, and the TWDB (interpolated) estimate for the same period shows a projection error of minus 0.23%. Given this small magnitude of difference between TSDC and TWDB estimates, the Region D planning group voted to keep the population and water demand project values in the 2011 Region D Regional Water Plan identical to those in the 2006 Region D Water Plan. The planning group also noted that the 2010 U.S. Census population numbers will be available after this round of planning, and recommended that they be used as a basis of population projection during the fourth round of regional water planning.

The following sections of this chapter describe the methodology that was used in the second round of planning and carried over to this round, to develop regional population and water demand projections. This chapter presents projections for population and water demand for major cities, major 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 2011 Regional Water Plan and approval from the Texas Water Development Board (TWDB) for inclusion in the 2012 State Water Plan.

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

Total Regional Projection	2000	2010	2020	2030	2040	2050	2060
Population	**704,171**	**772,163**	**843,027**	**908,748**	**978,298**	**1,073,570**	**1,213,095**
Water Demand (ac-ft)							
Municipal	111,537	119,951	128,711	136,749	145,404	158,458	178,178
Manufacturing	253,206	301,091	328,568	351,427	373,504	392,387	421,496
Irrigation	15,486	15,504	15,415	15,329	15,182	14,949	14,728
Steam Electric	73,477	89,038	96,492	112,809	132,703	156,951	186,509
Mining	7,532	8,802	9,605	10,108	10,595	11,111	11,625
Livestock	26,577	26,690	26,736	26,785	26,698	26,554	26,441
Total Water Demand (ac-ft)	**487,815**	**561,076**	**605,527**	**653,207**	**704,086**	**760,410**	**838,977**

Both population and water demand are projected to grow by approximately 72% from the years 2000 to 2060. The largest percentage of water is currently used for manufacturing and municipal uses. In the future demand for steam electric power generation is expected to grow substantially as greater needs for electric utilities powering this region and other regions within the state increase through 2060.

2.1 METHODOLOGY

2.1.1 Population Projections

Population projections using a standard cohort-component procedure were developed using the 2000 Census data and other available sources. Projections were first developed at the county level, and then allocated to municipal and county-other water user groups (WUG's). As previously discussed, the NETRWPG voted to keep the population in this round of planning essentially identical to 2006 plan.

2.1.2 Water Demand Projections

The planning group voted to keep water demand projections in this round of planning identical to the 2006 plan. Discussion of how demand projections were developed in the second round of planning is presented in the following paragraphs.

In the second round of planning development of new municipal water use estimates (gallons per capita per day) were based on data through 2000 from the TWDB Water Use Survey. Demand projections for non-municipal water user groups were also developed. TWDB contracted with outside researchers that used industry specific inputs to develop new methodologies and county level demand projections for manufacturing, mining and steam electric. TWDB, with input from other state and federal agencies developed projections for irrigation and livestock. Similar to the population projections, the water demand projections were released for the planning groups to review and request revisions as necessary.

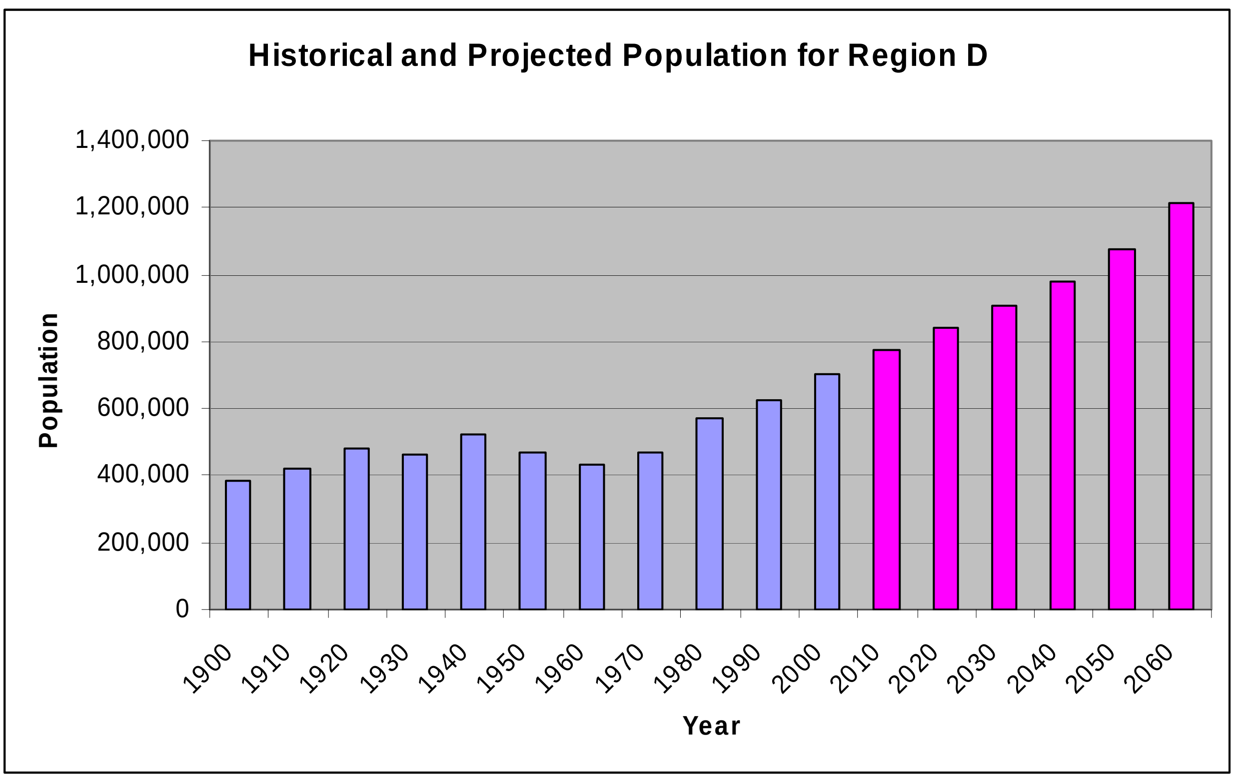
NETRWPG collected water use information from municipal water user groups, industrial users and other user groups as was available. Each of the public water systems in the North East Texas Region was surveyed. Surveys were completed based on interviews with a responsible representative of each public water system where possible or by existing data from the TWDB if the information was not available. The survey included information on major water users, type of water use (ie) municipal, manufacturing, industrial, livestock, etc. Based on responses from the public water systems, revisions to water demand projections were recommended for inclusion in the 2006 Regional Water Plan.

The population and water demand projections from the second round of water planning will be used in this round of water planning. The NETRWPG reviewed the TSDC and TWDB population estimates, and given the small magnitude of difference between these estimates (0.23%), the planning group voted to keep the population and water demand projection values in the 2011 plan identical to those in the 2006 plan. After approval by the NETRWPG, the projections were forwarded for approval by the TWDB.

2.2 POPULATION PROJECTIONS

The population of the nineteen county North East Texas Region is projected to grow over the fifty year planning period. The graphic 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

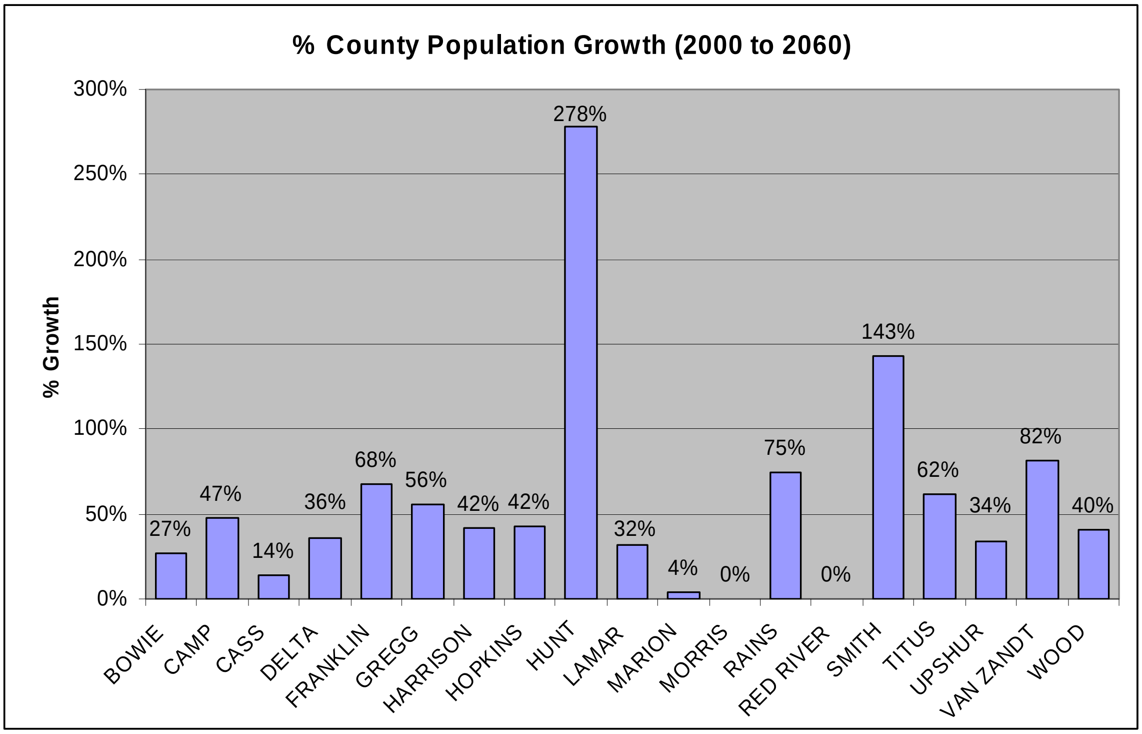


The Region's population is anticipated to grow by 72% overall (from 2000 to 2060) with the largest percentage growth occurring in Hunt and Smith Counties. In the year 2000, the counties with the largest population were Gregg and Bowie Counties. These counties include the Cities of Longview and Texarkana respectively. By 2060 the largest county populations in the region are expected to be Hunt County and Gregg County, with Bowie County falling to the third 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	2000 Census	2010	2020	2030	2040	2050	2060
Bowie	89,306	96,953	103,397	108,397	113,397	113,397	113,397
Camp	11,549	12,586	13,735	14,798	15,639	16,291	17,006
Cass	30,438	30,990	32,240	33,490	34,740	34,740	34,740
Delta	5,327	5,728	6,244	6,744	7,244	7,244	7,244
Franklin	9,458	11,533	13,363	14,613	15,863	15,863	15,863
Gregg	111,379	118,770	126,421	134,330	143,481	155,871	173,587
Harrison	62,110	67,547	72,930	76,824	79,759	83,191	88,241
Hopkins	31,960	35,934	39,882	42,951	45,528	45,528	45,528
Hunt	76,596	82,948	94,401	110,672	137,371	196,757	289,645
Lamar	48,499	52,525	56,536	60,286	64,036	64,036	64,036
Marion	10,941	11,295	11,420	11,420	11,420	11,420	11,420
Morris	13,048	13,039	13,039	13,039	13,039	13,039	13,039
Rains	9,139	11,173	13,221	14,687	15,400	15,755	15,991
Red River	14,314	14,251	14,251	14,251	14,251	14,251	14,251
Smith	31,806	39,211	44,742	50,259	55,758	65,008	77,246
Titus	28,118	31,158	34,430	37,593	40,462	43,064	45,497
Upshur	35,291	38,372	41,496	43,619	44,953	46,003	47,385
Van Zandt	48,140	55,423	63,079	69,539	74,392	80,547	87,414
Wood	36,752	42,727	48,200	51,236	51,565	51,565	51,565
Region Total	**704,171**	**772,163**	**843,027**	**908,748**	**978,298**	**1,073,570**	**1,213,095**

Figure 2.2 Percent Projected Population Growth by County (2000 to 2060)

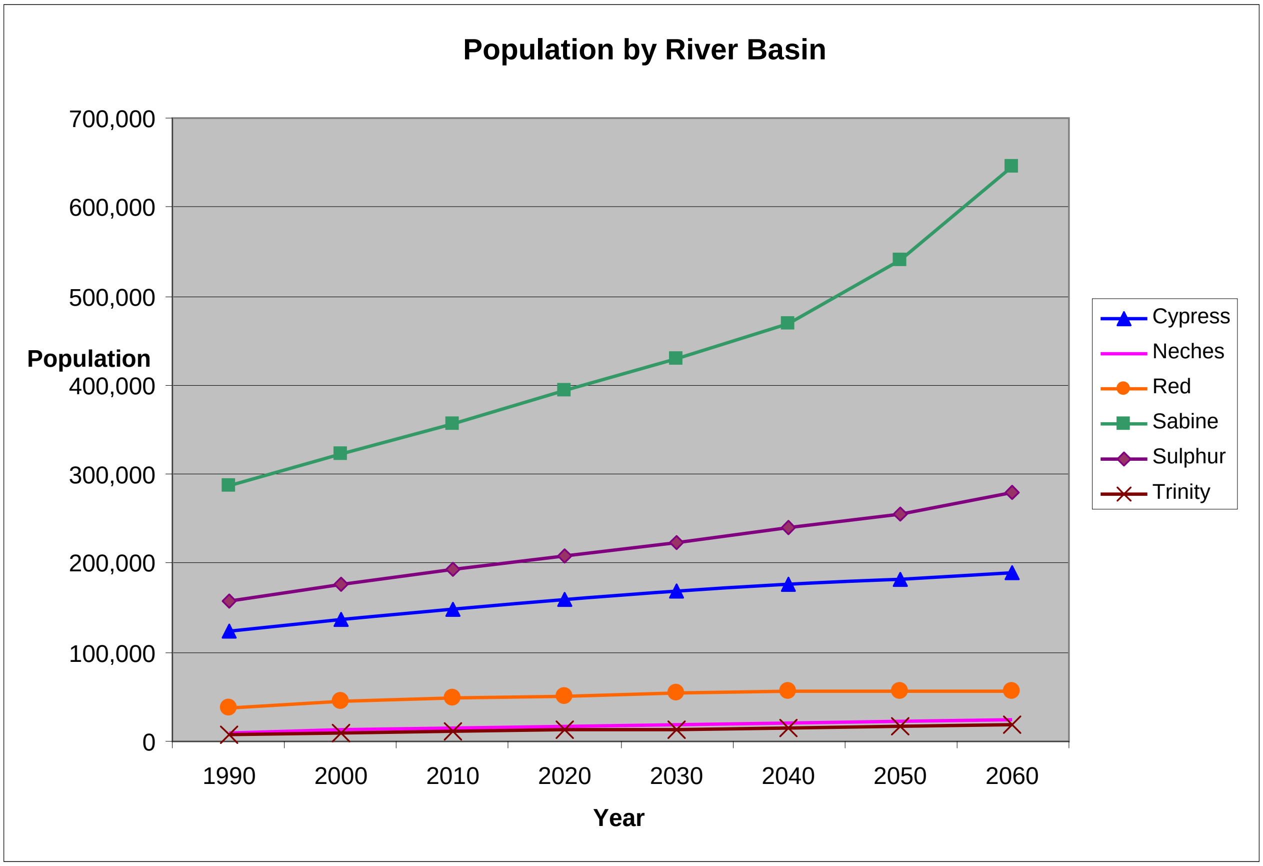


As depicted in Table 2.3 and Figure 2.3, the largest portion of the Region's population is within the Sabine River Basin. The Cities of Greenville, Longview, Kilgore and portions of Marshall are within the Sabine River basin as well as a large geographic area comprised of many smaller water user groups. 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.

Table 2.3 Population Projection by River Basin

River Basin	1990	2000	2010	2020	2030	2040	2050	2060
Cypress	124,140	136,240	147,521	159,188	168,469	176,308	182,112	189,254
Neches	9,748	13,245	15,305	17,469	19,294	20,667	22,408	24,348
Red	36,722	45,091	48,089	51,183	53,804	56,473	56,167	55,859
Sabine	286,395	323,018	357,392	393,969	429,682	469,436	540,037	644,902
Sulphur	157,472	177,266	193,039	208,778	223,628	240,347	256,037	279,749
Trinity	7,762	9,311	10,817	12,440	13,871	15,067	16,809	18,983
Grand Total	**622,239**	**704,171**	**772,163**	**843,027**	**908,748**	**978,298**	**1,073,570**	**1,213,095**

Figure 2.3 Population Projection by River Basin



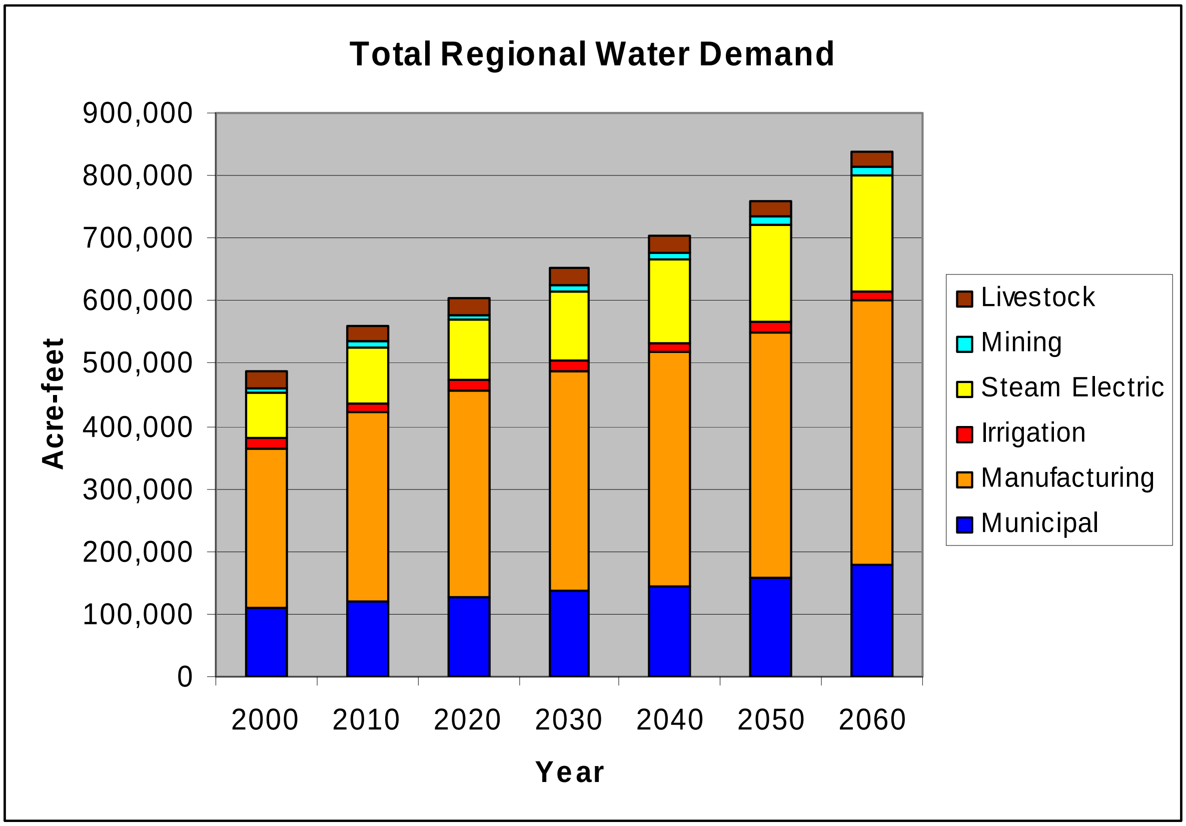
2.3 WATER DEMAND PROJECTIONS

As noted earlier, the NETRWPG voted to keep the population and water demand projections in the 2011 plan identical to those in the 2006 plan. Total annual water demand is expected to increase approximately 50% or 277,900, from 2010 to 2060. The increase in regional water demand will be due to increases in steam electric, manufacturing and 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	2000	2010	2020	2030	2040	2050	2060
Municipal	111,537	119,951	128,711	136,749	145,404	158,458	178,178
Manufacturing	253,206	301,091	328,568	351,427	373,504	392,387	421,496
Steam Electric	73,477	89,038	96,492	112,809	132,703	156,951	186,509
Livestock	26,577	26,690	26,736	26,785	26,698	26,554	26,441
Irrigation	15,486	15,504	15,415	15,329	15,182	14,949	14,728
Mining	7,532	8,802	9,605	10,108	10,595	11,111	11,625
Total Demand (ac-ft)	**487,815**	**561,076**	**605,527**	**653,207**	**704,086**	**760,410**	**838,977**

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



Total water demand by county and by river basin are a cumulative measures of all water demand in the region for municipal, manufacturing, mining, steam electric, livestock and irrigation purposes. Cass, Harrison, Morris and Titus Counties currently have, and are projected to continue to have the highest overall water demand through 2060. Due to population growth (municipal demand), manufacturing and to a lesser extent 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 308,000 acre-feet of water will be needed in 2060 for the portion of the Sabine River Basin that is in this Region.

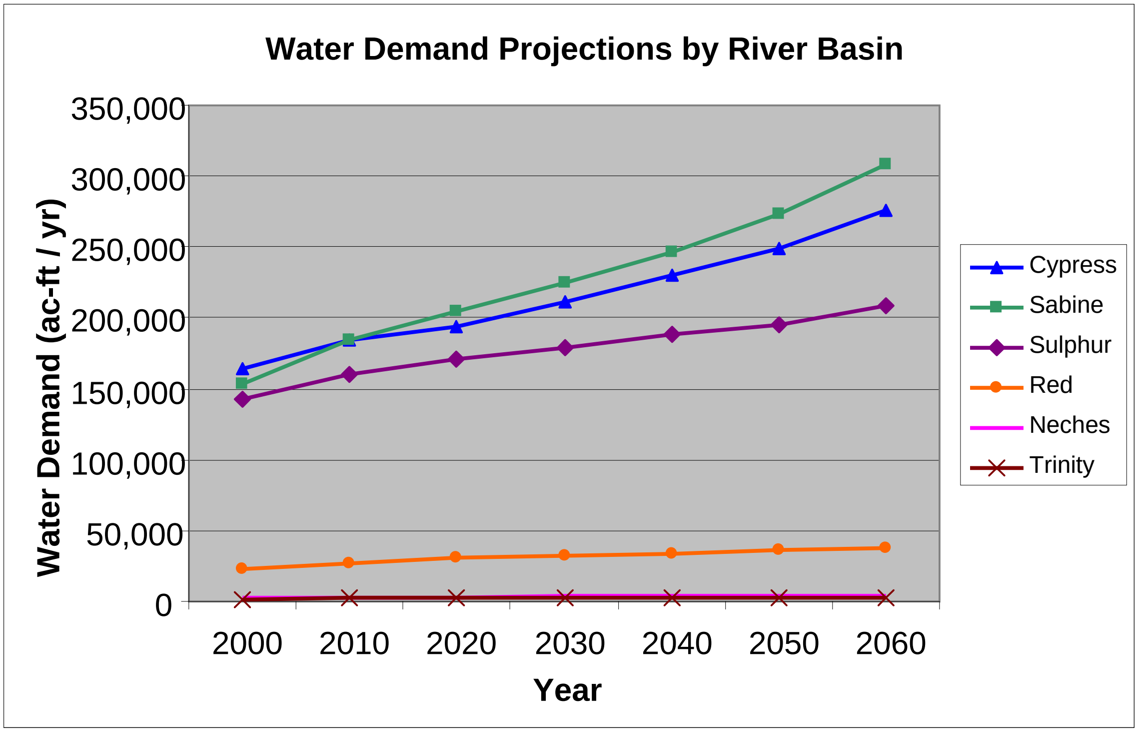
Table 2.5 Total Water Demand Projections by County (acre-feet)

County	2000	2010	2020	2030	2040	2050	2060
Bowie	20,048	21,495	22,485	23,184	23,667	23,399	23,340
Camp	2,802	2,933	3,075	3,210	3,313	3,402	3,504
Cass	98,960	113,920	121,883	128,199	134,250	139,344	148,341
Delta	1,744	1,775	1,822	1,871	1,925	1,916	1,910
Franklin	3,839	3,833	3,999	4,115	4,229	4,203	4,183
Gregg	20,742	21,693	22,453	23,694	25,194	27,417	30,533
Harrison	96,191	113,588	125,935	138,886	152,499	165,928	182,035
Hopkins	11,592	12,376	13,006	13,510	13,923	14,028	14,219
Hunt	16,810	26,457	31,894	36,315	42,626	54,089	70,810
Lamar	23,866	29,276	32,722	34,944	37,459	39,738	42,743
Marion	6,504	6,095	5,646	5,959	6,340	6,806	7,382
Morris	77,513	90,664	98,347	104,498	110,175	114,793	123,680
Rains	2,074	2,352	2,629	2,825	2,916	2,961	2,998
Red River	8,238	8,042	7,855	7,876	7,916	7,993	8,106
Smith	6,641	7,933	8,839	9,722	10,595	12,179	14,298
Titus	63,157	68,809	70,659	80,458	92,161	106,186	123,481
Upshur	7,152	7,639	8,051	8,312	8,481	8,623	8,842
Van Zandt	11,299	12,740	14,057	15,097	15,923	16,950	18,103
Wood	8,643	9,456	10,170	10,532	10,494	10,455	10,469
Region Total	**487,815**	**561,076**	**605,527**	**653,207**	**704,086**	**760,410**	**838,977**

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

River Basin	2000	2010	2020	2030	2040	2050	2060
Cypress	164,744	184,055	194,199	211,242	229,638	249,180	276,615
Neches	2,605	2,882	3,172	3,414	3,595	3,830	4,097
Red	22,872	27,557	30,487	32,214	34,142	35,934	38,280
Sabine	153,451	184,168	204,689	224,486	246,176	272,970	307,927
Sulphur	142,177	160,243	170,591	179,274	187,800	195,523	208,783
Trinity	1,966	2,171	2,389	2,577	2,735	2,973	3,275
Grand Total	**487,815**	**561,076**	**605,527**	**653,207**	**704,086**	**760,410**	**838,977**

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 water use includes business establishments excluding 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 Water User Groups (WUGs) designated in the population projection portion of the study. The municipal water demand projections are based on population and per capita water usage.

- The year 2000 was chosen by the TWDB as the base year to estimate projected water demand because census information for the year 2000 would provide a more accurate estimate of population than an off-census year. The year 2000 was the driest year in the last decade for a majority of the planning regions and for the State of Texas as a whole. The water use data for the year 2000 takes into account the dry year water usage as well as incorporating water savings resulting from the 1991 State Water Efficient Plumbing Act and conservation efforts supported by local cities or utilities.
- Per capita water usage was first determined for the year 2000 scenario by dividing the total water used for municipal purposes in a particular WUG and dividing by the population.

- For planning purposes, the North East Texas Regional Water Planning Group proposed a minimum baseline per capita water use rate of 115 gallon per capita per day (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.
- Additional water savings due to the continued adoption of water efficient plumbing fixtures, as detailed in the 1991 State Water Efficient Plumbing Act, were subtracted from the base gpcd. The recommended reductions in gpcd from the base year, due to the assumed replacement of plumbing fixtures with new water-efficient fixtures is 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 water user group (WUG) was multiplied by the WUG's population for that year to obtain a projected water demand.

2.3.1.2 Regional Municipal Water Demand Projections

Approximately 20% 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 58,000 acre-feet, or 49% over the fifty year planning period (2010 to 2060). 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 and Hunt Counties. Driven by the large population growth, Hunt County municipal water demand is projected to grow by over 200% through the year 2060.

The average daily per capita water use for municipal purposes in Region D during the year 2000 was 137 gpcpd. The statewide average water use was 17% higher, at 160 gpcpd, for the same baseline year. Further breakdown of water demand and estimated plumbing code savings per specific water user group (WUG) can be found in Table 2 – in the Appendix to Chapter 2.

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

County	2000	2010	2020	2030	2040	2050	2060
Bowie	14,459	15,342	16,077	16,559	17,030	16,927	16,922
Camp	1,811	1,938	2,077	2,210	2,311	2,398	2,497
Cass	4,832	4,838	4,993	5,130	5,277	5,263	5,263
Delta	815	853	906	961	1,022	1,019	1,019
Franklin	1,374	1,621	1,837	1,977	2,113	2,107	2,107
Gregg	17,032	17,746	18,413	19,181	20,177	21,892	24,393
Harrison	8,326	8,882	9,467	9,909	10,282	10,721	11,373
Hopkins	5,649	6,255	6,799	7,238	7,589	7,640	7,734
Hunt	12,922	13,693	15,182	17,282	20,795	28,913	41,683
Lamar	8,896	9,444	10,022	10,578	11,122	11,084	11,084
Marion	1,525	1,565	1,575	1,568	1,561	1,556	1,556
Morris	1,926	1,886	1,854	1,828	1,802	1,785	1,785
Rains	1,397	1,675	1,952	2,148	2,239	2,284	2,321
Red River	2,135	2,100	2,075	2,051	2,028	2,019	2,019
Smith	5,420	6,570	7,409	8,208	9,016	10,517	12,550
Titus	4,914	5,288	5,729	6,147	6,543	6,937	7,344
Upshur	5,175	5,620	6,008	6,250	6,398	6,522	6,716
Van Zandt	7,104	8,034	9,036	9,873	10,496	11,319	12,257
Wood	5,825	6,601	7,300	7,651	7,603	7,555	7,555
Region Total	**111,537**	**119,951**	**128,711**	**136,749**	**145,404**	**158,458**	**178,178**

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

River Basin	2000	2010	2020	2030	2040	2050	2060
Cypress	20,931	22,293	23,752	24,882	25,846	26,615	27,655
Neches	1,817	2,067	2,341	2,572	2,743	2,967	3,224
Red	7,515	7,883	8,280	8,611	8,939	8,863	8,821
Sabine	50,788	55,028	59,479	63,794	68,787	78,564	93,287
Sulphur	29,214	31,218	33,189	35,038	37,085	39,213	42,659
Trinity	1,272	1,462	1,670	1,852	2,004	2,236	2,532
Region Total	**111,537**	**119,951**	**128,711**	**136,749**	**145,404**	**158,458**	**178,178**

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 Texas Water Development Board (TWDB) recommended water demand projections for manufacturing, steam-electric and mining to the Regional Water Planning Group.

- The TWDB contracted with an outside consultant to assist in preparation of statewide mining and manufacturing water demand projections. Estimates for each county were based on water use coefficients relating total water use to total economic output for manufacturing and mining. Future water demand was calculated by multiplying the water use coefficient by the projected future output. The study and resulting report was completed by Waterstone Environmental Hydrology and Engineers, Inc and The Perryman Group.

- The TWDB used this report, titled "Water Demand Methodology and Projections for Mining and Manufacturing", in conjunction with actual industrial water use reported to the TWDB to refine an estimate for manufacturing and demand projections.

- The water planning group 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.

- For the 2006 Regional Water Plan, the TWDB contracted with representatives of investor-owned utility companies of Texas to conduct a study to evaluate steam electric power generation water demand. The study, titled "Power Generation Water Use in Texas for the Years 2000 Through 2060" was referenced and compared with TWDB estimates and available water use data obtained from the power generation facilities. Anticipated power generation facilities proposed for construction and recently completed within the Region were also evaluated and included in the water demand projections.

  In this third round of planning, TWDB contracted with the Bureau of Economic Geology (BEG) to assist in the rework of statewide steam electric numbers to include effects of carbon capture requirements for coal plants and gas plants. Further discussion on results and conclusions of the consultant is presented in section 2.3.3, Regional Steam Electric Demand Projections.

- In instances when a change in the recommended water demand was necessary, the TWDB required submittal of specific documentation regarding the type of facility and anticipated increase in water usage (or reduced usage) as a result. A complete description of the requirements for revision and methodology can be found in the Appendix to Chapter 2.

2.3.2.2 Regional Manufacturing Demand Projections

Over the fifty year period from 2010 to 2060, 50% to 52% 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 grow approximately 66.5% in the period from 2000 to 2060. Harrison, Cass and Morris counties currently have the greatest demand for water used for manufacturing purposes. These three counties are also projected to have the greatest incremental manufacturing water demand growth through 2060.

According to the TWDB 2007 Water Use Survey, the three largest water using industries in the region, in order of size, are:

International Paper	Cass County
U.S. Steel	Morris County
Eastman Chemical Company	Harrison County

Table 2.9 Manufacturing Demand by County (acre-feet)

County	2000	2010	2020	2030	2040	2050	2060
Bowie	1,900	2,287	2,543	2,761	2,972	3,153	3,407
Camp	37	42	45	47	49	51	54
Cass	92,584	107,434	115,199	121,355	127,237	132,324	141,299
Delta	0	0	0	0	0	0	0
Franklin	0	0	0	0	0	0	0
Gregg	1,954	2,423	2,753	3,052	3,345	3,597	3,904
Harrison	71,081	84,814	95,100	104,187	113,268	121,203	130,511
Hopkins	891	1,039	1,111	1,168	1,222	1,268	1,357
Hunt	762	1,009	1,232	1,463	1,713	1,951	2,115
Lamar	4,804	5,580	5,949	6,240	6,521	6,763	7,225
Marion	55	65	72	76	79	83	89
Morris	74,999	88,205	95,931	102,101	107,795	112,420	121,294
Rains	2	2	2	2	2	2	2
Red River	5	6	7	7	7	7	8
Smith	185	225	252	275	298	317	343
Titus	3,323	7,216	7,565	7,834	8,086	8,295	8,861
Upshur	206	248	272	291	312	330	355
Van Zandt	317	378	409	435	459	479	517
Wood	101	118	126	133	139	144	155
Region Total	**253,206**	**301,091**	**328,568**	**351,427**	**373,504**	**392,387**	**421,496**

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

River Basin	2000	2010	2020	2030	2040	2050	2060
Cypress	78,644	95,804	103,916	110,382	116,356	121,215	130,693
Neches	0	0	0	0	0	0	0
Red	700	813	867	910	952	988	1,055
Sabine	74,184	88,681	99,524	109,133	118,740	127,143	136,950
Sulphur	99,678	115,793	124,261	131,002	137,456	143,041	152,798
Trinity	0	0	0	0	0	0	0
Region Total	**253,206**	**301,091**	**328,568**	**351,427**	**373,504**	**392,387**	**421,496**

2.3.3 Regional Steam Electric Demand Projections

During the third round of Regional Water Planning, the Texas Water Development Board contracted with the Bureau of Economic Geology to evaluate Steam Electric Projections for this round of planning and assist in the rework of statewide steam electric numbers. Two proposals were presented – one with business as usual and one with carbon capture required in 2020 for coal plants and 2030 for gas plants. With business as usual, the 2010 demand estimate was 55,733 acre-feet and the 2060 estimate was 102,454 acre-feet. With carbon capture, the 2010 demand estimate was 55,733 acre-feet and the 2060 estimate was 243,960 acre-feet. The existing demand numbers (89,038 acre-feet in 2010, and 186,509 acre-feet in 2060) are in between the two sets of numbers – demand as things are now and demand with carbon capture mandated. The recommendation to TWDB was to readopt the same numbers for steam electric in the new regional water plan as was used in the 2006 plan. The Region D planning group voted to adopt the same numbers as used in the 2006 plan.

Annual steam electric water demand is projected to increase 154% from the year 2000 to 2060. The majority of this increase is expected to occur in Hunt, Harrison, Titus and Lamar counties as steam electric power generation facilities are expanded and additional facilities are anticipated to come on-line to supply the power generation needs of Region D and surrounding regions. In 2000, steam electric power generation represented approximately 15% of water demand for this Region. By 2060 steam electric is anticipated to require 22% of the region's water demand.

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

County	2000	2010	2020	2030	2040	2050	2060
Bowie	0	0	0	0	0	0	0
Camp	0	0	0	0	0	0	0
Cass	0	0	0	0	0	0	0
Delta	0	0	0	0	0	0	0
Franklin	0	0	0	0	0	0	0
Gregg	1,475	1,227	978	1,143	1,345	1,591	1,890
Harrison	15,437	18,438	19,838	23,193	27,283	32,268	38,345
Hopkins	0	0	0	0	0	0	0
Hunt	0	8,639	12,366	14,457	17,006	20,114	23,902
Lamar	1,783	5,940	8,503	9,941	11,694	13,831	16,435
Marion	2,794	2,323	1,852	2,165	2,547	3,012	3,580
Morris	64	53	43	50	59	69	82
Rains	0	0	0	0	0	0	0
Red River	738	614	489	572	673	796	946
Smith	0	0	0	0	0	0	0
Titus	51,186	51,804	52,423	61,288	72,096	85,270	101,329
Upshur	0	0	0	0	0	0	0
Van Zandt	0	0	0	0	0	0	0
Wood	0	0	0	0	0	0	0
Region Total	**73,477**	**89,038**	**96,492**	**112,809**	**132,703**	**156,951**	**186,509**

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

River Basin	2000	2010	2020	2030	2040	2050	2060
Cypress	54,044	54,180	54,318	63,503	74,702	88,351	104,991
Neches	0	0	0	0	0	0	0
Red	1,783	5,940	8,503	9,941	11,694	13,831	16,435
Sabine	16,912	28,304	33,182	38,793	45,634	53,973	64,137
Sulphur	738	614	489	572	673	796	946
Trinity	0	0	0	0	0	0	0
Region Total	**73,477**	**89,038**	**96,492**	**112,809**	**132,703**	**156,951**	**186,509**

2.3.4 Regional Mining Demand Projections

Mining water demand represents a very small portion of the regional water demand (about 1.5%). Annual water demand for mining purposes is anticipated to grow by 35% for the sixty year period from 2000 to 2060. Mining water demand is largest in Titus County and is projected to remain so through 2060.

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

County	2000	2010	2020	2030	2040	2050	2060
Bowie	46	42	41	40	39	39	39
Camp	24	23	23	23	23	23	23
Cass	704	808	851	874	896	917	939
Delta	0	0	0	0	0	0	0
Franklin	1,343	1,090	1,040	1,016	994	974	954
Gregg	42	58	70	79	88	98	107
Harrison	365	430	460	478	496	514	529
Hopkins	145	175	189	197	205	213	221
Hunt	67	57	55	54	53	52	51
Lamar	22	16	15	15	15	15	15
Marion	99	111	116	119	122	124	126
Morris	39	35	34	34	34	34	34
Rains	0	0	0	0	0	0	0
Red River	0	0	0	0	0	0	0
Smith	214	298	320	360	381	423	459
Titus	2,727	3,494	3,935	4,182	4,429	4,677	4,940
Upshur	1	1	1	1	1	1	1
Van Zandt	1,412	1,862	2,146	2,323	2,502	2,686	2,863
Wood	282	302	309	313	317	321	324
Region Total	**7,532**	**8,802**	**9,605**	**10,108**	**10,595**	**11,111**	**11,625**

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

River Basin	2000	2010	2020	2030	2040	2050	2060
Cypress	3,926	4,555	4,963	5,196	5,426	5,661	5,906
Neches	83	110	126	137	147	158	168
Red	32	27	27	26	26	26	26
Sabine	2,073	2,625	2,937	3,158	3,364	3,595	3,811
Sulphur	1,370	1,422	1,479	1,512	1,547	1,580	1,617
Trinity	48	63	73	79	85	91	97
Region Total	**7,532**	**8,802**	**9,605**	**10,108**	**10,595**	**11,111**	**11,625**

2.3.5 Livestock Demand

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

2.3.5.1 Methodology

The livestock water demand projections developed by the Texas Water Development Board and recommended for use in the 2006 Regional Water Plan were used as the default projections. These projections were developed using Texas Agricultural Statistics Service projections based on the number and type of livestock per county and Texas Agricultural Extension Service Estimates of water use rates by each type of livestock.

2.3.5.2 Regional Livestock Water Demand Projections

Livestock water demand represented approximately 5.4% of water demand in the North East Texas Region in the year 2000. Livestock water demand is expected to remain relatively constant over the 50 year planning period, with a reduction to just over 3% of Regional water demand. Livestock water demand is spread relatively evenly throughout the region with Hopkins County showing the largest demand of approximately 4,850 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-feet)

County	2000	2010	2020	2030	2040	2050	2060
Bowie	1,439	1,510	1,510	1,510	1,372	1,176	1,008
Camp	930	930	930	930	930	930	930
Cass	834	834	834	834	834	834	834
Delta	344	344	344	344	344	344	344
Franklin	1,122	1,122	1,122	1,122	1,122	1,122	1,122
Gregg	239	239	239	239	239	239	239
Harrison	876	918	964	1,013	1,064	1,116	1,171
Hopkins	4,857	4,857	4,857	4,857	4,857	4,857	4,857
Hunt	1,121	1,121	1,121	1,121	1,121	1,121	1,121
Lamar	2,593	2,593	2,593	2,593	2,593	2,593	2,593
Marion	1,963	1,963	1,963	1,963	1,963	1,963	1,963
Morris	485	485	485	485	485	485	485
Rains	675	675	675	675	675	675	675
Red River	1,609	1,609	1,609	1,609	1,609	1,609	1,609
Smith	458	458	458	458	458	458	458
Titus	1,007	1,007	1,007	1,007	1,007	1,007	1,007
Upshur	1,530	1,530	1,530	1,530	1,530	1,530	1,530
Van Zandt	2,433	2,433	2,433	2,433	2,433	2,433	2,433
Wood	2,062	2,062	2,062	2,062	2,062	2,062	2,062
Region Total	**26,577**	**26,690**	**26,736**	**26,785**	**26,698**	**26,554**	**26,441**

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

River Basin	2000	2010	2020	2030	2040	2050	2060
Cypress	6,707	6,731	6,758	6,787	6,816	6,846	6,878
Neches	672	672	672	672	672	672	672
Red	2,826	2,853	2,853	2,853	2,802	2,729	2,667
Sabine	7,337	7,355	7,374	7,394	7,416	7,438	7,461
Sulphur	8,389	8,433	8,433	8,433	8,346	8,223	8,117
Trinity	646	646	646	646	646	646	646
Region Total	**26,577**	**26,690**	**26,736**	**26,785**	**26,698**	**26,554**	**26,441**

2.3.6 Irrigation Demand

Irrigation water is water used in crop production as defined in the survey of irrigation conducted by the Natural Resources Conservation Service (NRCS).

2.3.6.1 Methodology

A comprehensive irrigation survey was performed by the TWDB in 2000 to provide up to date crop and irrigation data to make changes to the 2002 State Water Plan. Estimates for acreage under irrigation and individual crop needs were supplied by the NRCS, data developed in previous state water plans and new data based on Potential Evapotranspiration (PET).

The acreage planted for each crop under irrigation is estimated for each county. The crop water application for each crop is estimated by the NRCS and multiplied by the acreage to estimate the total irrigation for a county or region.

2.3.6.2 Regional Irrigation Water Demand Projections

Irrigation water represented approximately 3.2% of water demand in the North East Texas Region in the year 2000. Irrigation demand is expected to remain relatively constant over the 50 year planning period, with a reduction in percentage to around 2% of Regional water demand. Irrigation water demand is concentrated in Lamar, Red River, Bowie and Hunt Counties. Tables 2.17 & 2.18 present irrigation water demand for Region D.

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

County	2000	2010	2020	2030	2040	2050	2060
Bowie	2,204	2,314	2,314	2,314	2,254	2,104	1,964
Camp	0	0	0	0	0	0	0
Cass	6	6	6	6	6	6	6
Delta	585	578	572	566	559	553	547
Franklin	0	0	0	0	0	0	0
Gregg	0	0	0	0	0	0	0
Harrison	106	106	106	106	106	106	106
Hopkins	50	50	50	50	50	50	50
Hunt	1,938	1,938	1,938	1,938	1,938	1,938	1,938
Lamar	5,768	5,703	5,640	5,577	5,514	5,452	5,391
Marion	68	68	68	68	68	68	68
Morris	0	0	0	0	0	0	0
Rains	0	0	0	0	0	0	0
Red River	3,751	3,713	3,675	3,637	3,599	3,562	3,524
Smith	364	382	400	421	442	464	488
Titus	0	0	0	0	0	0	0
Upshur	240	240	240	240	240	240	240
Van Zandt	33	33	33	33	33	33	33
Wood	373	373	373	373	373	373	373
Region Total	**15,486**	**15,504**	**15,415**	**15,329**	**15,182**	**14,949**	**14,728**

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

River Basin	2000	2010	2020	2030	2040	2050	2060
Cypress	492	492	492	492	492	492	492
Neches	33	33	33	33	33	33	33
Red	10,016	10,041	9,957	9,873	9,729	9,497	9,276
Sabine	2,157	2,175	2,193	2,214	2,235	2,257	2,281
Sulphur	2,788	2,763	2,740	2,717	2,693	2,670	2,646
Trinity	0	0	0	0	0	0	0
Region Total	**15,486**	**15,504**	**15,415**	**15,329**	**15,182**	**14,949**	**14,728**

2.3.7 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 (S.B. 3). While no volumes or rates have been projected in this plan, NETRWPG anticipates a significant amount of water will be needed in the Region's rivers, streams, and lakes to fill the need.

As discussed in *Section 3.5 Impact of Environmental Flow Policies on Water Rights, Water Availability, and Water Planning,* S.B. 3 establishes a process to determine the environmental flow needs for each river basin. The Texas Water Development Board is anticipated to seek funds for the process for basins in the North East Texas Region. Moreover, a voluntary process authorized by S.B. 3 is ongoing for the Cypress Basin. Thus, the NETRWPG recognizes that environmental flow needs will likely be defined during Round 4 of the planning process and can then be incorporated more specifically in that regional plan.

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CHAPTER 3.0 EVALUATION OF CURRENT WATER SUPPLIES IN THE REGION

A key task in the preparation of the water plan for the North East Texas Region is to determine 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 with projected needs beyond their available supply.

As part of the evaluation of current water supplies in the Region, the planning group was charged with updating the water supply availability numbers from the 2006 plan. Water supply estimates were updated using a variety of methods:

- For groundwater, estimates were updated incorporating data from the TCEQ groundwater availability models for the Queen City, Sparta, and Nacatoch aquifers.
- 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 TWDB.
- A survey form was distributed to all municipal WUGs to identify any changes in supply sources or amounts since the 2006 plan – for example, new wells, purchase contract renewals, new contracts, mergers, or new reuse supplies.
- In the Sulphur and Cypress Basins, the yield of various stream electric water supplies have been updated using TCEQ supplied WAM data.

Surface water supplies for which a consensus was reached in the 2006 plan, and which were not subject to further questions were left unchanged.

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

- Estimates of available supply by source;
- 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 supply availability estimates accordingly. In Table 3.1 below, the term "Livestock Local Supply" refers to water which is impounded in privately owned stock tanks or pools with yields less than 200 ac-ft/yr. These smaller facilities are not permitted by the State and are not included in the larger category "Surface Water in Region D". Likewise the "Other Local Supply" refers to similar small surface impoundments for mining or manufacturing. Also, the term "Irrigation" refers to surface water supply from run-of-river and is not included in "Surface Water in Region D".

Table 3.1 Overall Water Supply by Source

Overall Water Availability for Region D (ac-ft/yr)						
	2010	**2020**	**2030**	**2040**	**2050**	**2060**
Surface Water in Region D	1,536,037	1,531,351	1,526,046	1,520,761	1,515,475	1,510,192
Groundwater in Region D	309,951	309,951	309,951	309,951	309,951	309,951
Irrigation Local Supply	13,271	13,256	13,243	13,111	12,801	12,788

Livestock Local Supply	19,476	19,343	19,006	18,928	18,531	18,498
Other Local Supply	3,113	3,372	3,533	3,696	3,863	4,024
Direct Reuse	86,411	81,292	75,756	70,230	71,394	80,131
Total	**1,968,259**	**1,958,565**	**1,947,535**	**1,936,677**	**1,932,015**	**1,935,584**

3.1 SURFACE WATER SUPPLIES

The North East Texas Regional Water Planning Area includes all or a portion of 19 counties that encompass major portions of four river basins: the Cypress Creek Basin, the Red River Basin, 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 North East Texas Region. 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."

A summary of the available surface water supplies for each of the river basins within the region is presented below. In accordance with TWDB requirements, the estimates of available water supply are based on the following key assumptions:

- Water supply is to be evaluated as the amount of water that a user can depend on obtaining during a 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.

- Water availability is to be based on the assumption that all senior downstream water rights are being fully utilized.

- Water availability is to be based on the infrastructure that is currently in place. 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 in Chapter 4 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 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 TWDB rules, for the 2011 Regional Water Plan, Texas Commission on Environmental Quality (TCEQ) Water Availability Models (WAM) for reservoirs and river systems were utilized, except for Pat Mayse and Lake Crook Reservoirs. 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.

The working definition for firm yield is the maximum amount of water the reservoir can provide each year during drought of record considering reasonable sedimentation rates and reasonable predetermined withdrawal patterns, assuming full utilization of senior water rights, both upstream and downstream, and full satisfaction of environmental flow requirements for bays and estuaries, if they apply. 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 volume.

3.1.1.1 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 supplies modeled in the Sabine Basin included 13 reservoirs and run-of-the-river supplies from the Sabine River. Table 3.2 presents the estimated available water supply for these sources during drought of record conditions by decade.
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Table 3.2 Sabine Basin Surface Water Firm Yield

Sabine River Basin Surface Water Availability (ac-ft/yr)						
Source Name	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Big Sandy Creek Lake / Reservoir	3,361	3,361	3,361	3,361	3,361	3,361
Brandy Branch Lake / Reservoir	-	-	-	-	-	-
Edgewood City Lake / Reservoir	110	110	110	110	110	110
Lake Fork / Reservoir	173,035	171,820	170,605	169,390	168,175	166,960
Gladewater Lake / Reservoir	2,125	2,125	2,125	2,125	2,125	2,125
Greenville City Lake / Reservoir	3,486	3,486	3,486	3,486	3,486	3,486
Hawkins Lake / Reservoir	-	-	-	-	-	-
Holbrook Lake / Reservoir	-	-	-	-	-	-
Loma Lake / Reservoir	-	600	600	600	600	600
Mill Creek Lake / Reservoir	706	706	706	706	706	706
Quitman Lake / Reservoir	-	-	-	-	-	-
Tawakoni Lake / Reservoir	229,807	228,093	226,380	224,667	222,953	221,240
Winnsboro Lake / Reservoir	-	-	-	-	-	-
Sabine River Combined Run of River	166,156	166,156	166,156	166,156	166,156	166,156
Direct Re-use	8,930	9,206	9,096	8,886	8,794	8,657
Total	**587,716**	**585,663**	**582,625**	**579,487**	**576,466**	**573,401**

3.1.1.2 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 Region, all or part of Bowie, Red River, and Lamar counties are in the Red River Basin.

The existing surface water supplies in the Red River Basin include Lake Texoma, Pat Mayse Lake and Lake Crook. Table 3.3 presents the estimated water supply that is available under drought of record conditions for sources in the Red River Basin in which entities in Region D currently have available water supply. 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 have been updated as shown in Table 3.3. HDR Engineering, at the request of the City of Paris, recently 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 October 15th 2009 meeting approved the utilization of the results from the HDR water availability model. The new models provide slightly more water than shown in the 2006 Plan. Lamar County supply appears adequate throughout the planning period using the population assumptions from Chapter 2.

Table 3.3 Red River Basin Surface Firm Yield

Red River Basin Surface Water Availability (ac-ft/yr)						
Source Name	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
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
Total	**66,960**	**66,960**	**66,960**	**66,960**	**66,960**	**66,960**

3.1.1.3 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 River Basin covers approximately 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 3.4 presents the supply available in the Sulphur River Basin.

Table 3.4 Sulphur River Basin Surface Firm Yield

Sulphur River Basin Surface Water Availability (ac-ft/yr)						
Source Name	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Big Creek Lake / Reservoir	1,518	1,518	1,518	1,518	1,518	1,518
Turkey Creek Lake	140	140	120	120	120	120
Chapman/Cooper Lake/Reservoir (Non-System)	78,070	76,778	75,487	74,196	72,904	71,614
Chapman/Cooper Lake/Reservoir (NTMWD)	49,913	49,088	48,262	47,436	46,611	45,786

Caney Creek Lake	1,032	1,032	1,032	1,032	1,032	1,032
Langford Lake / Reservoir	488	488	488	488	488	488
River Crest Lake / Sulphur Run of the River*	8,624	8,624	8,624	8,624	8,624	8,624
Sulphur Springs Lake	9,800	9,800	9,800	9,800	9,800	9,800
Elliot Creek Lake	1,928	1,928	1,928	1,928	1,928	1,928
Wright Patman Lake / Reservoir**	363,000	363,000	363,000	363,000	363,000	363,000
Sulphur River Combined Run of River	1,420	1,420	1,420	1,420	1,420	1,420
Total	**515,933**	**513,816**	**511,679**	**509,563**	**507,445**	**505,330**

* 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 is estimated at 363,000 ac-ft/yr. However, only 180,000 ac-ft/yr is permitted.

3.1.1.4 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 3.5 Cypress Creek Basin Surface Firm Yield

Cypress River Basin Surface Water Availability (ac-ft/yr)						
Source Name	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Bob Sandlin Lake/Reservoir	60,430	60,430	60,430	60,430	60,430	60,430
Caddo Lake / Reservoir	10,000	10,000	10,000	10,000	10,000	10,000
Cypress Springs Lake / Reservoir	10,737	10,497	10,257	10,017	9,777	9,537
Ellison Creek Lake / Reservoir	13,857	13,857	13,857	13,857	13,857	13,857
Gilmer Lake / Reservoir	6,180	6,180	6,180	6,180	6,180	6,180
Johnson Creek Lake / Reservoir	0	0	0	0	0	0
Monticello Lake/Reservoir*	2,439	2,439	2,439	2,439	2,439	2,439
Lake O' the Pines / Reservoir*	174,960	174,960	174,960	174,960	174,960	174,960
Tankersley Lake / Reservoir	6,672	6,672	6,672	6,672	6,672	6,672
Welsh Lake / Reservoir*	4,476	4,476	4,476	4,476	4,476	4,476
Cypress River Combined Run-of-River	68,523	68,523	68,523	68,523	68,523	68,523
Grays Creek Run-of-River	16,084	16,084	16,084	16,084	16,084	16,084
Direct Reuse	77,481	72,086	66,660	61,344	62,600	71,474

Total	**451,839**	**446,204**	**440,538**	**434,982**	**435,998**	**444,632**

* Monticello and Welsh Reservoirs results include TCEQ WAM results plus the contractual transfers from Lake O' the Pines, which correspondingly reduce the Lake O' the Pines availability (Lake O' the Pines is reduced by 2,439 ac-ft/yr, which is shown in Monticello Lake, and 4,470 ac-ft/yr, which is shown in Welsh Lake per contract).

3.1.1.5 Neches River Basin

The Neches River Basin originates in Van Zandt County and extends southeast to the Gulf of Mexico. The total drainage area of the basin is approximately 10,000 square miles, although the portion within the North East Texas Region is very small. Only small portions of Van Zandt and Smith Counties are located within the basin.

3.1.1.6 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.

3.2 GROUNDWATER SUPPLIES

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

Previous estimates of groundwater availability for the North East Texas Region were developed by the TWDB and were based on numerous local and regional aquifer studies that employed various methods for estimating water supply availability. Under one common approach, which will be referred to as the recharge method, groundwater availability is assumed equal to the long term average annual recharge to the aquifer. Recharge refers to the total of all sources by which an aquifer can be replenished with water, including precipitation, infiltration from streams, lateral or vertical inflow from other subsurface formations, and irrigation return flow.

After estimating groundwater availability based on average annual recharge estimates, assumptions must be made with regard to how a particular groundwater supply will be managed. In general, there are two management options. One option assumes that the "safe yield" of the aquifer will not be exceeded and that the overall static water level in the aquifer will not be continually decreased. The second option assumes that the long term water availability from an aquifer is equal to the annual recharge volume plus a specified volume of water held in storage within the aquifer. This management scenario is often referred to as "aquifer mining" in that a long term water level decline is expected, and the groundwater supply will be depleted over time. Both of these groundwater management approaches have been practiced in Texas based on the varying hydro-geologic, political, and socioeconomic factors found in different areas of the state. For example, aquifer mining has been an accepted policy throughout much of the Ogallala Aquifer in the Texas High Plains because the recharge is relatively low and groundwater demand for irrigation is relatively high. On the other hand, a "safe yield" policy has been adopted for the Edwards Aquifer in Central Texas in part because of potential impact to endangered species that are dependent on spring discharge from the aquifer.

For some areas of the state, previous state water plans have assumed that groundwater supply is equal to the historical groundwater usage in the particular geographical region plus the projected increase in demand by current users of the resource. This method was used in cases where there was great uncertainty in estimates of long term groundwater availability. Uncertain estimates may exist for many reasons, including aquifer complexity, lack of adequate recharge estimates, or lack of quantitative understanding of the flow system. This approach is considered conservative in terms of ensuring that groundwater resources are not over-allocated. However, in some areas, this approach is likely to underestimate long term groundwater availability, particularly if the historical use is only a fraction of the total recharge.

Another complexity of predicting long term groundwater availability under "mining" conditions is predicting future groundwater supply when the groundwater demand is unknown. For example, a severe drought may cause significantly more groundwater mining than under normal conditions, leaving a groundwater supply shortage for the future. In other words, it is difficult to know under mining scenarios how and when the groundwater in storage will be utilized and it is therefore difficult to predict what the available supply will be in the future.

The concepts of groundwater availability and aquifer sustainability have been debated significantly in recent years. For groundwater source availability, the TWDB planning guidelines (Exhibit C) require that regional planning groups:

"Calculate the largest annual amount of water that can be pumped from a given aquifer without violating the most restrictive physical or regulatory or policy conditions limiting withdrawals, under drought-of-record conditions. Regulatory conditions refer specifically to any limitations on pumping withdrawals imposed by groundwater conservation districts through their rules and permitting programs."

This guideline requires that planning groups make a policy decision as to the interpretation of the term "most restrictive" as it relates to long-term groundwater availability. If these conditions, referred to as Desired Future Conditions (DFCs), are adopted by a Groundwater Conservation District (GDC), its Groundwater Management Area (GMA) is required to use these adopted conditions to calculate its Managed Available Groundwater (MAG) estimates which are then submitted to the TWDB for water planning.

TWDB Exhibit C further requires that "once GAM (Groundwater Availability Model) information is accessible for an area within a region, the Planning Group shall incorporate this information in its next planning cycle unless better site-specific information is developed." The Region D Planning Group determined that the available Queen City/Sparta/Carrizo Wilcox and Trinity/Woodbine GAMs were the most appropriate tool for analyzing regional groundwater availability in the Region for those aquifers. Subsequent to publication of the 2006 RWP report, GAMs were completed for the Nacatoch and Blossom aquifers. However, because these models were not made available for runs to make drawdown predictions, the groundwater availability assessment for these and other small aquifers were based on published information, historical water use data from these aquifers, available well and water level records, and the knowledge base of the consultant team.

The GAMs are regional models that were developed as a tool to better understand long-term regional impacts from historical and proposed groundwater pumping. The GAMs do not define, estimate, or prescribe groundwater availability or supply for the Regional Water Planning Group (RWPG), but rather provide a tool to evaluate aquifer water level impacts under different pumping scenarios.

3.2.2 Approach for Estimating Groundwater Availability in Region D

The North East Texas Regional Water Planning Group determined that it is in the best interest of the Region to maintain an acceptable level of aquifer sustainability during the 50-year planning window as well as for future generations beyond the 50-year planning period. Thus, where it was possible to estimate drawdown with a GAM, the ground-water availability for the planning period was defined as the amount of groundwater that could be withdrawn from aquifers over the next 50 years that would not cause more than 50 feet of water level decline (or more than a 10% decrease in the saturated thickness in outcrop areas) in the aquifers as compared to water levels in 2000.

To the extent possible, these criteria were used to guide the development of the ground-water availability assessment and to determine groundwater supply for each aquifer in each county. However, there were some county-aquifer-basin source groundwater supplies that could not meet the groundwater demands based on this criteria. Therefore, in these areas, groundwater supply was increased to ensure that all existing groundwater users could continue to use groundwater as a source and potentially expand groundwater use through new strategies. This effectively means that the water level decline in some areas may be greater than 50 feet over a 50-year period based on estimates from the current GAM. The planning group acknowledges that in some areas, additional water does occur in storage within the aquifers and that a portion of that water (above the estimated supply) could be pumped if there is not a groundwater conservation district in place to prevent such withdrawals.

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 1000 mg/l, and would require treatment to be acceptable for municipal supply. However, groundwater with TDS below 1500 mg/l is sometimes acceptable for irrigation, and below 3000 mg/l is acceptable for some livestock.

3.2.3 Groundwater Availability by Aquifer

Groundwater availability estimates have been extracted from various water management reports. These include reports of Desired Future Conditions (DFCs) for an aquifer, updated Regional Water Planning pumping estimates applied to predictive models, and Groundwater Availability Model (GAM) runs to determine the Managed Available Groundwater (MAG) for each aquifer.

Table 3.6 defines updated groundwater availability estimates for 2011. Because each of these estimations vary according to the source of data and accurateness of calculation method, some values have changed slightly from the 2006 Regional Water Planning (RWP) report and some have not changed at all. Professional judgment was used during quality assurance procedures to report the most accurate updated water availability estimates. Values reported are considered constant and to be used as the projected rate for the 50-year predictions. The source(s) of data for each aquifer are summarized below..

3.2.3.1 Blossom Aquifer

Groundwater availability estimates for the Blossom Aquifer were taken from GAM Run 09-05 MAG. In a letter dated October 6, 2008 Ms. Cheryl Maxwell, administrative manager of the Clearwater Underground Water Conservation District acting on behalf of GMA 8, provided Desired Future Conditions (later clarified on December 15, 2008) of the Trinity Aquifer for a GAM run request. This GAM run was used to define specific MAG estimates for GMA-8 using DFCs provided by the Groundwater Conservation Districts (GCDs). Desired Future Conditions for the Blossom Aquifer are outlined and re-defined using a spreadsheet model method. This method produced only slightly different available groundwater values than those reported in the 2006 Regional Water Plan. A GAM run to determine MAG estimates has not been run for the Blossom Aquifer, therefore these estimates are not considered official.

3.2.3.2 Carrizo-Wilcox Aquifer

Groundwater availability estimates for the Carrizo-Wilcox Aquifer were taken from updated Regional Water Planning pumping estimates that were applied to the Queen City/Sparta and Carrizo-Wilcox predictive model. Mr. David Alford of the Pineywoods Groundwater Conservation District, acting on behalf of GMA 11, requested a predictive model run for the northern part of the Queen City, Sparta, and Carrizo-Wilcox Aquifers. Released August 29, 2008, GAM Run 08-23 summarizes a 50-year predictive simulation of the aquifers. This run uses updated estimated pumping based on the 2007 State Water Plan. It is worth mentioning that no Red River County pumpage was included in this GAM run; therefore, the available groundwater estimate used in the 2006 RWP report is reported as the Red River County available groundwater. A GAM run to determine MAG estimates has not been run for the Carrizo-Wilcox Aquifer so the highest estimated pumpage from GAM 08-03 is used as the availability estimate; therefore these estimates are not considered official.

3.2.3.3 Nacatoch Aquifer

Groundwater availability estimates for the Nacatoch Aquifer were also taken from revised DFCs prepared for GMA-8. In a memo dated March 30, 2009 to Ms. Cheryl Maxwell, administrative manager of the Clearwater Underground Water Conservation District, Desired Future Conditions for the Blossom Aquifer are outlined and re-defined using a spreadsheet model method. As stated above for the Blossom Aquifer, this method produced only slightly different available groundwater values than those reported in the 2006 Regional Water Plan. For the Nacatoch Aquifer, Titus Co. was not included in the estimations made for GMA-8 because it is in GMA-11. For this reason, the available groundwater estimate, which was used in the 2006 RWP report for Titus County, was also used in this round of planning.

3.2.3.4 Queen City Aquifer

Groundwater availability estimates for the Queen City Aquifer were also taken from updated Regional Water Planning pumping estimates that were applied to the Queen City/Sparta and Carrizo-Wilcox predictive model. See details of the GAM request made in the description of Carrizo-Wilcox available groundwater estimates above.

3.2.3.5 Trinity Aquifer

Groundwater availability estimates for the Trinity Aquifer were taken from GAM Run 08-84mag. In a letter dated October 6, 2008 Ms. Cheryl Maxwell, administrative manager of the Clearwater Underground Water Conservation District acting on behalf of GMA 8, provided Desired Future Conditions (later clarified on December 15, 2008) of the Trinity Aquifer for a GAM run request. This GAM run was used to define specific MAG estimates for GMA-8 using DFCs provided by the Groundwater Conservation Districts (GCDs). These MAG estimates are reported here and considered official groundwater availability volumes for 2011 Region D Water Planning.

3.2.3.6 Woodbine Aquifer

Groundwater availability estimates for the Woodbine Aquifer were taken from GAM Run 08-14mag. In a letter dated December 26, 2007 Ms. Cheryl Maxwell, administrative manager of the Clearwater Underground Water Conservation District acting on behalf of GMA 8, provided Desired Future Conditions of the Woodbine Aquifer for a GAM run request. This GAM run was used to define specific MAG estimates for GMA-8 using DFCs provided by the Groundwater Conservation Districts (GCDs). These MAG estimates are reported here and considered official groundwater availability volumes for 2011 Region D Water Planning.

3.2.3.7 Other Aquifers

A category for other aquifers was included in the 2006 Region D RWP report, which is assumed to account for shallow alluvial aquifers in the region. There was no evidence of updated estimates of available groundwater from alluvium found, so these values were not changed.

Table 3.6: Groundwater Availability by Aquifer (ac-ft/yr)

Aquifer	County	Water Availability Estimates *(for 2011 planning)*
Blossom Aquifer	Bowie	201
	Lamar	394
	Red River	1,678
	Total	2,273
Carrizo-Wilcox Aquifer	Bowie	15,673
	Camp	3,921
	Cass	3,527
	Franklin	11,671
	Gregg	7,539
	Harrison	8,660
	Hopkins	4,761
	Marion	2,030
	Morris	2,660
	Rains	1,770
	Red River	239
	Smith	13,981
	Titus	11,134
	Upshur	6,959
	Van Zandt	11,087
	Wood	9,852
Carrizo-Wilcox Aquifer	Total	115,505
Nacatoch Aquifer	Bowie	3,941
	Delta	293
	Franklin	10
	Hopkins	922
	Hunt	2,966
	Lamar	45
	Rains	10
	Red River	708
	Titus	1,041
	Total	9,936
Queen City Aquifer ***Queen City Aquifer (cont.)***	Camp	3,610
	Cass	38,189
	Gregg	7,500
	Harrison	10,020
	Marion	15,150
	Morris	9,540
	Smith	35,520
	Upshur	25,000
	Van Zandt	3,750
	Wood	21,231

Aquifer	County	Water Availability Estimates *(for 2011 planning)*
	Total	169,510
Trinity Aquifer	Delta	362
	Hunt	551
	Lamar	1,322
	Red River	530
	Total	2,765
Woodbine Aquifer	Delta	20
	Hunt	2,840
	Lamar	3,644
	Red River	166
	Total	6,670
Other Aquifer	Bowie	2,994
	Hopkins	298
	Total	3,292
Total Regional Groundwater	Total	309,951

*The models used for groundwater estimation assume steady production – therefore groundwater values for each decade are equal.

3.2.4 Description of Aquifers

3.2.4.1 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 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 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. Production decreases in the western half of the aquifer, where yields of 35 gal/min to 85 gal/min are typical. In addition, water quality from the Blossom Aquifer does not meet current drinking water standards for public water supplies but may be used for domestic and livestock purposes.

3.2.4.2 Carrizo-Wilcox Aquifer

The Carrizo-Wilcox group is the most extensive and productive aquifer in the North East Texas Region and is considered a major aquifer by the TWDB. 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. Estimates of groundwater availability from the Carrizo-Wilcox Aquifer in the North East Texas Region are provided in Table 3.6. Total estimated groundwater availability from the Carrizo-Wilcox Aquifer in the North East Texas Region is over 115,430 ac-ft/yr.

3.2.4.3 Nacatoch Aquifer

The Nacatoch Aquifer 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. Nacatoch water quality is generally good and the aquifer provides water used for municipal, domestic, and other uses within its extent. Table 3.6 shows the detailed groundwater availability by county for the Nacatoch Aquifer.

3.2.4.4 Queen City Aquifer

The Queen City Aquifer is classified as a minor aquifer by the TWDB. The Queen City Aquifer overlies the Carrizo-Wilcox Aquifer and is shallower and more prone to potential impacts of drought and overpumping 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.

3.2.4.5 Trinity Aquifer

Water quality in the Trinity Aquifer in the North East Texas Region, 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. Although the Trinity Aquifer is classified as a major aquifer by the TWDB, groundwater availability and usage from the aquifer is limited in the North East Texas Region.

3.2.4.6 Woodbine Aquifer

The Woodbine Aquifer is classified as a minor aquifer by the TWDB. Water quality in the Woodbine Aquifer in the North East Texas Region 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.

3.3 SUPPLIES CURRENTLY AVAILABLE TO EACH WATER USER GROUP

The water supplies available to the individual water user groups in 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 this regional water plan and the assumptions, if any, made in developing this data.

The first series of data presents water supply by use category.

3.3.1 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 pattern but also water use and water supply. Each water user group, and those water users within the "County Other" category, was asked to identify their water supply source and supply volume.

The water user group 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 2060. 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.

The 2006 NETRWP water supply volumes were used for the manufacturing, mining, livestock, irrigation and steam electric users. No changes in demand were recommended in Round III of planning for these groups. Livestock and irrigation were assumed to be from private (local) supplies. These private supplies may be individual water wells on private property or local surface water supplies. In general, therefore, the plan has assumed that irrigation and livestock supply from local supplies will match the livestock and irrigation water demand.

3.3.2 Regional Municipal Water Supply

Table 3.7 Regional Municipal Water Supply by County

Supply Available (ac-ft/yr)							
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Bowie	Red	9,115	8,336	7,702	7,091	6,516	5,539
	Sulphur	59,793	52,437	46,583	40,954	35,633	26,768
	Total	**68,908**	**60,773**	**54,284**	**48,045**	**42,149**	**32,307**
Camp	Cypress	14,236	14,242	14,248	14,253	14,258	14,263
	Total	**14,236**	**14,242**	**14,248**	**14,253**	**14,258**	**14,263**
Cass	Cypress	8,401	8,419	8,460	8,501	8,542	8,542
	Sulphur	1,438	1,456	1,496	1,537	1,578	1,578
	Total	**9,839**	**9,875**	**9,956**	**10,038**	**10,120**	**10,120**
Delta	Sulphur	2,344	2,373	2,289	2,281	2,257	2,225
	Total	**2,344**	**2,373**	**2,289**	**2,281**	**2,257**	**2,225**
Franklin	Cypress	3,578	3,588	3,596	3,603	3,603	3,603
	Sulphur	3,518	3,539	3,554	3,566	3,566	3,566
	Total	**7,096**	**7,127**	**7,150**	**7,169**	**7,169**	**7,169**
Gregg	Cypress	1,712	1,722	1,733	1,746	1,738	1,762
	Sabine	69,056	68,996	68,940	68,895	68,877	68,905
	Total	**70,768**	**70,718**	**70,673**	**70,641**	**70,615**	**70,667**
Harrison	Cypress	8,389	8,524	8,619	8,684	8,701	8,812

		Supply Available (ac-ft/yr)					
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
	Sabine	35,696	35,782	35,840	35,848	35,860	35,878
	Total	**44,085**	**44,306**	**44,459**	**44,532**	**44,561**	**44,690**
Hopkins	Cypress	631	632	632	631	631	631
	Sabine	1,019	1,054	1,069	1,079	1,053	1,029
	Sulphur	21,350	20,975	20,607	20,180	20,014	19,576
	Total	**23,000**	**22,661**	**22,308**	**21,890**	**21,698**	**21,236**
Hunt	Sabine	34,868	34,432	34,240	34,239	35,046	36,684
	Sulphur	9,563	9,514	9,460	9,446	9,508	9,630
	Trinity	110	112	121	136	171	222
	Total	**44,451**	**44,058**	**43,821**	**43,821**	**44,725**	**46,536**
Lamar	Red	15,198	15,080	14,976	14,889	14,803	14,628
	Sulphur	28,027	27,842	27,705	27,567	27,446	27,191
	Total	**43,225**	**42,922**	**42,681**	**42,456**	**42,249**	**41,819**
Marion	Cypress	10,783	10,791	10,791	10,791	10,791	10,791
	Total	**10,783**	**10,791**	**10,791**	**10,791**	**10,791**	**10,791**
Morris	Cypress	12,886	12,886	12,886	12,886	12,886	12,886
	Sulphur	504	504	504	504	504	504
	Total	**13,390**	**13,390**	**13,390**	**13,390**	**13,390**	**13,390**
Rains	Sabine	3,745	3,780	3,794	3,785	3,764	3,741
	Total	**3,745**	**3,780**	**3,794**	**3,785**	**3,764**	**3,741**
Red River	Red	449	448	448	448	448	448
	Sulphur	3,117	3,113	3,109	3,105	3,105	3,105
	Total	**3,566**	**3,561**	**3,557**	**3,553**	**3,553**	**3,553**
Smith	Sabine	9,030	9,461	9,995	10,536	11,499	12,723
	Total	**9,030**	**9,461**	**9,995**	**10,536**	**11,499**	**12,723**
Titus	Cypress	9,829	9,383	8,976	8,590	9,138	7,403
	Sulphur	1,437	1,525	1,618	1,673	1,729	1,790
	Total	**11,266**	**10,908**	**10,594**	**10,263**	**10,867**	**9,193**
Upshur	Cypress	12,668	12,731	12,771	12,793	12,811	12,836
	Sabine	2,643	2,643	2,643	2,643	2,643	2,643
	Total	**15,311**	**15,374**	**15,414**	**15,436**	**15,454**	**15,479**
Van Zandt	Neches	2544	2667	2,762	2,833	2,922	3,022
	Sabine	7,154	7,240	7,321	7,377	7,387	7,373
	Trinity	3,149	3,179	3,198	3,205	3,222	3,245
	Total	**12,847**	**13,086**	**13,281**	**13,414**	**13,531**	**13,640**
Wood	Cypress	541	544	546	546	546	546
	Sabine	9,623	9,696	9,733	9,728	9,720	9,713
	Total	**10,164**	**10,240**	**10,279**	**10,274**	**10,266**	**10,259**
REGION TOTAL		**418,145**	**409,646**	**402,967**	**396,569**	**392,917**	**383,802**

Table 3.8 Regional Municipal Water Supply by Basin

Supply Available (ac-ft/yr)						
BASIN	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Cypress	83,654	83,462	83,258	83,024	83,645	82,075
Neches	2,545	2,668	2,762	2,833	2,922	3,022
Red River	24,763	23,864	23,126	22,428	21,768	20,616
Sabine	172,832	173,083	173,578	174,130	175,849	178,689
Sulphur	131,092	123,278	116,924	110,813	105,341	95,934
Trinity	3,259	3,291	3,319	3,341	3,393	3,467
TOTAL	**418,145**	**409,646**	**402,967**	**396,569**	**392,917**	**383,802**

3.3.3 Regional Manufacturing Supply

Table 3.9 Regional Manufacturing Water Supply by County

Supply Available (ac-ft/yr)							
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Bowie	Red	8	9	10	11	12	13
	Sulphur	2,279	2,534	2,751	2,961	3,141	3,394
	Total	**2,287**	**2,543**	**2,761**	**2,972**	**3,153**	**3,407**
Camp	Cypress	42	45	47	49	51	54
	Total	**42**	**45**	**47**	**49**	**51**	**54**
Cass	Cypress	17	19	20	21	21	23
	Sulphur	107,417	115,180	121,335	127,216	132,303	141,276
	Total	**107,434**	**115,199**	**121,355**	**127,237**	**132,324**	**141,299**
Delta	Sulphur	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Franklin	Cypress	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Gregg	Cypress	-	-	-	-	-	-
	Sabine	7,754	7,754	7,754	7,754	7,754	7,754
	Total	**7,754**	**7,754**	**7,754**	**7,754**	**7,754**	**7,754**
Harrison	Cypress	11	12	13	14	15	17
	Sabine	163,869	163,869	163,869	163,869	163,869	163,869
	Total	**163,880**	**163,881**	**163,882**	**163,883**	**163,884**	**163,886**
Hopkins	Cypress	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Sulphur	1,039	1,111	1,168	1,222	1,268	1,357
	Total	**1,039**	**1,111**	**1,168**	**1,222**	**1,268**	**1,357**

Supply Available (ac-ft/yr)							
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Hunt	Sabine	732	894	1,062	1,243	1,416	1,535
	Sulphur	277	338	401	470	535	580
	Trinity	-	-	-	-	-	-
	Total	**1,009**	**1,232**	**1,463**	**1,713**	**1,951**	**2,115**
Lamar	Red	805	858	900	941	976	1,042
	Sulphur	4,775	5,091	5,340	5,580	5,787	6,183
	Total	**5,580**	**5,949**	**6,240**	**6,521**	**6,763**	**7,225**
Marion	Cypress	65	72	76	79	83	89
	Total	**65**	**72**	**76**	**79**	**83**	**89**
Morris	Cypress	127,301	121,906	116,480	111,164	112,420	121,294
	Sulphur	-	-	-	-	-	-
	Total	**127,301**	**121,906**	**116,480**	**111,164**	**112,420**	**121,294**
Rains	Sabine	2	2	2	2	2	2
	Total	**2**	**2**	**2**	**2**	**2**	**2**
Red River	Red	-	-	-	-	-	-
	Sulphur	6	7	7	7	7	8
	Total	**6**	**7**	**7**	**7**	**7**	**8**
Smith	Sabine	225	252	275	298	317	343
	Total	**225**	**252**	**275**	**298**	**317**	**343**
Titus	Cypress	7,216	7,565	7,834	8,086	8,295	8,861
	Sulphur	-	-	-	-	-	-
	Total	**7,216**	**7,565**	**7,834**	**8,086**	**8,295**	**8,861**
Upshur	Cypress	248	272	291	312	330	355
	Sabine	-	-	-	-	-	-
	Total	**248**	**272**	**291**	**312**	**330**	**355**
Van Zandt	Neches	-	-	-	-	-	-
	Sabine	378	409	435	459	479	517
	Trinity	-	-	-	-	-	-
	Total	**378**	**409**	**435**	**459**	**479**	**517**
Wood	Cypress	-	-	-	-	-	-
	Sabine	118	126	133	139	144	155
	Total	**118**	**126**	**133**	**139**	**144**	**155**
REGION TOTAL		**424,584**	**426,325**	**430,203**	**431,897**	**439,225**	**458,721**

Table 3.10 Regional Manufacturing Water Supply by Basin

Supply Available (ac-ft/yr)						
BASIN	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Cypress	134,900	129,891	124,761	119,725	121,215	130,693
Neches	0	0	0	0	0	0
Red River	813	867	910	952	988	1,055
Sabine	173,078	173,306	173,530	173,764	173,981	174,175
Sulphur	115,793	124,261	131,002	137,456	143,041	152,798
Trinity	0	0	0	0	0	0
TOTAL	**424,584**	**428,325**	**430,203**	**431,897**	**439,225**	**458,721**

3.3.4 Regional Irrigation Supply

Table 3.11 Regional Irrigation Water Supply by County

Supply Available (ac-ft/yr)							
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Bowie	Red	4,620	4,620	4,620	4,500	4,200	4,200
	Sulphur	-	-	-	-	-	-
	Total	**4,620**	**4,620**	**4,620**	**4,500**	**4,200**	**4,200**
Camp	Cypress	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Cass	Cypress	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Delta	Sulphur	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Franklin	Cypress	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Gregg	Cypress	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Harrison	Cypress	28	28	28	28	28	28
	Sabine	39	39	39	39	39	39
	Total	**67**	**67**	**67**	**67**	**67**	**67**
Hopkins	Cypress	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Hunt	Sabine	1,386	1,386	1,386	1,386	1,386	1,386
	Sulphur	552	552	552	552	552	552
	Trinity	-	-	-	-	-	-
	Total	**1,938**	**1,938**	**1,938**	**1,938**	**1,938**	**1,938**
Lamar	Red	3,017	3,017	3,017	3,017	3,017	3,017

Supply Available (ac-ft/yr)							
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Lamar (cont.)	Sulphur	-	-	-	-	-	-
	Total	**3,017**	**3,017**	**3,017**	**3,017**	**3,017**	**3,017**
Marion	Cypress	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Morris	Cypress	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Rains	Sabine	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Red River	Red	2,024	2,003	1,982	1,961	1,941	1,921
	Sulphur	1,689	1,672	1,655	1,638	1,621	1,603
	Total	**3,713**	**3,675**	**3,637**	**3,599**	**3,562**	**3,524**
Smith	Sabine	462	491	516	542	569	594
	Total	**462**	**491**	**516**	**542**	**569**	**594**
Titus	Cypress	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Upshur	Cypress	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Van Zandt	Neches	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Trinity	-	-	-	-	-	-
	Total	-	-	-	-	-	-
Wood	Cypress	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Total	-	-	-	-	-	-
REGION TOTAL		**13,817**	**13,808**	**13,795**	**13,663**	**13,353**	**13,340**

Table 3.12: Regional Irrigation Water Supply by Basin

Supply Available (ac-ft/yr)						
BASIN	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Cypress	28	28	28	28	28	28
Neches	0	0	0	0	0	0
Red River	9,661	9,640	9,619	9,478	9,158	9,138
Sabine	1,887	1,916	1,941	1,967	1,994	2,019
Sulphur	2,241	2,224	2,207	2,190	2,173	2,155
Trinity	0	0	0	0	0	0
TOTAL	**13,817**	**13,808**	**13,795**	**13,663**	**13,353**	**13,340**

3.3.5 Regional Steam Electric Supply

Table 3.13 Regional Steam Electric Water Supply by County

		Supply Available (ac-ft/yr)					
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Bowie	Red	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Camp	Cypress	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Cass	Cypress	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Delta	Sulphur	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Franklin	Cypress	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Gregg	Cypress	-	-	-	-	-	-
	Sabine	2,000	2,000	2,000	2,000	2,000	2,000
	Total	**2,000**	**2,000**	**2,000**	**2,000**	**2,000**	**2,000**
Harrison	Cypress	-	-	-	-	-	-
	Sabine	24,161	24,161	24,161	24,161	24,161	24,161
	Total	**24,161**	**24,161**	**24,161**	**24,161**	**24,161**	**24,161**
Hopkins	Cypress	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Hunt	Sabine	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-
	Trinity	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Lamar	Red	8,961	8,961	8,961	8,961	8,961	8,961
	Sulphur	-	-	-	-	-	-
	Total	**8,961**	**8,961**	**8,961**	**8,961**	**8,961**	**8,961**
Marion	Cypress	6,668	6,668	6,668	6,668	6,668	6,668
	Total	**6,668**	**6,668**	**6,668**	**6,668**	**6,668**	**6,668**
Morris	Cypress	820	820	820	820	820	820
	Sulphur	-	-	-	-	-	-
	Total	**820**	**820**	**820**	**820**	**820**	**820**
Rains	Sabine	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**

Supply Available (ac-ft/yr)							
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Red River Red River (cont.)	Red	-	-	-	-	-	-
	Sulphur	8,624	8,624	8,624	8,624	8,624	8,624
	Total	**8,624**	**8,624**	**8,624**	**8,624**	**8,624**	**8,624**
Smith	Sabine	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Titus	Cypress	67,415	67,415	67,415	67,415	67,415	67,415
	Sulphur	-	-	-	-	-	-
	Total	**67,415**	**67,415**	**67,415**	**67,415**	**67,415**	**67,415**
Upshur	Cypress	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Van Zandt	Neches	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Trinity	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Wood	Cypress	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
REGION TOTAL		**118,649**	**118,649**	**118,649**	**118,649**	**118,649**	**118,649**

Table 3.14 Regional Steam Electric Water Supply by Basin

Supply Available (ac-ft/yr)						
BASIN	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Cypress	74,903	74,903	74,903	74,903	74,903	74,903
Neches	0	0	0	0	0	0
Red River	8,961	8,961	8,961	8,961	8,961	8,961
Sabine	26,161	26,161	26,161	26,161	26,161	26,161
Sulphur	8,624	8,624	8,624	8,624	8,624	8,624
Trinity	0	0	0	0	0	0
TOTAL	**118,649**	**118,649**	**118,649**	**118,649**	**118,649**	**118,649**

3.3.6 Regional Mining Supply

Table 3.15 Regional Mining Water Supply by County

Supply Available (ac-ft/yr)							
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Bowie	Red	19	19	18	18	18	18
	Sulphur	23	22	22	21	21	21
	Total	**42**	**41**	**40**	**39**	**39**	**39**
Camp	Cypress	23	23	23	23	23	23
	Total	**23**	**23**	**23**	**23**	**23**	**23**
Cass	Cypress	351	370	380	389	399	408
	Sulphur	457	481	494	507	518	531
	Total	**808**	**851**	**874**	**896**	**917**	**939**
Delta	Sulphur	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Franklin	Cypress	651	621	607	593	582	570
	Sulphur	439	419	409	401	392	384
	Total	**1,090**	**1,040**	**1,016**	**994**	**974**	**954**
Gregg	Cypress	-	-	-	-	-	-
	Sabine	58	70	79	88	98	107
	Total	**58**	**70**	**79**	**88**	**98**	**107**
Harrison	Cypress	209	224	233	241	250	257
	Sabine	221	236	245	255	264	272
	Total	**430**	**460**	**478**	**496**	**514**	**529**
Hopkins	Cypress	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Sulphur	175	189	197	205	213	221
	Total	**175**	**189**	**197**	**205**	**213**	**221**
Hunt	Sabine	57	55	54	53	52	51
	Sulphur	-	-	-	-	-	-
	Trinity	-	-	-	-	-	-
	Total	**57**	**55**	**54**	**53**	**52**	**51**
Lamar	Red	8	8	8	8	8	8
	Sulphur	8	7	7	7	7	7
	Total	**16**	**15**	**15**	**15**	**15**	**15**
Marion	Cypress	111	116	119	122	124	126
	Total	**111**	**116**	**119**	**122**	**124**	**126**
Morris	Cypress	35	34	34	34	34	34
	Sulphur	-	-	-	-	-	-
	Total	**35**	**34**	**34**	**34**	**34**	**34**
Rains	Sabine	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Red River	Red	-	-	-	-	-	-
	Sulphur	-	-	-	-	-	-

Supply Available (ac-ft/yr)							
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Smith	Sabine	298	320	360	381	423	459
	Total	**298**	**320**	**360**	**381**	**423**	**459**
Titus	Cypress	3,174	3,574	3,799	4,023	4,248	4,487
	Sulphur	320	361	383	406	429	453
	Total	**3,494**	**3,935**	**4,182**	**4,429**	**4,677**	**4,940**
Upshur	Cypress	1	1	1	1	1	1
	Sabine	-	-	-	-	-	-
	Total	**1**	**1**	**1**	**1**	**1**	**1**
Van Zandt	Neches	110	126	137	147	158	168
	Sabine	1,689	1,947	2,107	2,270	2,437	2,598
	Trinity	63	73	79	85	91	97
	Total	**1,862**	**2,146**	**2,323**	**2,502**	**2,686**	**2,863**
Wood	Cypress	-	-	-	-	-	-
	Sabine	302	309	313	317	321	324
	Total	**302**	**309**	**313**	**317**	**321**	**324**
REGION TOTAL		**8,802**	**9,605**	**10,108**	**10,595**	**11,111**	**11,625**

Table 3.16 Regional Mining Water Supply by Basin

Supply Available (ac-ft/yr)						
BASIN	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Cypress	4,555	4,963	5,196	5,426	5,661	5,906
Neches	110	126	137	147	158	168
Red River	27	27	26	26	26	26
Sabine	2,625	2,937	3,158	3,364	3,595	3,811
Sulphur	1,422	1,479	1,512	1,547	1,580	1,617
Trinity	63	73	79	85	91	97
TOTAL	**8,802**	**9,605**	**10,108**	**10,595**	**11,111**	**11,625**

3.3.7 Regional Livestock Supply

Table 3.17 Regional Livestock Water Supply by County

Supply Available (ac-ft/yr)							
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Bowie	Red	289	289	289	289	289	289
	Sulphur	718	718	718	718	718	718
	Total	**1,007**	**1,007**	**1,007**	**1,007**	**1,007**	**1,007**
Camp	Cypress	459	459	459	459	459	459
	Total	**459**	**459**	**459**	**459**	**459**	**459**
Cass	Cypress	571	571	571	571	571	571
	Sulphur	-	-	-	-	-	-
	Total	**571**	**571**	**571**	**571**	**571**	**571**
Delta	Sulphur	451	451	451	451	451	451
	Total	**451**	**451**	**451**	**451**	**451**	**451**
Franklin	Cypress	414	414	414	414	414	414
	Sabine	2	2	2	2	2	2
	Sulphur	666	666	666	666	666	666
	Total	**1,082**	**1,082**	**1,082**	**1,082**	**1,082**	**1,082**
Gregg	Cypress	-	-	-	-	-	-
	Sabine	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Harrison	Cypress	366	366	366	366	366	366
	Sabine	0	0	0	0	0	0
	Total	**366**	**366**	**366**	**366**	**366**	**366**
Hopkins	Cypress	147	147	147	147	147	147
	Sabine	1,766	1,766	1,766	1,766	1,766	1,766
	Sulphur	2,461	2,340	2,075	2,060	1,771	1,771
	Total	**4,374**	**4,253**	**3,988**	**3,973**	**3,684**	**3,684**
Hunt	Sabine	896	896	896	896	896	896
	Sulphur	331	331	331	331	331	331
	Trinity	6	6	6	6	7	7
	Total	**1,233**	**1,233**	**1,233**	**1,233**	**1,234**	**1,234**
Lamar	Red	407	407	407	407	407	407
	Sulphur	808	808	808	823	823	848
	Total	**1,215**	**1,215**	**1,215**	**1,230**	**1,230**	**1,255**
Marion	Cypress	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Morris	Cypress	277	277	277	277	277	277
	Sulphur	-	-	-	-	-	-
	Total	**277**	**277**	**277**	**277**	**277**	**277**
Rains	Sabine	700	700	700	700	700	700
	Total	**700**	**700**	**700**	**700**	**700**	**700**
Red River	Red	396	396	396	396	396	396

Supply Available (ac-ft/yr)							
COUNTY	**Basin**	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Red River (cont.)	Sulphur	911	911	911	911	911	911
	Total	**1,307**	**1,307**	**1,307**	**1,307**	**1,307**	**1,307**
Smith	Sabine	-	-	-	-	-	-
	Total	**-**	**-**	**-**	**-**	**-**	**-**
Titus	Cypress	-	-	-	-	-	-
	Sulphur	156	156	156	156	156	156
	Total	**156**	**156**	**156**	**156**	**156**	**156**
Upshur	Cypress	1,235	1,235	1,235	1,235	1,235	1,235
	Sabine	363	363	363	363	363	363
	Total	**1,598**	**1,598**	**1,598**	**1,598**	**1,598**	**1,598**
Van Zandt	Neches	613	613	613	613	613	613
	Sabine	1,035	1,035	1,035	1,035	1,035	1,035
	Trinity	611	599	527	449	340	282
	Total	**2,259**	**2,247**	**2,175**	**2,097**	**1,988**	**1,930**
Wood	Cypress	202	202	202	202	202	202
	Sabine	2,219	2,219	2,219	2,219	2,219	2,219
	Total	**2,421**	**2,421**	**2,421**	**2,421**	**2,421**	**2,421**
REGION TOTAL		**19,476**	**19,343**	**19,006**	**18,928**	**18,531**	**18,498**

Table 3.18 Regional Livestock Water Supply by Basin

Supply Available (ac-ft/yr)						
BASIN	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Cypress	3,671	3,671	3,671	3,671	3,671	3,671
Neches	613	613	613	613	613	613
Red River	1,092	1,092	1,092	1,092	1,092	1,092
Sabine	6,981	6,981	6,981	6,981	6,981	6,981
Sulphur	6,502	6,381	6,116	6,116	5,827	5,852
Trinity	617	605	533	455	347	289
TOTAL	**19,476**	**19,343**	**19,006**	**18,928**	**18,531**	**18,498**

3.4 WHOLESALE WATER PROVIDERS

Wholesale Water Providers (WWP) sell water to other entities for distribution. Table 3.19 provides a listing of WWPs 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 and Cherokee Water Company imports water from Lake Cherokee in Region I.

Table 3.19 Wholesale Water Providers

Wholesale Water Provider	Source Region	Source Basin	Supply Available ac-ft/yr					
			2010	2020	2030	2040	2050	2060
Cash SUD	D	Sabine	5,602	5,578	5,553	5,529	5,504	5,480
Cash SUD	C	Sabine	1,255	971	831	733	666	608
Cherokee Water Company	I	Sabine	18,000	18,000	18,000	18,000	18,000	18,000
City of Commerce	D	Sabine	7,750	7,615	7,457	7,246	6,804	6,148
City of Commerce	D	Sulphur	315	315	295	295	295	295
City of Emory	D	Sabine	1,901	1,887	1,873	1,859	1,845	1,832
Franklin County WD	D	Cypress	10,737	10,497	10,257	10,017	9,777	9,537
City of Greenville	D	Sabine	24,001	23,849	23,696	23,543	23,391	23,237
Lamar County WSD	D	Red	18,795	18,795	18,795	18,795	18,795	18,795
City of Longview	D	Cypress	20,000	20,000	20,000	20,000	20,000	20,000
City of Longview	D	Sabine	62,618	62,618	62,618	62,618	62,618	62,618
City of Marshall	D	Cypress	16,000	16,000	16,000	16,000	16,000	16,000
City of Mount Pleasant	D	Cypress	16,598	16,598	16,598	16,598	16,598	16,598
Northeast Texas MWD	D	Cypress	160,311	160,311	160,311	160,311	160,311	160,311
City of Paris	D	Red	66,960	66,960	66,960	-66,960	66,960	66,960
Sabine River Authority	D	Sabine	402,842	399,913	396,985	394,057	391,128	388,200
Sulphur River MWD	D	Sulphur	33,255	32,869	32,468	32,040	31,556	30,936
City of Sulphur Springs	D	Sulphur	22,537	22,389	22,235	22,071	21,886	21,6549
City of Texarkana	D	Sulphur	180,000	180,000	180,000	180,000	180,000	180,000
Titus County FWD #1	D	Cypress	48,500	48,500	48,500	48,500	48,500	48,500
Total Water Availability to WWPs in Region D			**1,117,977**	**1,113,665**	**1,109,432**	**1,105,172**	**1,100,634**	**1,290,604**

3.5 IMPACT OF ENVIRONMENTAL FLOW POLICIES ON WATER RIGHTS, WATER AVAILABILITY, AND WATER PLANNING

The objective of this section of the 2011 Plan is to provide an evaluation of the effect of environmental flow policies on water rights, water availability, and water planning in the NETWRPG area and within Region I to the extent that it affects Region D. Much has occurred in the area of environmental flow recommendations since the 2006 Plan was adopted, including the development of new recommendations for the Sabine and Neches watersheds. However, it is not clear how much effect these recommendations will have in the short-term.

The Legislature passed Senate Bill 3 (S.B. 3) in the 2007 80th Regular Session. S.B. 3 is the third in a series of three omnibus water bills related to the State of Texas' meeting the future needs for water. S.B. 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 and required TCEQ to adopt the recommendations in the form of environmental flow standards. Such standards will be 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 S.B. 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 freshwater inflows necessary to maintain the viability of Texas' bay and estuary systems 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 on a case-by-case basis as part of the water rights permitting process.

S.B. 3 called for the appointment of stakeholder committees for the various watershed feeding 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 feed 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 of potential interest. Stakeholder committees for both areas were appointed in 2008. Each stakeholder committee then appointed a "Bay and Basin Expert Science Team" (BBEST) in the fall of 2008 to address the development of environmental flow recommendations in accordance with S.B. 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 other sources. 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, at this time, have been considered by the stakeholder committee but were not adopted. Over the next few months, analysis of the potential effects of these new recommendations will be undertaken.

Environmental flow recommendations 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 should result in more clarity in how diversions can be made and better ensure that sufficient water is available in the streams of the Sabine and Neches basins.

As a result of the implementation of new environmental flow recommendations, 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 know at this time.

The implementation of environmental flow recommendations will result in a need to more carefully consider environmental flow needs during the process of water planning in Region D as well as other areas. In future planning cycles the NETRWPG will need to analyze new water rights in light of these recommendations to determine how the new environmental flow requirements are consistent with the long-term protection of the region’s water resources.

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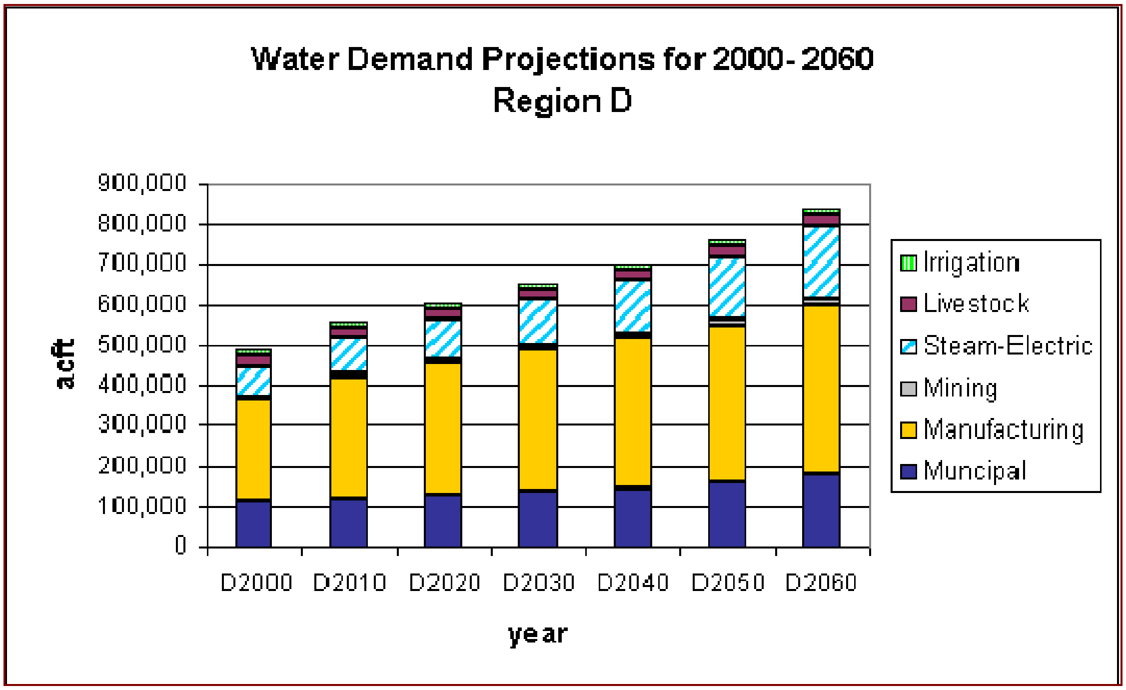
CHAPTER 4.0 COMPARISON OF WATER DEMANDS WITH WATER SUPPLIES TO DETERMINE NEEDS

The objective of this chapter is to compare the water demands within the North East Texas Region, as presented in Chapter 2, with currently available water supplies, as presented in Chapter 3. This chapter compares the demands and supplies of each 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, 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 major water providers. If an entity obtains water from more than one major water provider, it is listed under each of its water sources.

Within the North East Texas Region, three types of water shortages have been identified. The first, and most common, is caused by expiration of a water supply contract or permit. Most water supply contracts and permits have expiration dates, and the Texas Water Development Board (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. The second type of shortage is also contractual. These are instances where a contract expires, 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. This type of shortage is most common among entities that utilize groundwater supplies because well capacity is held at existing development levels throughout the planning period.

The North East Texas Regional Water Planning Group (Region D) has considered the variety of actions and permit applications that may come before the Texas Commission on Environmental Quality (TCEQ) and the 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 North East Texas Regional Water Planning Group 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 Illustration of the Projected Demands of the Six Water User Groups within the Region



4.1 COUNTY SUMMARIES OF WATER NEEDS

The following subsections, 4.1.1 through 4.1.19, 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 water needs that exceed supply at some point within the planning period. Entities that are anticipated to have a surplus have been included in Table 4.38 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 contracts with the City of Texarkana (Texarkana Water Utilities) for water supply from Wright Patman. All of the projected water shortages in Bowie County are contractual except one. A summary of the estimated water supply shortages in Bowie County is listed below as Table 4.1. City of Texarkana also imports water from Arkansas, and exports water to Texarkana, Arkansas. For this water plan, these imports and exports are assumed to offset one another, and Arkansas demand/supply has been excluded from the plan totals.

Table 4.1 Water Supply Shortages in Bowie County

Bowie County	Total Water Shortage in ac-ft/yr						Shortage
Year	2010	2020	2030	2040	2050	2060	Type
Central Bowie WSC	257	303	336	369	362	353	EI
Hooks	81	108	130	151	151	151	EI
Macedonia-Eylau MUD #1	217	251	270	294	279	270	EI
New Boston	45	101	139	175	168	168	EI
Redwater	146	159	167	178	174	171	EI
Red River Redevelopment Authority				21	567	1114	A
Wake Village	356	414	472	529	587	645	EI
Burns Redbank WSC	80	89	94	99	95	92	EI
Oak Grove WSC	44	48	50	52	50	49	EI

4.1.2 Camp County

Groundwater from the Carrizo-Wilcox Aquifer and surface water from the Northeast Texas Municipal Water District (Lake Bob Sandlin) supply water for all of the municipalities in Camp County. Bi-County WSC and Woodland Harbor are the two water systems that are projected to have shortages. A summary of the identified water supply shortages in Camp County is listed below as Table 4.2.

Table 4.2 Water Supply Shortages in Camp County

Camp County	Total Water Shortage in ac-ft/yr						Shortage
Year	2010	2020	2030	2040	2050	2060	Type
Bi-County WSC		128	299	434	539	653	A
Woodland Harbor	61	60	60	60	60	60	A

4.1.3 Cass County

Two municipalities in Cass County are supplied by the Carrizo-Wilcox Aquifer, but only one of these municipalities relies on groundwater as its sole supply source. The greater portion of the total municipal supply is provided by surface water from outside of the county. Manufacturing in Cass County has increased surface water usage and supply. No water supply shortages have been identified in Cass County in this round of planning.

4.1.4 Delta County

The primary source for Delta County water supply is Big Creek Lake and Cooper Reservoir. Ben Franklin WSC is projected to have a shortage beginning in 2030. Ben Franklin WSC has a well in the Trinity Aquifer, and currently provides water to its own customers and also has a supply contract with Enloe-Lake Creek WSC. In 2005 the Delta County Municipal Utility District (MUD) absorbed the Charleston WSC, Lone Star WSC, Enloe-Lake Creek WSC, and the utility system of the City of Pecan Gap. The following table, Table 4.3, is a summary of identified water supply shortages in Delta County.

Table 4.3 Water Supply Shortages in Delta County

Delta County	Total Water Shortage in ac-ft/yr						Shortage
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**Type**
Ben Franklin WSC			33	36	36	36	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 Mt. Vernon and Cypress Springs Special Utility District (SUD). No water supply shortages have been identified in Franklin County in this round of planning.

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). The City of Gladewater is supplied by Lake Gladewater. The City of White Oak gets water from Big Sandy Creek. Liberty-Danville FWSD No.2 has a contract that does not expire within the planning period but is inadequate to meet projected demands in 2040. Most of the manufacturing demands in Gregg County are supplied from Longview. However, there are other sources, including local supply, direct reuse, and the Carrizo-Wilcox Aquifer. The City of Liberty City, West Gregg SUD, and Liberty-Danville FWSD 2 utilize groundwater from the Carrizo-Wilcox and have insufficient well capacity. A summary of the identified water supply shortages in Gregg County is presented as Table 4.4.

Table 4.4 Water Supply Shortages in Gregg County

Gregg County	Total Water Shortage in ac-ft/yr						Shortage
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**Type**
Clarksville City	120	134	148	164	186	217	A
Liberty City WSC				53	177	353	A
West Gregg SUD			56	119	208	333	A
Liberty-Danville FWSD 2				1	17	40	EI
Starrville-Friendship WSC				19	54	101	A

4.1.7 Harrison County

Most of the water shortages in this county are due to limited current well capacity to withdraw water from the Carrizo-Wilcox Aquifer. Steam Electric demands are supplied by the Brandy Branch Reservoir, Lake O' the Pines and direct use of treated wastewater from the City of Longview. The following table, Table 4.5, is a summary of identified water supply shortages in Harrison County.

Table 4.5 Water Supply Shortages in Harrison County

Harrison County	Total Water Shortage in ac-ft/yr						Shortage
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**Type**
Waskom	55	101	134	159	188	231	A
Blocker-Crossroads WSC	78	91	100	107	116	128	A
Caddo Lake WSC	10	6	19	27	37	52	A
Leigh WSC						1	A
Scottsville						7	A
Steam Electric				1852	6837	12914	EI
Talley WSC	59	81	97	109	122	142	A
Waskom Rural WSC #1						5	A

4.1.8 Hopkins County

Miller Grove WSC is the water system identified with a shortage in Hopkins County. The shortage is caused by current limited well capacity to withdraw water from the Nacatoch Aquifer. Carrizo Wilcox and the Nacatoch aquifers are the main source of groundwater supply for the county. Contracts in Hopkins County are by and large with the City of Sulphur Springs. The City of Sulphur Springs has a contract with the Sulphur River MWD for water from the Cooper Reservoir, and also has rights to Lake Sulphur Springs. The following table, Table 4.6, is a summary of identified water supply shortages in Hopkins County.

Table 4.6: Water Supply Shortages in Hopkins County

Hopkins County	Total Water Shortage in ac-ft/yr						Shortage
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**Type**
Miller Grove WSC			24	30	17	6	A

4.1.9 Hunt County

Water shortages in Hunt County are both contractual and actual in nature. Sabine River Authority (SRA) is a leading wholesale water provider for consumers in Hunt County. All SRA water from Lake Tawakoni and Lake Fork has been contracted and there is no water available from these lakes to meet projected shortages. Able Springs WSC, Cash SUD and Combined Consumers SUD have water supply contracts with SRA and will experience some shortage during the planning period. SRA is proposing to transfer water from the Toledo Bend Reservoir to the North Texas region to meet anticipated future needs of its customers. Some of the water from Toledo Bend could also be used to meet steam electric deficits. 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 4.7, is a summary of identified water supply shortages in Hunt County.

Table 4.7 Water Supply Shortages in Hunt County

Hunt County	Total Water Shortage in ac-ft/yr						Shortage
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**Type**
Able Springs WSC					47	143	EI
Campbell WSC	9	46	101	201	424	773	A
Cash SUD					1015	4546	EI
Celeste						63	A
Combined Consumers SUD					832	2617	EI
Hickory Creek SUD				198	670	1418	A
North Hunt WSC	78	167	288	482	910	1589	EI
Wolfe City			20	34	66	114	A
Steam Electric	8639	12366	14457	17006	20114	23902	A
Jacobia WSC					84	328	EI
Little Creek Acres	20	27	37	54	93	153	A
Maloy WSC	26	39	57	84	154	263	EI
Poetry WSC				1	14	46	A
Shady Grove WSC						280	EI
West Leonard WSC			1	5	12	24	A

4.1.10 Lamar County

Petty WSC, and Steam Electric are the users identified with a water shortage. Petty WSC has a well in the Woodbine Aquifer that is not expected to be adequate to meet projected demands beginning 2010. Panda's steam electric contract with City of Paris is not adequate to meet projected demand around 2030 and thereafter. A summary of the identified water supply shortages in Lamar County is presented below as Table 4.8. The City of Paris is the major supplier of surface water in the county.

Table 4.8 Water Supply Shortages in Lamar County

Lamar County	Total Shortages in ac-ft/yr						Shortage
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**Type**
Petty WSC	1	2	20	21	20	20	A
Steam Electric			980	2733	4870	7474	EI

4.1.11 Marion County

The Carrizo-Wilcox Aquifer and Lake O' The Pines supply most of the water demand in Marion County, and currently meet all of the projected needs in the county. There are no deficits projected in Marion County.

4.1.12 Morris County

Two cities within Morris County rely on the Carrizo-Wilcox for supply and the other two rely on surface water from Lake O' The Pines. All of these municipalities have adequate supply for the next 50 years. There are no identified water supply shortages in Morris County.

4.1.13 Rains County

Sabine River Authority, Lake Tawakoni, is the main wholesale water provider for Rains County. Groundwater is predominantly from the Carrizo-Wilcox. South Rains WSC has a contract amount with the City of Emory that is not sufficient to meet current demands. The following table, Table 4.9, is a summary of identified water supply shortages in Rains County.

Table 4.9 Water Supply Shortages in Rains County

Rains County	Total Water Shortage in ac-ft/yr						Shortage
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**Type**
South Rains WSC	160	239	284	295	287	277	EI

4.1.14 Red River County

There is an adequate supply for the next 50 years. There are no identified water supply shortages in Red River County.

4.1.15 Smith County

The portion of Smith County that is in the North East Texas Region is almost solely supplied by the Carrizo-Wilcox Aquifer. Most projected shortages in this county are due to insufficient well capacity to withdraw water from the aquifer. 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 4.10.

Table 4.10: Water Supply Shortages in Smith County

Smith County	Total Water Shortage in ac-ft/yr						Shortage
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**Type**
Crystal Systems Inc.				45	209	425	A
Lindale Rural WSC					77	189	A
Lindale					101	374	A
Winona						5	EI
Star Mountain WSC				1	36	83	A

4.1.16 Titus County

Water supply in Titus County is predominately from Lakes Monticello, Bob Sandlin Welsh Reservoir, Lake O' the Pines, and Tankersley, and from the Carrizo-Wilcox Aquifer. Titus County Franklin County Water District (FWSD) supplies water to the City of Mount Pleasant. Mount Pleasant supplies Winfield, Tri-Water, and manufacturing demands in addition to its internal needs. Steam Electric is the WUG that was identified with a shortage. A summary of the identified water supply shortages in Titus County is listed below as Table 4.11.

Table 4.11 Water Supply Shortages in Titus County

Titus County	Total Water Shortage in ac-ft/yr						Shortage
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**Type**
Steam Electric					**14816**	**28987**	**EI**

4.1.17 Upshur County

There is an adequate supply of water for the next 50 years. There are no identified water supply shortages in Upshur County.

4.1.18 Van Zandt County

The cities of Canton and Grand Saline obtain water from the Carrizo-Wilcox Aquifer. In addition, Canton utilizes supply from its city lake. These two cities will all experience deficits due to inadequate supplies and will need to seek additional sources of water. Other actual shortages are due to insufficiencies in groundwater production capacity. The following table, Table 4.12, is a summary of identified water supply shortages in Van Zandt County.

Table 4.12 Water Supply Shortages in Van Zandt County

Van Zandt County	Total Water Shortage in ac-ft/yr						Shortage
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**Type**
Canton			29	57	104	161	A
Grand Saline		39	73	99	137	185	A
R P M WSC						10	A
Corinth WSC					6	23	A
Crooked Creek WSC		8	21	30	42	56	A
Edom WSC		16	34	48	66	86	A
Fruitvale WSC		64	119	159	211	269	A
Little Hope-Moore WSC	13	48	78	101	129	161	A
Van					25	83	A

4.1.19 Wood County

All actual shortages in Wood County are caused by groundwater sources, which will prove insufficient within the planning period. Additional sources of supply will be needed for these entities. Table 4.13, is a summary of identified water supply shortages in Wood County.

Table 4.13 Water Supply Shortages in Wood County

Wood County	Total Water Shortage in ac-ft/yr						Shortage
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	**Type**
Mineola	203	318	374	367	360	360	A

4.2 RIVER BASIN SUMMARIES OF WATER NEEDS

The North East Texas Regional Water Planning Area is divided among four main river basins including the Red River Basin, the Sulphur River Basin, the Cypress River 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. These two basins are not discussed because of the small area situated within the North East Texas Region.

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 contractual shortages. No actual water shortage was identified in the Red River Basin. Tables 4.14 detail the shortages in the basin.

Table 4.14 Water Shortages due to Expirations and Insufficient Contract Amounts – Red River Basin

Insufficient Contract	Water Shortage in ac-ft/yr					
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Central Bowie WSC	52	61	68	74	73	71
Hooks	81	108	130	151	151	151
New Boston	13	31	43	54	52	52
Burns Redbank WSC	80	89	94	99	95	92
Oak Grove WSC	21	23	24	25	24	24
Steam Electric			980	2733	4870	7474

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 contract expirations, though there are several entities with projected actual water needs. Most of the actual needs are caused by insufficient supplies from groundwater sources. The city of Wolfe City has inadequate surface water source in their city lake. Table 4.15 and 4.16 detail the shortages in the basin.

Table 4.15 Water Shortages due to Expiration and Insufficient Contract Amounts – Sulphur River Basin

Insufficient Contract	Water Shortage in ac-ft/yr					
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Maloy WSC	26	39	57	84	154	263
City of New Boston	32	70	96	121	116	116
City of Redwater	146	159	167	178	174	171
City of Wake Village	356	414	472	529	587	645
Central Bowie WSC	205	242	268	295	289	282
Macedonia-Eylau WSC	217	251	270	294	279	270
North Hunt WSC	164	247	366	560	988	1659
Oak Grove WSC	23	25	26	27	26	25

Table 4.16 Actual Water Shortages – Sulphur River Basin

Actual Shortages	Water Shortages in ac-ft/yr					
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Campbell WSC	6	28	60	113	243	457
City of Wolfe City			20	34	66	114
Ben Franklin WSC			33	36	36	36
Hickory Creek SUD				136	529	1151
Miller Grove WSC			24	30	17	6
Petty WSC	1	2	20	21	20	20
Red River Redevelopment Authority				21	567	1114
West Delta WSC	19	27	36	48	48	48

4.2.3 Cypress River Basin

The Cypress River Basin includes portions of Cass, Franklin, Gregg, Harrison, Hopkins, Morris, Titus, Upshur, and Wood Counties, as well as all of Camp and Marion Counties. Supply shortages in the Cypress River Basin occur primarily among entities that utilize groundwater from the Carrizo-Wilcox Aquifer. Steam electric will have a shortage in the Cypress River Basin starting year 2030. Table 4.17 detail the shortages in the basin.

Table 4.17 Actual Water Shortages – Cypress River Basin

Actual Shortages	Water Shortages in ac-ft/yr					
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Bi-County WSC		128	299	434	539	653
Steam Electric				1613	14816	28987
Woodland Harbor	61	60	60	60	60	60
City of Linden	92	98	101	106	104	104
City of Scottsville						7
City of Waskom		28	55	76	100	135
Caddo Lake WSC	10	6	19	27	37	52
Leigh WSC						1
Pritchett WSC				3	9	18
Talley WSC	11	15	17	20	22	26
Waskom Rural WSC #1						5

4.2.4 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 most of the shortages are due to deficits in groundwater supply. Steam electric makes up a significant amount of the shortage in the Sabine Basin. Table 4.18 and 4.19 detail the shortages in the basin.

Table 4.18 Water Shortages due to Expiration and Insufficient Contract Amounts – Sabine River Basin

Insufficient Contract	Water Shortages in ac-ft/yr					
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Able Springs WSC					47	143
Cash SUD					1486	4922
Combined Consumers SUD					832	2617
Jacobia WSC					84	328
Poetry WSC	6	14	25	40	71	126
Shady Grove WSC						280
South Rains WSC	160	239	284	295	287	277
City of Winona						5

Table 4.19 Actual Water Shortages – Sabine River Basin

Actual Shortages	Water Shortages in ac-ft/yr					
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Campbell WSC	3	18	41	88	181	305
City of Celeste						63
Hickory Creek SUD		6	27	62	141	267
City of Canton			29	57	104	161
City of Grand Saline		39	73	99	137	185
City of Clarksville City	120	134	148	164	186	217
City of Lindale					101	374
City of Mineola	203	318	374	367	360	360
City of Winona						5
Blocker-Crossroads WSC	78	91	100	107	116	128
Crystal Systems Inc.				45	209	425
Liberty-Danville FWSD 2				1	17	40
Liberty City WSC				53	177	353
Lindale Rural WSC					77	189
Star Mountain WSC				1	36	83
Starrville-Friendship WSC				19	54	101
Steam Electric	8639	12366	14457	18858	26591	36816
Talley WSC	48	66	80	89	22	116
West Gregg SUD			56	119	208	333

4.3 SUMMARY OF NEEDS – WHOLESALE WATER PROVIDERS

The following section presents the supply/demand analysis for the 17 wholesale water providers in the North East Texas Region that sell more than 1000 acre-feet in any one year. Tables present the total water supply for each major water provider assuming that current contracts, permits, and water rights are held constant. Demands are comprised of current contract amounts unless an entity's projected demand exceeds the contract amount sometime in the future. Where projected demand exceeds the contract amount, a notation has been made, and the estimated demand has been entered. While this method does not take into account that entities may use alternate water sources rather than increase contracts, it gives major water providers a good idea of what future demands will be if all current users continue with existing supplies and contracts. Finally, the amount of surplus is noted.

4.3.1 Cash SUD

Cash SUD is a public water supply located primarily in Hunt County. The water supply corporation sells water to Aqua Texas, Inc., City of Lone Oak and City of Quinlan. In addition to meeting the needs of its retail customers, Cash 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 a water supply deficit of 1,015 ac-ft/yr around 2050 and increasing to 4,546 ac-ft/yr by 2060. Supplies and demands are shown in Table 4.20.

Table 4.20 Water Supplies and Demands for Cash SUD

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Lake Tawakoni	1622	1615	1607	1600	1593	1586
Lake Fork	3980	3963	3946	3929	3911	3894
Lake Lavon	1255	971	831	733	666	608
TOTAL	**6,857**	**6,549**	**6,384**	**6,262**	**6,170**	**6,088**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
Aqua Texas, Inc.	168	168	168	168	168	168
Lone Oak, City of	168	168	168	168	168	168
Quinlan, City of	605	605	605	605	605	605
Non-Contractual:						
Cash SUD	1,939	2,400	3,030	4,037	6,244	9,693
TOTAL	**2,880**	**3,341**	**3,971**	**4,978**	**7,185**	**10,634**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**3,977**	**3,208**	**2,413**	**1,284**	**-1,015**	**-4,546**

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. Assuming contract amounts stay constant over the planning period, Cherokee Water Company will have adequate supply, which is shown below in Table 4.21.

Table 4.21 Water Supplies and Demands for Cherokee Water Company

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Lake Cherokee	18,000	18,000	18,000	18,000	18,000	18,000
TOTAL	**18,000**	**18,000**	**18,000**	**18,000**	**18,000**	**18,000**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
City of Longview	16,000	16,000	16,000	16,000	16,000	16,000
Steam Electric	2,000	2,000	2,000	2,000	2,000	2,000
TOTAL	**18,000**	**18,000**	**18,000**	**18,000**	**18,000**	**18,000**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

4.3.3 City of Commerce (Commerce Water District)

Commerce, located in Hunt County, buys most of its water from the Sabine River Authority. Additional supply is from five wells into the Nacatoch Aquifer with a total yield of 315 ac-ft/yr in 2010 and 295 ac-ft/yr in 2060. The city also has a contract with 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 WSC, West Delta WSC, Maloy WSC, and Gafford Chapel WSC. In addition, Commerce serves its own municipal needs. Commerce is projected to have a water surplus of 6,228 ac-ft in 2010 and 1,486 ac-ft in 2060. Available supplies and demands are shown in Table 4.22.

Table 4.22 Water Supplies and Demands for City of Commerce

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Lake Tawakoni	7,750	7,615	7,457	7,246	6,804	6,148
Nacatoch Aquifer	315	315	295	295	295	295
TOTAL	**8,065**	**7,930**	**7,752**	**7,541**	**7,099**	**6,443**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
North Hunt WSC	147	147	147	147	147	147
West Delta WSC	74	74	74	74	74	74
Maloy WSC	34	34	34	34	34	34
Gafford Chapel WSC	-	-	-	-	-	-
Non-Contractual:						
Manufacturing	129	129	129	129	129	129
Commerce Municipal	1,418	1,503	1,644	1,862	2,397	3,248
TOTAL	**1,837**	**1,996**	**2,235**	**2,603**	**3,519**	**4,967**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**6,228**	**5,934**	**5,517**	**4,938**	**3,580**	**1,486**

4.3.4 City of Emory

This provider supplies South Rains Water Supply Corporation and City of East Tawakoni. In addition, the city serves its own municipal needs. The City of Emory buys water from the Sabine River Authority. Current contract with the authority is for 2,016 ac-ft/year. Emory is projected to have a water surplus of 649 ac-ft in 2010 and 468 ac-ft in 2060. Available supplies and demands are shown in Table 4.23.

Table 4.23 Water Supplies and Demands for City of Emory

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Lake Tawakoni	1,901	1,887	1,873	1,859	1,845	1,832
TOTAL	**1,901**	**1,887**	**1,873**	**1,859**	**1,845**	**1,832**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
South Rains WSC	265	265	265	265	265	265
City of East Tawakoni	773	773	773	773	773	773
Non-Contractual:						
Emory Municipal	214	235	257	277	301	326
TOTAL	**1,252**	**1,273**	**1,295**	**1,315**	**1,339**	**1,364**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**649**	**614**	**578**	**544**	**506**	**468**

4.3.5 Franklin County Water District

The Franklin County Water District (FCWD) holds water rights in Lake Cypress Springs of 11,710 ac-ft, which exceeds the safe yield estimated for the reservoir by the Cypress Basin Water Availability Model. FCWD serves wholesale customers only, and these customers include Cypress Springs SUD, the City of Mount Vernon, the City of Winnsboro and Cypress Springs Country Club. These wholesale customers hold water supply contracts which expire in 2024 or 2040. FCWD is projected to have a deficit beginning 2010, which is shown in Table 4.24, based upon the Cypress Creek water availability model and using recent hydrographic survey data developed by the TWDB. Franklin County Water District has requested additional analysis to determine if the current data accurately reflects the capacity of the reservoir, which is beyond the scope of this plan.

The overallocation shown for Franklin County Water District in Table 4.24 results from the FCWD having contracted an amount in excess of the safe yield of its source, Lake Cypress Springs. The result is that the FCWD could not presently fulfill its contractural obligation to all of its wholesale customers simultaneously. However, the projected actual needs of the individual customers are less than the contracted amounts such that the FCWD can meet projected demands for the planning period. No physical strategy has been recommended at this time pending further analysis of the need by the FCWD.

Table 4.24 Water Supplies and Demands for Franklin County Water District

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Lake Cypress Springs	10,737	10,497	10,257	10,017	9,777	9,537
TOTAL	**10,737**	**10,497**	**10,257**	**10,017**	**9,777**	**9,537**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
Cypress Springs SUD	3,500	3,500	3,500	3,500	3,500	3,500
City of Mt. Pleasant	3,598	3,598	3,598	3,598	3,598	3,598
City of Mount Vernon	3,000	3,000	3,000	3,000	3,000	3,000
City of Winnsboro	4,832	4,832	4,832	4,832	4,832	4,832
TOTAL	**14,930**	**14,930**	**14,930**	**14,930**	**14,930**	**14,930**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**-4,193**	**-4,433**	**-4,673**	**-4,913**	**-5,153**	**-5,393**

4.3.6 Lamar County Water Supply District

Lamar County Water Supply District (LCWSD) buys water from the City of Paris, the source being Lake Crook and Pat Mayse Lake. The water district supplies water to 410 WSC, Red River WSC, the City of Blossom, Deport, Roxton, Reno, Toco, and Detroit, and the Pattonville WSC, Manufacturing and its own retail needs. None of the LCWSD customers has been projected to experience a supply shortage during the 2010 to 2060 planning period. As shown in Table 4.25, LCWSD has a water supply surplus.

Table 4.25 Water Supplies and Demands for Lamar County Water Supply District

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Pat Mayse Lake	18,795	18,795	18,795	18,795	18,795	18,795
TOTAL	**18,795**	**18,795**	**18,795**	**18,795**	**18,795**	**18,795**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
410 WSC	252	249	246	243	243	243
Red River WSC	184	184	184	184	184	184
Blossom	201	216	230	245	245	245
Deport	100	107	113	120	120	120
Roxton	97	104	111	118	118	118
Pattonville WSC	184	184	184	184	184	184
Reno	557	628	699	754	814	873
Toco	12	12	12	12	12	12
Detroit	40	41	41	41	41	41
Non-Contractual:						
Manufacturing	18	18	18	18	18	18
Lamar County WSD	1,996	2,087	2,198	2,324	2,271	2,218
TOTAL	**3,641**	**3,830**	**4,037**	**4,244**	**4,251**	**4,257**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**15,154**	**14,965**	**14,758**	**14,551**	**14,544**	**14,538**

4.3.7 Northeast Texas Municipal Water District

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, which is shown in Table 4.26.

Table 4.26 Water Supplies and Demands for Northeast Texas Municipal Water District

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Lake O' The Pines	174,960	174,960	174,960	174,960	174,960	174,960
Lake Bob Sandlin	12,000	12,000	12,000	12,000	12,000	12,000
Water Stored Above Lake O' The Pines	6,909	6,909	6,909	6,909	6,909	6,909
TOTAL	**193,869**	**193,869**	**193,869**	**193,869**	**193,869**	**193,869**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
Avinger	1,116	1,116	1,116	1,116	1,116	1,116
Daingerfield	7,606	7,606	7,606	7,606	7,606	7,606
Hughes Springs	4,158	4,158	4,158	4,158	4,158	4,158
Jefferson	7,031	7,031	7,031	7,031	7,031	7,031
Lone Star	3,482	3,482	3,482	3,482	3,482	3,482
Longview	20,000	20,000	20,000	20,000	20,000	20,000
Marshall	9,000	9,000	9,000	9,000	9,000	9,000
Ore City	1,994	1,994	1,994	1,994	1,994	1,994
Pittsburg	10,347	10,347	10,347	10,347	10,347	10,347
Harleton WSC	55	55	55	55	55	55
Mims WSC	801	801	801	801	801	801
Tryon Road SUD	2,263	2,263	2,263	2,263	2,263	2,263
Diana SUD	739	739	739	739	739	739
NETMWD South Side	775	775	775	775	775	775
Manufacturing	32,400	32,400	32,400	32,400	32,400	32,400
Steam Electric*	46,668	46,668	46,668	46,668	46,668	46,668
TOTAL	**148,435**	**157,268**	**157,268**	**157,268**	**157,268**	**157,268**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**45,434**	**45,434**	**45,434**	**45,434**	**45,434**	**45,434**

* This number is an aggregate of various contracts and does not match the TWDB Database 2012 (DB12) numbers.

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.

Several of the Sabine River Authority's customers have water shortages, all caused by contract expiration or inadequate contract amounts. Approximately 79 percent of the firm water supply in both Lake Fork and Lake Tawakoni is committed to entities in Regions C and I as noted in Table 4.27.

Table 4.27 Water Supplies and Demands for Sabine River Authority

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Lake Tawakoni	229,807	228,093	226,380	224,667	222,953	221,240
Lake Fork	173,035	171,820	170,605	169,390	168,175	166,960
TOTAL	**402,842**	**399,913**	**396,985**	**394,057**	**391,128**	**388,200**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
Bright Star-Salem	840	840	840	840	840	840
Commerce	8,094	8,033	7,973	7,913	7,852	7,792
Edgewood	793	787	781	776	770	764
Emory	1,901	1,887	1,873	1,859	1,845	1,832
Greenville	20,515	20,363	20,210	20,057	19,904	19,751
Quitman	1,026	1,019	1,012	1,004	997	990
Kilgore	6,270	6,230	6,190	6,151	6,112	6,073
Longview	18,321	18,192	18,064	17,935	17,807	17,678
Point	422	419	416	413	410	407
West Tawakoni	1,080	1,072	1,064	1,056	1,047	1,039
Wills Point	2,112	2,097	2,081	2,066	2,050	2,035
Ables Springs WSC	1,120	1,120	1,120	1,120	*1,120	1,120
Cash SUD	5,602	5,578	5,556	5,529	*5,504	*5,480
Combined Consumers SUD	1,668	1,656	1,645	1,633	*1,622	1,610
Mac Bee SUD	2,159	2,143	2,127	2,111	2,095	2,079
South Tawakoni WSC	1,056	1,048	1,041	1,033	1,025	1,018
Mining (TXU)**	10,993	10,915	10,838	10,761	10,684	10,607
Other Regions	315,664	313,330	310,943	308,661	307,448	303,491
Manufacturing	3,206	3,184	3,161	3,139	3,116	3,094
TOTAL	**402,842**	**399,913**	**396,985**	**394,057**	**391,128**	**388,200**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

* Needs a contract increase to meet projected demand.

**Luminant has released this water back to SRA, and is currently being redistributed to various SRA customers.

4.3.9 Sulphur River Municipal Water District

The Sulphur River Municipal Water District Authority (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. Current WAM runs show Cooper Reservoir as having a firm yield of 127,983 ac-ft/yr. The amounts of water allocated to each city are given in Table 4.28.

Table 4.28 Water Supplies and Demands for Sulphur River Municipal Water District

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Cooper Reservoir	33,255	32,870	32,468	32,040	31,556	30,936
TOTAL	**33,255**	**32,870**	**32,468**	**32,040**	**31,556**	**30,936**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
Commerce	13,679	13,520	13,355	13,179	12,980	12,725
Cooper	6,839	6,760	6,678	6,590	6,490	6,362
Sulphur Springs	12,737	12,589	12,435	12,271	12,086	11,849
TOTAL	**33,255**	**32,870**	**32,468**	**32,040**	**31,556**	**30,936**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

4.3.10 Titus County Fresh Water Supply District (TCFWSD) No.1

This entity supplies the City of Mount Pleasant and Texas Utilities with water from Lake Bob Sandlin. TCFWSD has no uncommitted water supply in Lake Bob Sandlin. No shortages are projected for this system as shown in Table 4.29.

Table 4.29 Water Supplies and Demands for Titus County Fresh Water Supply District

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Lake Bob Sandlin	48,500	48,500	48,500	48,500	48,500	48,500
TOTAL	**48,500**	**48,500**	**48,500**	**48,500**	**48,500**	**48,500**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
Mt. Pleasant	10,000	10,000	10,000	10,000	10,000	10,000
Luminant	38,500	38,500	38,500	38,500	38,500	38,500
TOTAL	**48,500**	**48,500**	**48,500**	**48,500**	**48,500**	**48,500**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**0**	**0**	**0**	**0**	**0**	**0**

4.3.11 City of Greenville

Greenville owns several small city lakes, which have a combined firm yield of 3,486 ac-ft. In addition, Greenville has a contract with the Sabine River Authority for 20,997 ac-ft/yr of supply from Lake Tawakoni. This contract with Sabine River Authority expires in 2013, but it is assumed in this plan to be renewed until 2060. 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. Jacobia WSC currently has a contract with Greenville for 338 ac-ft, but the WSC's demand will exceed that amount by 2050. As shown in Table 4.30, Greenville has a water supply surplus. However, a large steam electric power plant proposed north of Greenville would consume all of this surplus, and more. This need has been shown in the category "Steam Electric – Hunt County".

Table 4.30: Water Supplies and Demands for the City of Greenville

SUPPLIES (ac-ft)	2010	2020	2030	2040	2050	2060
Lake Tawakoni	20,515	20,363	20,210	20,057	19,904	19,751
City Lakes	3,486	3,486	3,486	3,486	3,486	3,486
TOTAL	**24,001**	**23,849**	**23,696**	**23,543**	**23,390**	**23,237**

DEMANDS (ac-ft)	2010	2020	2030	2040	2050	2060
Contractual:						
Caddo Mills	174	178	186	201	242	309
Jacobia WSC	338	338	338	338	*338	338
Shady Grove WSC	562	562	562	562	562	*562
Non-Contractual:						
Manufacturing	532	694	862	1,043	1,216	1,335
Mining	20	19	20	23	24	29
Greenville Municipal	5,555	5,641	5,750	6,009	6,737	7,915
TOTAL	**7,181**	**7,432**	**7,718**	**8,176**	**9,119**	**10,488**

SURPLUS (ac-ft)	2010	2020	2030	2040	2050	2060
TOTAL	**16,821**	**16,417**	**15,979**	**15,367**	**14,272**	**12,750**

* Needs a contract increase to meet projected demand.

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. Shortages in this system are caused by contractual inadequacies. Leigh and Talley WSC deficits are a matter of inadequate supply but both plan to develop additional groundwater. However, in the case of Cypress Valley WSC and Talley WSC, water is purchased from Marshall though there is no formal contract in place. Marshall is projected to have a surplus of approximately 75 percent of its total water supply, which is shown in Table 4.31.

Table 4.31 Water Supplies and Demands for the City of Marshall

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Big Cypress Bayou	16,000	16,000	16,000	16,000	16,000	16,000
Lake O' The Pines	9,000	9,000	9,000	9,000	9,000	9,000
TOTAL	**25,000**	**25,000**	**25,000**	**25,000**	**25,000**	**25,000**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
Cypress Valley WSC	5	5	5	5	5	5
Talley WSC	5	5	5	5	5	5
Gill WSC	100	100	100	100	100	100
Leigh WSC	184	184	184	184	184	184
Non-Contractual:						
Marshall Municipal	3,257	3,213	3,186	3,206	3,229	3,265
Manufacturing	2,000	2,000	2,000	2,000	2,000	2,000
TOTAL	**5,551**	**5,507**	**5,480**	**5,500**	**5,523**	**5,559**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**19,449**	**19,493**	**19,520**	**19,500**	**19,477**	**19,441**

4.3.13 City of Longview

The City of Longview purchases supply from Northeast Texas Municipal Water District (NETMWD), Cherokee Water Co., SRA, and owns water rights on Big Sandy Creek and Sabine River. Shortages in this system are contractual. Table 4.32 shows the Longview system is projected to have a supply surplus throughout the planning period of approximately 68 percent of total available supply. Shortages in this system are caused mainly by contractual expirations, with one contractual inadequacy.

Table 4.32 Water Supplies and Demands for the City of Longview

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Cherokee Water Company	16,000	16,000	16,000	16,000	16,000	16,000
NETMWD	20,000	20,000	20,000	20,000	20,000	20,000
Big Sandy Creek	1,120	1,120	1,120	1,120	1,120	1,120
Sabine River Authority	20,000	20,000	20,000	20,000	20,000	20,000
Sabine River ROR	19,337	19,337	19,337	19,337	19,337	19,337
Reuse	6,161	6,161	6,161	6,161	6,161	6,161
TOTAL	**82,618**	**82,618**	**82,618**	**82,618**	**82,618**	**82,618**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
Hallsville	737	737	737	737	737	737
White Oak	1,120	1,120	1,120	1,120	1,120	1,120
Elderville WSC	737	737	737	737	737	737
Gum Springs WSC	1,105	1,105	1,105	1,105	1,105	1,105

Steam Electric	6,161	6,161	6,161	6,161	6,161	6,161
Non-Contractual:						
Longview Municipal	10,671	10,812	11,029	11,397	12,149	13,225
Manufacturing	5,300	6,360	7,420	8,480	9,540	10,600
TOTAL	**25,831**	**27,032**	**28,309**	**29,737**	**31,549**	**33,685**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**56,787**	**55,586**	**54,309**	**52,881**	**51,069**	**48,933**

4.3.14 City of Mount Pleasant

Mount Pleasant has water rights in Lake Cypress Springs of 3,598 ac-ft. The city has a contract with Titus County Freshwater Supply District for 10,000 ac-ft from Lake Bob Sandlin. Finally, Mount Pleasant has water rights in Lake Tankersley of 3,000 ac-ft, bringing the city's total available supply to 16,598 ac-ft. 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 Water Supply Corporation 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 6,353 ac-ft in 2010 and reducing to a surplus of 3,487 ac-ft by 2060, as shown in Table 4.33.

Table 4.33 Water Supplies and Demands for the City of Mount Pleasant

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Lake Tankersley	3,000	3,000	3,000	3,000	3,000	3,000
Lake Cypress Springs	3598	3,598	3,598	3,598	3,598	3,598
Lake Bob Sandlin	10,000	10,000	10,000	10,000	10,000	10,000
TOTAL	**16,598**	**16,598**	**16,598**	**16,598**	**16,598**	**16,598**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
Tri SUD	1,469	1,612	1,767	1,869	1,962	2,047
Winfield	153	153	153	153	153	153
Manufacturing	5,507	5,678	5,807	5,936	6,132	6,598
Non-Contractual:						
Mount Pleasant Municipal	3,116	3,349	3,543	3,788	4,039	4,313
TOTAL	**10,245**	**10,792**	**11,270**	**11,746**	**12,286**	**13,111**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**6,353**	**5,806**	**5,328**	**4,852**	**4,312**	**3,487**

4.3.15 City of Paris

The City of Paris, Lamar County, has water rights in Lake Crook of 7,920 ac-ft/yr, and in Pat Mayse Lake of 61,612 ac-ft/yr. The safe yield from Pat Mayse Lake is estimated as 59,750 ac-ft in 2010 and 58,000 ac-ft in 2060. This estimate is taken from the previous water plans, and is not based upon the WAM for the Red River Basin, because the WAM is still undergoing TCEQ review. 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. Currently, Paris has almost 65 percent of its total available supply in use or contracted. As shown in Table 4.34, it is expected that 72 percent of the City's supply will be in use by 2060.

Table 4.34 Water Supplies and Demands for the City of Paris

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Pat Mayse Lake	59,670	59,670	59,670	59,670	59,670	59,670
Lake Crook	7,290	7,290	7,290	7,290	7,290	7,290
TOTAL	**66,960**	**66,960**	**66,960**	**66,960**	**66,960**	**66,960**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
Lamar County WSD	10,642	10,642	10,642	10,642	10,642	10,642
M J C WSC	81	85	90	95	95	95
Steam Electric	11,538	11,538	11,538	11,538	11,538	20,499
Manufacturing (Campbell)	8,961	8,961	8,961	8,961	8,961	8,961
Non-Contractual:						
Manufacturing	1,210	7,057	7,057	7,617	7,617	8,401
Paris Municipal	6,252	6,628	6,960	7,277	7,239	7,239
TOTAL	**38,684**	**44,911**	**45,248**	**46,130**	**46,092**	**55,837**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**28,276**	**22,049**	**21,712**	**20,830**	**20,868**	**11,123**

4.3.16 City of Sulphur Springs

Sulphur Springs, located in Hopkins County, has two sources of water supply. Lake Sulphur Springs has a firm yield of 9,800 ac-ft/yr. The city has a contract with the Sulphur River Municipal Water District (SRMWD) for 14,898 ac-ft/yr of supply from the Cooper Reservoir, available for the life of the reservoir. Current WAM runs show Cooper reservoir as having a firm yield of 127,983 ac-ft/yr, which is a reduction of approximately 13% from the round one regional water planning estimates. The supply from the SRMWD was proportioned to reflect the reduction in reservoir yield. Sulphur Springs currently has a surplus totaling 68 percent of total available supply. By 2060, the surplus decreases to 56 percent. Available supplies and demands are shown in Table 4.35.

Table 4.35 Water Supplies and Demands for the City of Sulphur Springs

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Cooper Lake	12,737	12,589	12,435	12,271	12,086	11,849
Lake Sulphur Springs	9,800	9,800	9,800	9,800	9,800	9,800
TOTAL	**22,537**	**22,389**	**22,235**	**22,071**	**21,886**	**21,649**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
Brashear WSC	133	146	152	155	142	131
Brinker WSC	34	34	34	34	34	34
Gafford Chapel	71	86	93	97	82	68
Martin Springs WSC	223	223	223	223	223	223
North Hopkins WSC	640	719	766	797	737	676
Pleasant Hill WSC	31	34	36	37	33	31
Shady Grove WSC #2	79	87	91	93	85	78
Non-Contractual:						
Manufacturing	1,039	1,111	1,168	1,222	1,268	1,357
Livestock	1,417	1,474	1,551	1,720	1,730	1,914
Sulphur Springs Municipal	3,511	3,771	4,061	4,320	4,620	4,945
TOTAL	**7,179**	**7,685**	**8,175**	**8,698**	**8,954**	**9,456**

SURPLUS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
TOTAL	**15,358**	**14,704**	**14,061**	**13,374**	**12,932**	**12,193**

4.3.17 City of Texarkana (Texarkana Water Utilities)

Texarkana Water Utilities supplies Texarkana, Texas, and Texarkana, Arkansas. There is supply and demand in both states. For planning purposes, it has been assumed that water supply from Arkansas will meet Arkansas demand. Therefore, supply and demands in Table 4.36 only consider Texarkana, Texas.

Texarkana, Texas supply comes from Lake Wright Patman through a contract with the U.S. Corps of Engineers. The TCEQ water rights permits in Wright Patman total 180,000 ac-fy/yr. Demands come from three counties and are as follows: Texarkana municipal and manufacturing, 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 WSC, City of Red Lick, Park Terrace MHP and manufacturing in Cass County. The Federal Correctional Institution is actually a commercial customer but is being treated as a separate entity for the purposes of this plan. In Table 3.36 a number of entities are denoted by an asterisk. These entities will require a contract increase to meet projected demands during the planning period. Renegotiation of these contracts would negatively impact the "surplus" shown in Table 3.36.

The contractual category "Manufacturing-Cass" includes International Paper, The non-contractual category "Manufacturing-Cass" represents the difference between the contractual requirement and TWDB projections for manufacturing in Cass County.

Table 4.36 Water Supplies and Demands for the City of Texarkana

SUPPLIES (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Lake Wright Patman	180,000	180,000	180,000	180,000	180,000	180,000
TOTAL	**180,000**	**180,000**	**180,000**	**180,000**	**180,000**	**180,000**

DEMANDS (ac-ft/yr)	2010	2020	2030	2040	2050	2060
Contractual:						
DeKalb	471	471	471	471	471	471
Hooks	*463	463	463	463	463	463
Maud	144	153	161	168	168	168
Nash	303	323	339	355	355	355
New Boston	*1,090	1,090	1,090	1,090	1,090	1,090
Redwater	147	*147	147	147	147	147
Wake Village	*359	359	359	359	359	359
Central Bowie WSC	*442	442	442	442	442	442
Macedonia-Eylau MUD #1	*552	552	552	552	552	552
Oak Grove WSC	*74	74	74	74	74	74
Atlanta	1,878	1,878	1,878	1,878	1,878	1,878
Queen City	633	633	633	633	633	633
Domino	55	55	55	*85	96	104
Annona	68	68	68	68	68	68
Avery	92	92	92	92	92	92
Red River WSC	68	68	68	68	68	68
Manufacturing Cass	120,000	120,000	120,000	120,000	120,000	120,000
Park Terrace MHP	2	2	2	2	2	2
Red Lick	129	135	139	143	142	142
Non-Contractual:						
Manufacturing Bowie	2,259	2,515	2,733	2,944	3,125	3,379
Fed. Correctional Institution	257	268	274	279	274	271
Texarkana Municipal	6,472	6,767	6,952	7,124	7,075	7,075
TOTAL	**135,958**	**136,555**	**136,992**	**137,437**	**137,574**	**137,833**
SURPLUS (ac-ft/yr)	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
	44,042	43,445	43,008	42,563	42,426	42,167

* Needs a contract increase to meet projected demand.

4.4 WATER SURPLUSES IN THE NORTH EAST TEXAS REGION

Table 4.37 lists the entities within the North East Texas Region, which 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. If a City serves customers outside of the City Limits they will have a county other component with the same name under "county other". Some WUGS are split by county, basin, or regional boundaries and will require a summation of the component pieces to arrive at a complete total of water supplies and demands. WUGs split by County lines are denoted with a "(P)" after the entity, which represents a partial listing.

Table 4.37 Water Surpluses in the North East Texas Region
Total Water Supply Surplus in ac-ft/yr

Bowie County	2010	2020	2030	2040	2050	2060
De Kalb	180	169	160	146	146	146
Leary	-	-	-	-	-	-
Maud	-	-	-	-	-	-
Nash	-	-	-	-	-	-
Red Lick	-	-	-	-	-	-
Red River County WSC	-	-	-	-	-	-
Redwater	1	-	-	-	-	-
Texarkana	-	-	-	-	-	-
COUNTY OTHER:						
Cody's MHP	2	2	2	3	3	3
El Chaparral MHP	39	39	40	40	41	41
Red River Redevelopment Authority	1617	1070	525	-	-	-
Self Supplied	-	-	-	-	-	-
Woodland Estates	124	124	125	125	125	125
Irrigation	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Total	**346**	**334**	**327**	**314**	**315**	**315**

Total Water Supply Surplus in ac-ft/yr

Camp County	2010	2020	2030	2040	2050	2060
Pittsburg	1,455	1,421	1,387	1,365	1,339	1,305
Bi-County WSC	57	-	-	-	-	-
Sharon WSC	2	1	-	-	-	-
COUNTY OTHER:						
Cherokee Point WC	54	52	51	50	49	48
HAB WSC	17	18	18	18	18	18
Newsome WSC	59	52	46	41	37	32
Self Supplied	-	-	-	-	-	-
Thunderbird WS	14	14	15	15	15	15
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Total	**1,713**	**1,613**	**1,572**	**1,544**	**1,513**	**1,473**

Total Water Supply Surplus in ac-ft/yr

Cass County	2010	2020	2030	2040	2050	2060
Atlanta	548	515	490	461	468	468
Hughes Springs (P)	4085	4074	4066	4056	4058	4058
Linden	154	148	145	140	143	143
Queen City	402	397	397	394	396	396
COUNTY OTHER:						
Atlanta State Rec. Area	90	90	90	90	90	90
Avinger	1464	1460	1456	1453	1453	1453
Bloomberg WSC	53	50	46	43	43	43
Domino	18	17	15	14	14	14
Douglassville	4	3	2	2	2	2
East Marion County WSC	8	7	5	4	4	4
Green Hills Subdivision	12	12	12	12	12	12
Hughes Springs (P)	92	92	92	92	92	92
Marietta WSC	35	34	32	31	31	31
Mims WSC	161	160	158	157	157	157
Spring Valley Subdiv.	11	11	11	11	11	11
Whispering Pines MHP	5	5	5	5	5	5
Whispering Pines Subdiv.	10	10	10	10	10	10
Total	**6,998**	**6,937**	**6,887**	**6,835**	**6,846**	**6,846**

Total Water Supply Surplus in ac-ft/yr

Delta County	2010	2020	2030	2040	2050	2060
Cooper	1,299	1,252	1,207	1,162	1,141	1,109
North Hunt WSC	55	47	38	27	16	0
COUNTY OTHER:						
Ben Franklin WSC	55	53	-	-	-	-
Charleston WSC	33	26	18	7	7	7
Enloe-Lake Creek WSC	-	-	-	-	-	-
Lone Star WSC	-	-	-	-	-	-
Pecan Gap	-	-	-	-	-	-
Self Supplied	-	-	-	-	-	-
West Delta WSC	17	9	0	-	-	-
Irrigation	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Total	**1,459**	**1,387**	**1,269**	**1,196**	**1,164**	**1,116**

Total Water Supply Surplus in ac-ft/yr

Franklin County	2010	2020	2030	2040	2050	2060
Mount Vernon	2,603	2,551	2,521	2,489	2,493	2,493
Winnsboro	830	811	798	786	788	788
Cypress Springs SUD	2,030	1914	1838	1765	1765	1765
COUNTY OTHER:						
Dear Cove POA WS	3	3	3	3	3	3
Pelican Bay	0	0	0	0	0	0
Self Supplied	-	-	-	-	-	-
Tri WSC	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Total	**5,466**	**5,279**	**5,160**	**5,043**	**5,049**	**5,049**

Total Water Supply Surplus in ac-ft/yr

Gregg County	2010	2020	2030	2040	2050	2060
Clarksville City	141	-	-	-	-	-
Easton	163	150	136	121	100	11
Elderville WSC	1047	995	942	880	797	313
Gladewater	35	41	52	58	56	50
Kilgore	1610	1542	1465	1374	1216	974
Lakeport	301	28	257	231	177	25
Liberty City WSC	192	116	38	-	-	-
Longview	25991	25843	25620	25249	24497	17821
Tryon Road SUD	3086	3015	2947	2871	2752	2567
West Gregg SUD	34					
White Oak	2131	2053	1976	1887	1743	1524
COUNTY OTHER:						
C & C Mobile Home Park	5	5	6	6	6	6
Clarksville City	6	5	5	4	3	2
East Mountain	-	-	-	-	-	-
E-J Water Company	14	15	15	16	16	16
Forest Lake Est. of Lgv.	24	24	24	24	24	24
Garden Acres Subdivision	45	46	46	46	46	46
Gladewater	26	24	21	19	14	8
Glenwood WSC	531	506	490	479	470	455
Gregg County Airport	-	-	-	-	-	-
Kilgore	76	71	66	61	53	41
Liberty-Danville FWSD 2	27	19	9	-	-	-
Sabine ISD	-	-	-	-	-	-
Self-Supplied	-	-	-	-	-	-
Starrville-Friendship WSC	51	43	34	25	11	-
Sun Acres Mobile Home Park	-	-	-	-	-	-
Warren City	121	116	110	104	95	81
White Oak	9	8	7	6	5	2
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Steam Electric	773	1022	857	655	409	110
Total	**36,439**	**35,687**	**34,356**	**34,116**	**32,490**	**24,076**

Total Water Supply Surplus in ac-ft/yr

Harrison County	2010	2020	2030	2040	2050	2060
Diana WSC	1364	1360	1357	1355	1353	1349
Gill WSC	128	103	85	72	56	33
Gum Springs WSC	432	355	285	232	171	80
Hallsville	424	352	300	261	215	148
Longview	25292	25299	25305	25308	25308	14908
Marshall	10257	10301	10328	10308	10285	10249
Tryon Road SUD	188	182	178	176	173	166
Waskom	19	-	-	-	-	-
COUNTY OTHER:						
Big Oaks Mobile Home Park	-	-	-	-	-	-
Blocker-Crossroads WSC	-	-	-	-	-	-
Caddo Lake State Park	18	18	18	18	18	18
Caddo Lake WSC	10	-	-	-	-	-
Cypress Valley WSC	67	53	42	34	25	11
Elysian Fields WSC	37	29	22	18	12	4
Harleton WSC	208	177	155	138	118	89
Holiday Springs MHP	4	4	4	4	4	4
Karnack WSC	48	39	33	28	22	14
Leigh WSC	128	94	70	52	30	-
North Harrison WSC	74	61	51	44	35	23
Pinehill MHP	1	1	1	1	1	1
Rolling Acres MHP & Subdivision	26	26	26	26	26	26
Scottsville	36	25	17	11	3	
Shadowood Water Co.	32	32	32	32	32	32
Self-Supplied	-	-	-	-	-	-
Talley WSC	-	-	-	-	-	-
Waskom Rural WSC #1	33	23	16	10	4	-
West Harrison WSC	170	152	139	129	118	102
Irrigation	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	55,221	44,936	35,850	26,770	18,836	9,530
Mining	-	-	-	-	-	-
Steam Electric	6,993	5,593	2,238	-	-	-
Total	**101,216**	**89,215**	**76,552**	**64,027**	**56,845**	**36,787**

Total Water Supply Surplus in ac-ft/yr

Hopkins County	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Cash SUD	-	-	-	-	-	-
Como	53	43	35	29	29	29
Sulphur Springs	15,358	14,704	14,061	13,374	12,932	12,193
Cumby	40	32	26	22	23	23
Cypress Springs SUD	378	365	358	355	368	379
Martin Springs WSC	236	193	172	160	203	242
North Hopkins WSC	281	202	155	124	184	245
Sharon WSC	3	2	1	-	-	-
COUNTY OTHER:						
Brashear WSC	-	-	-	-	-	-
Brinker WSC	44	20	8	2	27	50
Cornersville WSC	104	90	84	80	94	106
Gafford Chapel WSC	-	-	-	-	-	-
Jones WSC	1	-	-	-	-	1
Lake Fork WSC	23	22	22	21	23	24
Miller Grove WSC	15	6	-	-	-	-
Pickton WSC	16	7	3	1	9	17
Pleasant Hill WSC #2	-	-	-	-	-	-
Self Supplied	-	-	-	-	-	-
Shady Grove WSC #2	-	-	-	-	-	-
Shirley WSC	39	21	12	7	25	42
Irrigation	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Total	**16,591**	**15,707**	**14,937**	**14,175**	**13,917**	**13,350**

Total Water Supply Surplus in ac-ft/yr

Hunt County	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Campbell	11	5	-	-	-	-
Celeste	88	79	67	47	4	-
Commerce	6,629	6,409	6,110	5,682	4,705	3,197
Greenville	16,821	16,417	15,979	15,367	14,272	12,750
Loan Oak	96	97	97	97	97	97
Quinlan	428	427	425	423	418	410
West Tawakoni	769	730	700	667	627	588
Able Springs WSC	75	57	41	15	-	-
Blackland WSC	-	-	-	-	-	-
Caddo Basin SUD	-	-	-	-	-	-
Caddo Mills	-	-	-	-	-	-
Cash SUD	3,421	2,686	1,922	776	-	-
Combined Consumers SUD	453	191	-	-	-	-
Community WC	110	95	97	99	100	100
Mac Bee WSC	57	44	27	-	-	-
North Hunt WSC	5	-	-	-	-	-
Josephine	-	-	-	-	-	-
Hickory Creek SUD	229	139	11	-	-	-
Wolfe City	15	9	-	-	-	-
COUNTY OTHER:						
Aquasource Co. - Barrow Subdivision	12	12	12	12	12	12
Aquasource Co. – Country Wood Estates	183	183	183	183	183	183
Aquasource Co. – Crazy Horse Rancheros	50	51	51	51	51	51
Aquasource Co. – Quinlan North Subd.	12	13	13	13	13	13
Aquasource Co. – Quinlan South Subd.	21	20	20	20	20	20
BHP WSC	-	-	-	-	-	-
Jacobia WSC	212	184	142	72	-	-
Lone Star WSC	-	-	-	-	-	-
Miller Grove WSC	-	-	-	-	-	-
Poetry WSC	3	0	0	0	0	0
Self Supplied	-	-	-	-	-	-
Shady Grove WSC	403	367	314	226	29	0
West Oaks Phoenix Corp. Water System	4	4	4	4	4	4
West Leonard WSC	2	1	-	-	-	-
Whisper Oaks Water Co-op	17	17	17	17	17	17
Hunt County cont.	2010	2020	2030	2040	2050	2060
Irrigation	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Total	**30,171**	**28,237**	**26,232**	**23,771**	**20,552**	**17,442**

Total Water Supply Surplus in ac-ft/yr

Lamar County	2010	2020	2030	2040	2050	2060
Blossom	-	-	-	-	-	-
Deport	-	-	-	-	-	-
Paris	28,001	26,702	25,774	24,826	24,369	23,069
Lamar County WSD	15,166	14,977	14,770	14,563	14,556	14,549
Reno	-	-	-	-	-	-
Roxton	-	-	-	-	-	-
COUNTY OTHER:						
410 WSC	-	-	-	-	-	-
MJC WSC	3	-	-	-	-	-
Pattonville WSC	135	133	130	127	128	129
Self Supplied	-	-	-	-	-	-
Irrigation	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Steam Electric	7,178	3,021	-	-	-	-
Total	**50,483**	**44,833**	**40,674**	**39,516**	**39,053**	**37,747**

Total Water Supply Surplus in ac-ft/yr

Marion County	2010	2020	2030	2040	2050	2060
Diana SUD	5	5	5	5	5	5
Jefferson	10668	10671	10678	10685	10690	10690
COUNTY OTHER:						
C & C Waterworks	2	2	2	2	2	2
Crestwood	74	74	74	74	74	74
Diana SUD	26	26	26	26	26	26
East Marion WSC	102	100	100	100	100	100
Harleton WSC	21	21	21	21	21	21
Holiday Harbor WSC	79	79	79	79	79	79
Indian Hills Subdivision	109	109	109	109	109	109
Kellyville Berea WSC	3	2	2	2	2	2
Mims WSC	612	611	611	611	611	611
Ore City	95	95	95	95	95	95
Pine Harbor	58	58	58	58	58	58
Self-Supplied	-	-	-	-	-	-
Shady Shores	3	3	3	3	3	3
Tejas Village	2	2	2	2	2	2
Irrigation						
Livestock						
Manufacturing						
Steam Electric	6,130	6,601	6,288	5,906	5,441	4,873
Total	**17,989**	**18,459**	**18,153**	**17,778**	**17,318**	**16,750**

Total Water Supply Surplus in ac-ft/yr

Morris County	2010	2020	2030	2040	2050	2060
Bi-County WSC	38	38	38	38	38	38
Daingerfield (P)	9915	9924	9932	9940	9946	9946
Hughes Springs (P)	26	26	26	26	26	26
Lone Star	4574	4580	4585	4591	4595	4595
Naples	22	27	29	29	29	29
Omaha	58	62	65	69	71	71
Tri WSC	4	5	5	5	5	5
COUNTY OTHER:						
Daingerfield (P)	235	235	235	236	236	236
Holly Springs WSC	35	33	31	29	30	30
Hughes Springs (P)	928	929	930	932	932	932
Mims WSC	7	7	7	8	8	8
Self-Supplied	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	39,096	25,975	14,379	3,369	-	-
Mining						
Steam Electric	767	777	770	761	751	738
Total	**55,705**	**42,618**	**31,032**	**20,033**	**16,667**	**16,654**

Total Water Supply Surplus in ac-ft/yr

Rains County	2010	2020	2030	2040	2050	2060
East Tawakoni	377	356	336	315	293	270
Emory	648	613	577	543	505	467
Point	136	119	98	78	58	38
Bright Star-Salem WSC	1,018	925	868	854	857	866
Cash SUD	-	-	-	-	-	-
COUNTY OTHER:						
Cedar Cove Landing	6	6	6	6	6	6
Community Water Co.	7	2	0	0	0	0
Lone Oak	3	2	2	2	2	2
Miller Grove WSC	-	-	-	-	-	-
Self Supplied	-	-	-	-	-	-
Shirley WSC	22	6	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Total	**2,217**	**2,029**	**1,887**	**1,798**	**1,721**	**1,649**

Total Water Supply Surplus in ac-ft/yr

Red River County	2010	2020	2030	2040	2050	2060
Bogata	131	136	141	144	144	144
Clarksville	1237	1250	1263	1276	1285	1285
Deport	-	-	-	-	-	-
Detroit	-	-	-	-	-	-
Red River County WSC	71	71	71	71	71	71
COUNTY OTHER:						
410 WSC	-	-	-	-	-	-
Annona	18	20	21	22	22	22
Avery	6	6	7	8	8	8
Deport	-	-	-	-	-	-
Lamar County WSD	-	-	-	-	-	-
Oak Grove WSC	-	-	-	-	-	-
Self Supplied	-	-	-	-	-	-
Talco	10	10	10	10	10	10
Irrigation	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Steam Electric	-	-	-	-	-	-
Total	**1,402**	**1,422**	**1,442**	**1,460**	**1,469**	**1,469**

Total Water Supply Surplus in ac-ft/yr

Smith County	2010	2020	2030	2040	2050	2060
Crystal Systems, Inc.	267	185	101	20	-	-
Jackson WSC	2	4	6	8	10	13
Liberty City WSC	8	7	6	5	3	1
Lindale	446	330	213	99	-	-
Lindale Rural WSC	137	93	48	4	-	-
Overton	3	4	5	6	5	5
Smith County WCID #1	577	535	495	454	384	290
Southern Utilities Co.	96	1	17	26	74	87
Tyler	759	653	550	449	273	36
West Gregg SUD	11	-	-	-	-	-
Winona	11	9	10	10	5	-
COUNTY OTHER:						
Ben Wheeler WSC	-	-	-	-	-	-
Duck Creek WSC		3	28	57	75	79
Enchanted Lakes Water Co.	-	-	-	-	-	-
Garden Valley Golf Resort	155	155	155	155	155	155
Pine Ridge WSC	78	108	142	176	196	220
R-P-M WSC	-	-	-	-	-	-
Self-Supplied	-	-	-	-	-	-
Silver Leaf Vac. Club, Inc	388	391	396	399	399	399
Star Mountain WSC	52	33	16	-	-	-
Starrville-Friendship WSC	33	22	13	3	-	-
Twin Oaks Ranch Water Supply	18	16	15	13	9	5
Tyler State Park	61	61	61	61	61	61
Irrigation	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Total	**2,835**	**2,425**	**2,176**	**1,925**	**1,649**	**1,351**

Total Water Supply Surplus in ac-ft/yr

Titus County	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Mount Pleasant	6,353	5,806	5,328	4,852	4,312	3,487
Talco	420	420	420	420	420	420
Bi-County WSC	106	101	95	91	87	84
Cypress Springs SUD	35	33	32	31	30	29
Tri WSC	-	-	-	-	-	-
COUNTY OTHER:						
Lake Bob Sandlin State Park	3	3	3	3	3	3
Northeast Texas Community College	140	140	140	140	140	140
Self Supplied	-	-	-	-	-	-
Winfield	78	71	64	57	52	47
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Steam Electric	8,533	7,914				
Total	**15,668**	**14,488**	**6,082**	**5,594**	**5,044**	**4,210**

Total Water Supply Surplus in ac-ft/yr

Upshur County	2010	2020	2030	2040	2050	2060
Bi-County WSC	90	59	40	29	20	7
Diana SUD	181	143	120	107	96	81
East Mountain	163	162	153	143	137	127
Gilmer	5394	5330	5282	5256	5233	5194
Ore City	2699	2679	2668	2661	2655	2645
Pritchett WSC	278	215	175	152	134	108
Sharon WSC	102	83	71	64	59	51
Big Sandy	126	119	117	117	115	111
Gladewater	86	69	63	62	57	46
COUNTY OTHER:						
Ambassador College	141	142	142	142	142	142
Big Woods Springs Water System	20	21	21	21	22	22
Brookshire's Camp Joy	24	24	24	24	24	24
Clear Lakes Village Sub.	64	66	67	69	69	69
East Mountain	20	18	18	18	16	16
Fouke	1					
Gladewater	25	23	23	22	22	21
Glenwood WSC	93	70	56	48	42	32
Harmoney ISD	-	-	-	-	-	-
Tx Wtr Syst., Inc.-Country Club Estates	6	5	5	4	4	4
Tx Wtr Syst., Inc.-Friendship System 1	7	5	4	4	3	3
Tx Wtr Syst., Inc.-Rosewood System 2	25	23	22	21	20	19
Self-Supplied	-	-	-	-	-	-
Union Grove WSC	-	-	-	-	-	-
Warren City	64	64	64	64	64	63
White Oak	27	27	26	26	25	25
Irrigation	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Total	**9,636**	**9,347**	**9,161**	**9,054**	**8,959**	**8,810**

Total Water Supply Surplus in ac-ft/yr

Van Zandt County	2010	2020	2030	2040	2050	2060
Edgewood	720	711	700	691	680	669
Van	160	106	57	23	-	-
Wills Point	1,514	1,455	1,405	1,365	1,310	1,246
Able Springs WSC	5	4	4	3	3	2
Bethel-Ash WSC	0	0	0	0	0	0
Combined Consumers SUD	-	-	-	-	-	-
Mac Bee SUD	-	-	-	-	-	-
RPM WSC	110	81	59	43	19	-
South Tawakoni WSC	568	481	407	349	277	199
Canton	68	13	-	-	-	-
Grand Saline	5	-	-	-	-	-
COUNTY OTHER:						
Canton North Estates	32	32	32	32	32	32
Corinth WSC	56	37	21	10	0	0
Crooked Creek WSC	7	0	0	0	0	0
Golden WSC	95	85	77	71	63	54
Martin Mill WSC	15	12	9	7	4	2
Myrtle Springs WSC	-	-	-	-	-	-
Pruitt-Sandflat WSC	230	204	182	165	145	121
Self Supplied	-	-	-	-	-	-
Tall Oaks Estates WS	24	24	24	24	24	24
Texas Water Services, Inc. Callender Lake	22	22	22	22	22	22
Irrigation	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Total	**3,558**	**3,254**	**2,999**	**2,805**	**2,579**	**2,371**

Total Water Supply Surplus in ac-ft/yr (cont.)

Wood County	2010	2020	2030	2040	2050	2060
Cypress Springs SUD	54	52	51	51	51	51
Mineola	-	-	-	-	-	-
Pritchett WSC	1	1	1	1	1	1
Sharon WSC	174	122	93	91	91	91
Winnsboro	272	217	189	194	198	198
Bright Star-Salem WSC	41	18	6	4	4	4
Hawkins	793	755	736	738	740	740
Quitman	649	598	575	578	581	581
Ramey WSC	452	412	390	388	388	388
COUNTY OTHER:						
Alba	14	5	0	1	2	2
Big Woods Springs Water System	20	21	21	21	22	22
Clear Lakes Village Subdivision	64	66	67	69	69	69
Duck Creek WSC	-	-	-	-	-	-
Fouke WSC	203	147	119	125	131	131
Golden WSC	203	174	159	162	165	165
Hawkins	60	59	58	59	59	59
Holly Ranch Water Co.	134	88	66	71	75	75
Jarvis Christian College	255	245	240	241	242	242
Jones WSC	197	148	124	130	134	134
Lake Fork WSC	53	25	11	14	17	17
Mineola	-	-	-	-	-	-
New Hope WSC	159	136	124	127	129	129
Self-Supplied	-	-	-	-	-	-
Yantis	44	36	32	33	34	34
Irrigation	-	-	-	-	-	-
Livestock	-	-	-	-	-	-
Manufacturing	-	-	-	-	-	-
Mining	-	-	-	-	-	-
Total	**3,798**	**3,289**	**3,030**	**3,065**	**3,099**	**3,099**

4.5 EVALUATION AND SELECTION OF WATER MANAGEMENT STRATEGIES

The primary emphasis of the regional water supply planning process established by S.B. 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.

4.6 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 Texas Administrative Code, Chapter 357). With regard to recommendations for meeting identified water supply needs, the regional water plans are to include:

- Specific recommendations for meeting near-term needs (2010-2030) in sufficient detail to allow the TWDB and the Texas Commission on Environmental Quality (TCEQ) to make financial assistance or regulatory decisions with regard to the consistency of the proposed action with an approved regional water plan.

- Recommendations or alternative scenarios for meeting long term needs (2030-2060).

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, 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 Regional Water Planning Group determined to be potentially feasible. Strategies to be considered may include:

- Municipal water conservation and drought response planning, including demand management
- Reuse of waste water;
- Expanded use or acquisition of existing supplies including systems optimization and conjunctive use of resources;
- Reallocation of reservoir storage to new uses;
- Voluntary redistribution of water resources including water marketing, regional water banks, sales, leases, options, subordination agreements, and financing arrangements;
- Enhancements of yields of existing sources;
- Control of naturally occurring chlorides;
- Interbasin transfers;
- New supply development including construction and improvement of surface water resources;
- Brush control, precipitation enhancement, and desalinization;
- Water supply that could be made available by cancellation of water rights based on data; provided by the Texas Commission on Environmental Quality;
- Aquifer storage and recovery.

According to TWDB rules, each of the potentially feasible water management strategies are to be evaluated by considering:

- The quantity, reliability, and cost of water delivered and treated for the end user's requirements;
- Environmental factors including effects on environmental water needs, wildlife habitat, and cultural resources;

- Impacts on other water resources of the state including other water management strategies and groundwater / surface water interrelationships;
- Impacts of water management strategies on threats to agricultural and natural resources;
- Any other factors deemed relevant by the regional water planning group including recreational impacts;
- Equitable comparison and consistent application of all water management strategies the regional water planning group determines to be potentially feasible for each water supply need;
- Consideration of the provisions in Texas Water Code, Section 11.085(k)(1) for interbasin transfers; and
- Consideration of third party social and economic impacts resulting from voluntary redistributions of water.

TWDB rules also require the RWPGs to "…provide water management strategies to be used during a drought-of-record" and, for each source of supply within a region, identify:

- Factors specific to each source of water supply to be considered in determining whether to initiate a drought response; and
- Actions to be taken as part of the response.

The North East Texas Regional Water Planning Group approach to the evaluation of water management strategies focused on the estimated water supply yield, cost, and the anticipated environmental impact of each water management strategy. 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 in consideration of TWDB guidelines regarding interest rates, debt service, and other project costs (e.g., environmental studies, permitting, and mitigation). In addition to environmental considerations included in estimates of cost for each strategy, environmental impacts were considered and 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 aquifer, county, 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 purposes of this planning effort 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.

In general, most of the projected water supply needs within the North East Texas Region are associated with relatively small municipal water users and water supply systems in the rural "county-other" water user groups. Overall, the recommended strategies for meeting these needs involve the development of additional groundwater supplies in areas where supply availability is not a constraint or the contractual acquisition of surface water supplies from existing sources. With the exception of the proposed transfer of water from Toledo Bend Reservoir to the Upper Sabine watershed, no major water supply development projects are recommended to meet needs within the region. Please refer to Chapter 4 of Appendix A for an analysis of movement of water to the Upper Sabine River Basin from Toledo Bend. As such, the mostly local 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 socio-economic 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 (Texas Water Code, Section 11.085(k)(1)).

4.7 REGIONAL SUMMARY

4.7.1 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 704,000, 2000 Census, to over 1.2 million in 2060. With population growth and continued urbanization, increases in municipal water demands are projected through the planning period. Table 4.38 below summarizes current and projected regional water demands for each of the six major water use categories.

Table 4.38 Population and Water Demand Projections Summary for the North East Texas Regional Water Planning Area

Regional Total Projection	2010	2020	2030	2040	2050	2060
Population	772,163	843,027	908,748	978,298	1,073,570	1,213,095
Municipal Water Demand (ac-ft/yr)	119,951	128,711	136,749	145,404	158,458	178,178
Manufacturing Water Demand (ac-ft/yr)	301,091	328,568	351,427	373,504	392,387	421,496
Irrigation Water Demand (ac-ft/yr)	15,504	15,415	15,329	15,182	14,949	14,728
Steam Electric Water Demand (ac-ft/yr)	89,038	96,492	112,809	132,703	156,951	186,509
Mining Water Demand (ac-ft/yr)	8,802	9,605	10,108	10,595	11,111	11,625
Livestock Water Demand (ac-ft/yr)	26,690	26,736	26,785	26,698	26,554	26,441
TOTAL WATER DEMAND (ac-ft/yr)	**561,076**	**605,527**	**653,207**	**704,086**	**760,410**	**838,977**

It is important to note that manufacturing will remain the dominant water use in the region, accounting for roughly 54 percent of water demand at present and 50 percent of water demand in 2060. Clearly, the manufacturing sector will continue to be a vital component of the region's economy for the foreseeable future.

4.7.2 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 supply available to the region during drought-of-record hydrologic conditions is approximately 1.47 million ac-ft/yr. This represents more than 60 percent of the total amount of water presently available to the region from all sources (i.e., groundwater and other local sources).

In addition to the supply available from surface water, nearly 877,000 ac-ft./yr. of water supply, or 40 percent of the total water supply is estimated to be available from groundwater sources at present.

4.7.3 Water Supply Needs

A user-by-user comparison of supply and demand reveals that 61 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 154,945 acre-ft/yr by the year 2060.

In Harrison, Hunt, Lamar, and Titus County, Steam Electric shows a shortage during the 50 year planning period. Cass County is projected to have a large increase in manufacturing demand and consequently a shortage during the planning period. No shortages are projected for the irrigation, mining and livestock categories of water use for any of the counties in the region.

4.7.4 Recommended Water Management Strategies

The Regional Water Planning Group is required by TWDB rules to evaluate all water management strategies that are deemed to be "potentially feasible." Specifically, 357.5(e)(4) states:

> *"Before a regional water planning group begins the process of identifying potentially feasible water management strategies, it shall document the process by which it will list all possible water management strategies that are potentially feasible for meeting a need in the region. Once this process is identified, the regional water planning group shall present it to the public…"*

A process description and a list of possible management strategies were presented to the planning group in August, 2009. 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. The planning group established 140 gpcpd usage as a limit above which all shortages were evaluated for a water conservation strategy. A flow chart outlining this process is presented in Chapter 6 as Figure 6.1. The consultants prepared a qualitative rating of the various strategies for each entity, including strategies proposed by the entity, based on cost, reliability, environmental and political factors. Recommended strategies were presented to the planning group for approvals and included in the Initially Prepared Plan.

Most of the water supply shortages in the region are projected to occur in rural communities. There are also a few shortages projected to occur in the manufacturing and steam electric power generation 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.

As indicated, most of the municipal water users identified with water supply shortages are small rural communities and rural water supply corporations. Generally speaking, there are only four categories of options for meeting the needs of these water users 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 North East Texas RWPG 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.

4.7.5 Advanced Water Conservation

The adopted water demand projections for municipal water users includes a significant degree of reduction in future per capita water demand due to plumbing code requirements for more efficient fixtures and low volume toilets.

An "advanced" water conservation scenario has also been evaluated for municipal water users in the North East Texas Region which have a demand greater than 140 gpcpd. This scenario includes implementation of the plumbing code measure plus implementation of additional measures by local entities including:

- Family clothes washers rebate;
- Irrigation audits;

- Rainwater harvesting;
- Rain barrels; and
- Commercial coin-operated clothes washer rebates.

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 North East Texas Regional Water Planning Group established a goal of 140 gallons/person/day in the approved water demand projections. As such, the advanced water conservation scenario was not considered as a strategy for any municipal water user with per capita use below 140 gallons per capita per day.

4.7.6 Water Reuse

This strategy includes the direct use of reclaimed water for nonpotable purposes (e.g., irrigation, industrial and steam electric cooling water). This strategy was considered applicable only to entities with a central wastewater collection and treatment system.

4.7.7 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 and decreasing reliability of groundwater as a future supply source due to quality issues within the region, this strategy was considered 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.

4.7.8 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), and consideration of interbasin transfers.

Other strategies listed in the TWDB rules and listed in Section 4.6 are not considered applicable in the North East Texas Region and were therefore not evaluated. For example, brush control 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. Similarly, sea water desalinization, aquifer storage and recovery, water rights cancellations, control of naturally occurring chlorides, and reservoir storage reallocation are not considered to be applicable to the needs of water users in the North East Texas Region.

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: improved system monitoring and operation, optimal contaminant removal, use of alternative sources for make-up water, and reducing heat load to evaporative cooling. In this round of planning, estimates were not made for electric power water conservation because data on operating strategies for each power plant was not available.

4.8 RECOMMENDED WATER MANAGEMENT STRATEGIES

In order to more accurately estimate the water needs in the North East Texas Region, the "county other" water user group in each of the 19 counties was divided into individual entities. The entities included water supply corporations, special utility districts, freshwater supply districts, unincorporated cities, cities not designated as water user groups by the TWDB, and self-supplied persons.

Senate Bill 1 requires future projects to be consistent with the regional water plans to be eligible for Texas Water Development Board (TWDB) funding and Texas Commission on Environmental Quality (TCEQ) permitting. The provision related to TCEQ is found in Texas Water Code §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 an approved regional water plan. TCEQ may waive this requirement if conditions warrant. For TWDB funding, Texas Water Code § 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 that appropriate regional water plan. The TWDB may waive this provision if conditions warrant.

Regional Water Planning Groups (RWPG) 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 navigation or recreation 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 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.

A total of 61 entities are projected to have a water shortage in either 2030 or 2060. Of these entities, 21 are contractual related shortages. The remaining 40 entities were actual projected shortages that require evaluation of alternatives for recommended water management strategies.

4.8.1 Recommended Strategies for Entities with Contractual Shortages

Within the North East Texas Region, there are 21 municipal entities with contractual shortages. As discussed earlier, there are three possible strategies to resolve these shortages. The first, and most common strategy is to renew the contract on or before its expiration date. This strategy is designated with an "E", for "expiration." There are some entities that require a renewal of their contract along with an increase in the contracted amount. This strategy is designated with an "EI", for "expiration and inadequate contract amount." Strategies for entities with contractual shortages are shown in Table 4.39.

Table 4.39 Recommended Strategies for Entities with Contractual Shortages

	Shortage (ac-ft/yr)		Groundwater Strategy (ac-ft/yr)		Surface Water Strategy (ac-ft/yr)	
Year	**2030**	**2060**	**2030**	**2060**	**2030**	2060
Bowie County						
Central Bowie WSC	336	353			336	353
Hooks	130	151			130	151
Macedonia-Eylau MUD #1	270	270			270	270
New Boston	139	168			139	168
Wake Village	472	645			472	645
Burns Redbank WSC (CO)	94	92			94	92
Oak Grove WSC (CO)	50	49			50	49
Redwater (CO)	166	171			166	171
Camp County						
Cass County						
Delta County						
Franklin County						
Gregg County						
Liberty-Danville FWSC2(CO)	0	40			0	40
Harrison County						
Steam Electric	0	14184			0	14184
Hopkins County						
Hunt County						
Able Springs WSC	0	143			0	143
Cash SUD	0	4546			0	4546
Combined Consumers SUD	0	2617			0	2617

	Shortage (ac-ft/yr)		Groundwater Strategy (ac-ft/yr)		Surface Water Strategy (ac-ft/yr)	
Year	**2030**	**2060**	**2030**	**2060**	**2030**	2060
North Hunt WSC	366	1659			366	1659
Jacobia WSC (CO)	0	328			0	328
Maloy WSC (CO)	57	263			57	263
Shady Grove WSC (CO)	0	280			0	280
Lamar County						
Panda Steam Electric	980	7474			980	7474
Marion County						
Morris County						
Rains County						
South Rains WSC (CO)	284	277			284	277
Red River County						
Smith County						
Winona	0	5			0	5
Titus County						
Steam Electric	0	33914			0	33914
Upshur County						
Van Zandt County						
Wood County						

4.8.2 Recommended Strategies for Entities with Actual Shortages

There are 40 entities in the North East Texas Region with actual projected water supply shortages. Additional groundwater supply is recommended for 31 of these entities. Surface water supplies are recommended for 10 entities. Campbell WSC in Hunt is recommended for both surface and groundwater. Although there are more individual entities with a recommendation for groundwater, surface water is the predominant recommended supply, accounting for approximately 92 percent of the total supply required. Table 4.40 summarizes these entities.

Table 4.40: Recommended Strategies for Entities with Actual Shortages

	Shortage (ac-ft/yr)		Groundwater Strategy (ac-ft/yr)		Surface Water Strategy (ac-ft/yr)	
Year	**2030**	**2060**	**2030**	**2060**	**2030**	**2060**
Bowie County						
Red River Redevelopment Authority (CO)	0	1114			0	1114
Camp County						
BI-County WSC	299	653			299	653
Woodland Harbor (CO)	60	60	65	65		
Delta County						
Ben Franklin WSC (CO)	33	36			33	36
Franklin County						
Gregg County						

	Shortage (ac-ft/yr)		Groundwater Strategy (ac-ft/yr)		Surface Water Strategy (ac-ft/yr)	
Year	**2030**	**2060**	**2030**	**2060**	**2030**	**2060**
Clarksville City	148	217	162	242		
Liberty City WSC	0	353	0	376		
West Gregg SUD	56	333	70	350		
Starrville-Friendship WSC	0	101	0	108		
Harrison County						
Waskom	134	231	138	231		
Blocker-CrossroadsWSC (CO)	100	128	129	129		
Caddo Lake WSC (CO)	19	52	43	86		
Leigh WSC (CO)	0	1	0	43		
Scottsville (CO)	0	7	0	65		
Talley WSC (CO)	97	142	118	177		
Waskom Rural WSC #1 (CO)	0	5	0	43		
Hopkins County						
Miller Grove WSC (CO)	24	6	35	35		
Hunt County						
Campbell WSC	101	773	108	108	0	665
Celeste	0	63			0	63
Hickory Creek SUD	0	1418	0	1613		
Poetry WSC	0	46			0	46
Wolfe City	20	114			20	114
Steam Electric	14457	23902			14457	23902
Little Creek Acres (CO)	37	153			37	153
West Leonard WSC (CO)	1	24	81	81		
Lamar County						
Petty WSC (CO)	20	20			20	20
Marion County						
Morris County						
Rains County						
Red River County						
Smith County						
Crystal Systems Inc.	0	425	0	538		
Lindale Rural WSC	0	189	0	215		
Lindale	0	374	0	376		
Star Mountain WSC (CO)	0	83	0	108		
Titus County						
Upshur County						
Van Zandt County						
Canton	29	161	97	194		
Grand Saline	73	185	161	323		
R P M WSC	0	10	0	65		
Corinth WSC (CO)	0	23	0	27		

	Shortage (ac-ft/yr)		Groundwater Strategy (ac-ft/yr)		Surface Water Strategy (ac-ft/yr)	
Year	**2030**	**2060**	**2030**	**2060**	**2030**	**2060**
Crooked Creek WSC (CO)	21	56	59	59		
Edom WSC (CO)	34	86	43	86		
Fruitvale WSC (CO)	119	269	129	301		
Little Hope-Moore WSC (CO)	78	161	113	188		
Van	0	83	0	134		
Wood County						
Mineola	374	360	403	403		
TOTALS (all counties)	**16,538**	**32,563**	**2,024**	**6,769**	**14,866**	**26,765**

The development of water wells generally has minimal environmental impact, because of the limited construction disturbance, and the limited disturbance tends to be temporary. Generally environmental issues can be easily avoided in the location of new wells. Similarly, water management strategies that require the transmission of treated water as opposed to construction of new treatment facilities or reservoirs, typically have minimal environmental impact because the disturbances with water mains are also temporary or can be avoided in the routing of the water transmission pipelines. The development of treatment facilities may have greater environmental impact. All of these strategies should avoid, minimize, or mitigate the environmental impacts during project development.

Back-up information on the evaluation of water management strategies for each entity with projected shortages can be found in Appendix C.

4.8.3 Bowie County

4.8.3.1 Riverbend Water Resources District

Description / Discussion of Needs:

Riverbend Water Resources District (RWRD) is a new water entity in Bowie and Red River Counties. Riverbend is a conservation and reclamation district created by Texas Senate Bill 1223 in 2009, which encompasses the geographic territory of its member entities. Initial members include:

(1) the City of Annona;
(2) the City of Avery;
(3) the City of DeKalb;
(4) the City of Hooks;
(5) the City of Maud;
(6) the City of New Boston;
(7) the City of Texarkana, Texas;
(8) the City of Wake Village; and
(9) the Red River Redevelopment Authority.

The District can be expanded in the future if additional entities so request. The District lies in the Red and Sulphur River Basins.

The member entities are supplied with surface water from Lake Wright Patman through contracts with Texarkana, TX. RWRD has completed 2 phases of preliminary engineering studies toward construction of an intake, pipeline, and water treatment plant using Wright Patman as the water supply. Texarkana, TX is currently working with RWRD to become the agent for Wright Patman and issues related to sales and distribution of raw and potable water.

This 2011 water plan recognizes that RWRD may become the contracting entity between its members and Texarkana. The strategies shown herein for entities with shortages in Bowie and Red River Counties rely on continued use of water from Lake Wright Patman. The strategies should be considered consistent with the plan for this planning cycle if RWRD is the contracting party rather than Texarkana, as long as the water source remains Lake Wright Patman.

4.8.3.2 Central Bowie WSC

Description / Discussion of Needs

Central Bowie WSC provides water service in Bowie County. The WUG population is projected to be 5,425 in 2010 and 6,169 in the year 2060. The WSC has a contract for water supply with the City of Texarkana for 442 ac-ft/yr. The WSC is projected to have a deficit of 257 ac-ft in 2010 and increasing to a deficit of 353 ac-ft by 2060.

Evaluated Strategies

There were four strategies considered to meet Central Bowie WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcpd 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 WSC is planning on continuing to contract with the City of Texarkana for treated surface water.

Recommendations

Increase in surface water contract from City of Texarkana is the recommended strategy to meet Central Bowie WSC's needs.

4.8.3.3 City of Hooks

Description / Discussion of Needs

City of Hooks provides water service in Bowie County. The WUG population is projected to be 3,228 in 2010 and 3,775 in the year 2060. The city has a contract for water supply with the City of Texarkana for 463 ac-ft/yr. Hooks is projected to have a deficit of 81 ac-ft in 2010 and increasing to a deficit of 151 ac-ft by 2060.

Evaluated Strategies

There were four strategies considered to meet City of Hooks' water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcpd 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.

Recommendations

Surface water purchase from City of Texarkana is the recommended strategy to meet City of Hooks' needs.

4.8.3.4 Macedonia-Eylau MUD

Description / Discussion of Needs

Macedonia-Eylau MUD provides water service in Bowie County. The WUG population is projected to be 4,577 in 2010 and 5,205 in the year 2060. The MUD has a contract for water supply with the City of Texarkana for 552 ac-ft/yr. The MUD is projected to have a deficit of 217 ac-ft in 2010 and increasing to a deficit of 270 ac-ft by 2060.

Evaluated Strategies

There were four strategies considered to meet the MUD's water supply shortages. Advanced conservation was considered because the per capita use per day was more than the 140 gpcpd 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 MUD is planning on continuing to purchase surface water from the City of Texarkana.

Recommendations

Savings from water conservation is minimal and has a higher unit cost. Surface water purchase from City of Texarkana is the recommended strategy to meet Macedonia-Eylau MUD's needs.

4.8.3.5 City of New Boston

Description / Discussion of Needs

City of New Boston provides water service in Bowie County. The WUG population is projected to be 5,219 in 2010 and 6,105 in the year 2060. The city has a contract for water supply with the City of Texarkana for 1090 ac-ft/yr. New Boston is projected to have a deficit of 45 ac-ft in 2010 and increasing to a deficit of 168 ac-ft by 2060.

Evaluated Strategies

There were four strategies considered to meet New Boston's water supply shortages. Advanced conservation was considered because the per capita use per day was more than the 140 gpcpd 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.

Recommendations

Savings from water conservation is minimal and has a higher unit cost. Surface water purchase from City of Texarkana is the recommended strategy to meet City of New Boston's needs.

4.8.3.6 Red River Redevelopment Authority (CO)

Description / Discussion of Needs

The Red River Redevelopment Authority (RRRA) is an instrumentality of and political sub-division of the State of Texas. The RRRA operates and maintains the wet utilities at the Red River Commerce Park (RRCP) and Red River Army Depot (RRAD) and is located in New Boston, Texas (Bowie County). The Commerce Park and RRAD are approximately 17 miles west of Texarkana, Texas.

The RRRA was formed as a direct result of the 1995 Base Realignment and Closure (BRAC) as part of the Department of Defense's goal to privatize utility systems. Approximately 700 acres, many buildings, and all of the wet utility systems have been transferred over to the RRRA. The RRRA's charter is to attract new industry and jobs to the Commerce Park in addition to providing reliable wet utility services to both the Depot and commercial clients.

The RRRA water system consists of a 3 MGD water treatment plant and water distribution lines and appurtenances within the Depot and the Commerce Park. The water sources are Caney Creek Lake and Elliott Creek Lake. Both lakes are within the boundaries of RRAD and were built to support the RRAD mission. The combined capacity of both lakes is 4,074 acre-feet.

The Red River Redevelopment Authority requests that the Regional Water Plan reflect the water allocation needs of RRRA to support the Red River Army Depot's mission and to attract new industrial and commercial clients. The allocation requirement for RRRA in 2010 is 1,343 acre-feet and 4,074 acre-feet in 2060.

Evaluated Strategies

RRRA has acquired a surface water right permit from TCEQ to utilize surface water from Caney Creek Lake and Elliott Creek Lake in Bowie County. The total permitted water use for both lakes is 2,960 ac-ft/yr. RRRA is not considering utilization of other strategies other than surface water from the two lakes, and additional surface water from Riverbend Water Resources District, to meet projected demands.

Recommendations

The recommended strategy for the Red River Redevelopment Authority to meet projected deficit of 21 ac-ft in 2040 and 1,114 ac-ft in 2060 is to enter into contract for surface water supply from the Riverbend Water Resources District, the source being Wright Patman Lake.

4.8.3.7 City of Redwater

Description / Discussion of Needs

City of Redwater provides water service in Bowie County. The WUG population is projected to be 2,489 in 2010 and 2,861 in the year 2060. The city has a contract for water supply with the City of Texarkana for 147 ac-ft/yr. The city also has a well that produces 73 ac-ft/yr. The city is projected to have a deficit of 146 ac-ft in 2010 and increasing to a deficit of 171 ac-ft by 2060.

Evaluated Strategies

There were four strategies considered to meet the City of Redwater's supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcpd 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.

Recommendations

Surface water purchase from City of Texarkana is the recommended strategy to meet City of Redwater's needs.

4.8.3.8 Wake Village

Description / Discussion of Needs

City of Wake Village provides water service in Bowie County. The WUG population is projected to be 5,546 in 2010 and 7,784 in the year 2060. The city has a contract for water supply with the City of Texarkana for 358 ac-ft/yr. Wake Village is projected to have a deficit of 356 ac-ft in 2010 and increasing to a deficit of 645 ac-ft by 2060.

Evaluated Strategies

There were four strategies considered to meet Wake Village's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcpd 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.

Recommendations

Surface water purchase from City of Texarkana is the recommended strategy to meet City of Wake Village's needs.

4.8.3.9 Burns-Redbank WSC (CO)

Description / Discussion of Needs

Burns Redbank WSC provides water service in Bowie County. The WUG population is projected to be 1,407 in 2010 and 1,600 in the year 2060. The WSC has a contract for water supply with the City of Hooks for 140 ac-ft/yr. The WSC is projected to have a deficit of 80 ac-ft in 2010 and increasing to a deficit of 92 ac-ft by 2060.

Evaluated Strategies

Four 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 gpcpd 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 WSC is planning on continuing to purchase surface water from the City of Hooks.

Recommendations

Surface water purchase from City of Hooks is the recommended strategy to meet Burns Redbank WSC's needs.

4.8.3.10 Oak Grove WSC (CO)

Description / Discussion of Needs

Oak Grove WSC provides water service in Bowie County and Red River County. The WUG population is projected to be 703 in 2010 and 791 in the year 2060. The WSC has a contract for water supply with the City of Texarkana for 53 ac-ft/yr. The WSC is projected to have a deficit of 44 ac-ft in 2010 and increasing to a deficit of 49 ac-ft by 2060.

Evaluated Strategies

There were four 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 gpcpd 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 WSC is planning on continuing to purchase surface water from the City of Texarkana.

Recommendations

Surface water purchase from City of Texarkana is the recommended strategy to meet Oak Grove WSC's needs.

4.8.4 Camp County

4.8.4.1 Bi-County WSC

Description / Discussion of Needs

Bi-County WSC provides water service in Camp, Morris, Titus and Upshur Counties. The WUG population in Camp County is projected to be 5,694 in 2010 and 11,205 in the year 2060. Bi-County relies on twenty-four wells in the Carrizo-Wilcox Aquifer with a total rated pumping capacity of approximately 2,761 gpm, or 1,485 ac-ft/yr. The portion of water supply available to the users in Camp County was estimated as 1,470 gpm or 790 ac-ft/yr. Bi-County WSC is projected to have a shortage of 128 ac-ft/yr in 2020 and increasing to 653 ac-ft/yr by 2060.

Evaluated Strategies

There were four strategies considered to meet Bi-County's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcpd threshold set by the water planning group. Reuse is not a feasible option because there is no centralized wastewater collection system. Groundwater was not selected because the WSC is planning on acquiring surface water from the Northeast Texas Municipal Water District (MWD).

Recommendations

Contract for surface water from Northeast Texas MWD is the recommended strategy to meet Bi-County's needs. Construction of infrastructure to convey water from the Northeast Texas MWD to the WSC is expected to begin at the appropriate time, and the source of the surface water will be Lake Bob Sandlin in the Cypress Creek basin.

4.8.4.2 Woodland Harbor (CO)

Description / Discussion of Needs

Woodland Harbor, which is within the County Other systems in Camp County, is a small water system located in northern Camp County. The system serves 588 people and is not projected to grow over the planning period. The current source of supply is a single well into the Carrizo-Wilcox with a tested capacity of 30 gpm. No sustained decline in water quantity or quality has been experienced in the existing well. Woodland Harbor is projected to have a water supply deficit of 60 ac-ft/yr beginning in 2010. The system does not have either a water conservation plan or a drought management plan.

Evaluated Strategies

The four strategies considered to meet Woodland Harbor's water supply shortages. Advanced conservation was not selected since per capita use is less than 140 gpcpd. Reuse is not a feasible option because there is no centralized wastewater collection system. Surface water alternatives were omitted since surface water treatment is not economically feasible for a system of this size. Groundwater from the Carrizo-Wilcox Aquifer was the alternative selected for this entity

Recommendations

The recommended strategy for Woodland Harbor to meet their projected deficit in 2010 is to construct two new wells into the Carrizo-Wilcox with a rated capacity of 60 gpm each, which would provide a total of 65 ac-ft/yr. Supply from these additional wells is sufficient to meet Woodland Harbor needs till 2060.

Additional storage is needed to meet the TCEQ's total storage requirement of 200 gallons/connection. This translates to a total storage of approximately 0.040 MG for the existing 200 connections. The existing system does not meet this requirement since it only has a total storage of 0.010 MG. An additional 0.030 MG of ground storage should be constructed as part of the project.

4.8.5 Cass County

4.8.5.1 Manufacturing

Description / Discussion of Needs

Manufacturing in Cass County accounts for the only water shortage in the county. The manufacturing WUG in Cass County has a demand that is projected to grow from a demand of 107,434 ac-ft/yr in 2010 to 141,299 ac-ft/yr in 2060. Manufacturing is projected to have a deficit of 14,731 ac-ft/yr in 2010 and increasing to a deficit of 50,471 ac-ft/yr in 2060.

Evaluated Strategies

Three strategies were considered to meet the Cass County manufacturing WUG's water supply shortages. In this round of planning, estimates were not made for manufacturing water conservation because data on operating strategies for each manufacturing plant was not available. Groundwater is not feasible due to the limited capacity of aquifers in the Cass County area. Surface water was considered as a viable alternative to meet projected demands.

Recommendations

The recommended strategy for the Cass County manufacturing WUG to meet projected demands during the planning period is to purchase water from NETMWD.

4.8.6 Delta County

4.8.6.1 Ben Franklin WSC (CO)

Description / Discussion of Needs

Ben Franklin WSC, which is within the County Other area in Delta County, is a small public water supply located in northern Delta County. The system served 205 people in 2000 and is projected to grow to 279 people by the year 2060. The current source of supply is a single 158 gpm well into the Trinity Aquifer. Ben Franklin WSC's well does not meet TCEQ secondary water quality standards and is expected to fail sometime after 2020. BFWSC is projected to have a water supply deficit of 33 ac-ft/yr by 2030 and increasing to a deficit of 36 ac-ft/yr in 2060.

Evaluated Strategies

Four strategies were considered to meet Ben Franklin's water supply shortages. Advanced conservation was not selected since per capita use is less than 140 gpcpd. Reuse is not a feasible option because there is no centralized wastewater collection system. Groundwater is not of appropriate quality, as noted above. Operation of a reverse osmosis or similar treatment system would not satisfy TCEQ requirements for two wells minimum, and is considered overly complex for a system of this size. Conversion to surface water by contracting or merging with Delta County MUD was the alternative selected for this entity. It should be noted that the system could also be served by surface water from Lamar County Water Supply District. The Delta County MUD strategy appears superior due to lesser construction requirements and lower unit costs.

Recommendations

The recommended strategy for Ben Franklin WSC is to enter into a contract for treated surface water with Delta County MUD. The MUD has adequate supply available, and has an expansion project underway which could deliver water to the Ben Franklin area around 2010. Since Delta County MUD already has water available, and since there would be no significant construction, environmental impact would be negligible. The alternative strategy is for Ben Franklin WSC to purchase water from Lamar County WSD.

4.8.7 Franklin County

There are no entities with actual shortages in Franklin County.

4.8.8 Gregg County

4.8.8.1 City of Clarksville City

Description / Discussion of Needs

The City of Clarksville City is located along the western end of the Gregg / Upshur county line. The city provides water service to city residents and to residents in Gregg

County outside of the city. In 2003, the city served 307 connections in the city and 10 connections in the county. The city population is projected to increase from 903 persons in 2010 to 1,621 persons in 2060 and the county other population is projected to increase from 33 persons in 2010 to 61 persons in 2060. The city relies on water purchased from the City of Gladewater, which utilizes surface water from Lake Gladewater that is owned and operated by the City of Gladewater. The city has a water conservation plan in place, which includes universal metering and education and information. The city does not have a drought contingency plan. The system is bounded on the east by the City of White Oak; the south by the Sabine River; the west by the City of Gladewater, and on the north by Union Grove Water Supply Corporation. The City of Gladewater and the City of Clarksville City have mutually agreed to not renew their water purchase contract so Clarksville City must develop a new supply source. The City of Clarksville City and the county residents it serves are projected to have a water supply deficit of 120 ac-ft/yr beginning in 2010 and increasing to a deficit of 217 ac-ft/yr in 2060.

Evaluated Strategies

Advanced water conservation was not considered as a strategy because the per capita use per day is less than the 140 gallons per capita per day threshold set by the water planning group, and because they have no supply at all with the expiration of the contract with Gladewater. Water reuse was not considered because there are no potential users of reclaimed water in Clarksville City. Surface water was considered. However, the closest surface water source is from Lake Gladewater and mutually agreeable terms for renewal of their contract could not be reached.

Recommendations

The City of Clarksville City has applied for funding to construct a well field in the Carrizo-Wilcox Aquifer in Gregg County with an expected yield of 162 ac-ft/yr. The recommended strategy that is cost effective and reliable for the city to meet their projected needs is to develop this well field by constructing two 150-gpm water wells and constructing water treatment facilities as necessary to attain water quality and quantity required to meet current demands and projected demands to 2040. An additional 150 gpm well will need to be added prior to 2040 to add 80 ac-ft/yr. The recommended supply source, Carrizo-Wilcox Aquifer, Sabine Basin, in Gregg County, has ample supply to provide for the future needs of the City of Clarksville City.

4.8.8.2 Liberty City WSC

Description / Discussion of Needs

Liberty City WSC provides water service in the rural southwestern portion of Gregg County and eastern Smith County. In 2003, the WSC served 1,574 connections. The population is projected to increase from 4,526 persons in 2010 to 8,485 persons in 2060. The City of Liberty City is served by the WSC. The WSC is included in the City and the County Other WUG for Gregg County and County Other WUG for Smith County. The system relies on ten wells with a total rated capacity of 1,520 GPM, or 817 ac-ft/yr. The system currently has a leak detection program for water conservation. The system is bounded on the north by Prairie Creek and the Sabine River; the east by SH 31; the south by Liberty-Danville FWSD #1 and West Gregg WSC; and on the west by the Starville WSC. LCWSC does not have a water conservation plan or a drought management plan. Liberty City WSC is projected to have a water supply deficit of 53 ac-ft/yr in 2040 increasing to a deficit of 353 ac-ft/yr in 2060.

Evaluated Strategies

Advanced water conservation was not considered for LCWSC because the per capita use per day of 128 gpcpd was below the 140 gpcpd threshold set by the water planning group. Water reuse was not considered because the Liberty City area does not have a centralized wastewater collection system. Surface water alternatives were not considered since no supply source is within close proximity to the area, and surface water treatment is not economically feasible for a system of this size. LCWSC has purchased water from the City of Kilgore in the recent past, so a purchase agreement alternative was considered.

Recommendations

The recommended strategy for LCWSC to meet their projected deficits would be to construct 4 additional water wells similar to their largest existing well. The recommended supply source for the wells would be the Carrizo-Wilcox Aquifer in Gregg County, which is projected to have an adequate supply availability for Liberty City WSC. A total of two additional wells with a rated capacity of 175 GPM each would provide approximately 376 additional ac-ft/yr. The wells should be constructed in the decades when the deficits are projected to occur. Due to the high unit cost of purchasing water from the City of Kilgore, the purchase agreement option is not recommended unless better terms can be negotiated with the City of Kilgore.

4.8.8.3 West Gregg SUD

Description / Discussion of Needs

West Gregg SUD provides water service in the rural southwestern corner of Gregg County, a portion of eastern Smith County, and a small portion of Rusk County. Approximately 3% of the system is outside of Region D. In 2003, the system served approximately 1,287 connections. The population is projected to increase from 3,376 persons in 2010 to 6,382 persons in 2060. The SUD is included in the WUGs for Gregg, Smith, and Rusk Counties. The system relies on seven wells with a total rated capacity of 910 gpm, or 489 ac-ft/yr. Approximately 19 ac-ft of this capacity is allocated to users outside of Region D. The system currently has a water conservation plan and a leak detection program. The system is bounded on the north by Liberty City WSC; the east by Liberty-Danville FWSD #1; the south by the City of Kilgore, and the west by the Browning community in Smith County. WG SUD has a water conservation plan but does not have a drought management plan. West Gregg SUD is projected to have a water supply deficit of 56 ac-ft/yr in 2030 increasing to a deficit of 333 ac-ft/yr in 2060.

Evaluated Strategies

Advanced water conservation was not considered because the per capita use per day of 120 gpcpd is less than the 140 gpcpd threshold set by the water planning group. Water reuse was not considered because the West Gregg service area does not have a centralized wastewater collection system. Surface water alternatives were not considered since no supply source is within close proximity to the area, and surface water treatment is not economically feasible for a system of this size.

Recommendations

The recommended strategy for West Gregg SUD to meet their projected deficits would be to construct five additional water wells similar to their existing wells. The recommended supply source for the wells would be the Carrizo-Wilcox Aquifer in Gregg County, which is projected to have an ample supply availability for WG SUD. A total of five additional wells at 130 gpm each would provide approximately 350 additional ac-ft/yr. The wells should be constructed in the decades when the deficits are projected to occur.

4.8.8.4 Liberty-Danville FWSD 2 (CO)

Description / Discussion of Needs

Liberty-Danville FWSD 2 provides water service in the rural southwestern portion of Gregg County east of the City of Kilgore. In 2003, the FWSD served 215 connections. The population is projected to increase from 618 persons in 2010 to 1,158 persons in 2060. The Liberty-Danville FWSD 2 is included in the County Other WUG for Gregg County. The system has a water purchase contract with the City of Kilgore for 36 MG/yr or 111 ac-ft/yr. The system is bounded on the north by I-20 and the Sabine River; the east by Elderville WSC; the south by Cross Roads WSC; and on the west by the City of

Kilgore. Liberty-Danville FWSD 2 does not have a water conservation plan or a drought management plan. Liberty-Danville FWSD 2 is projected to have a water supply deficit of 1 ac-ft/yr in 2040 increasing to a deficit of 40 ac-ft/yr in 2060.

Evaluated Strategies

Advanced water conservation was eliminated for LDFWSD 2 because the per capita use per day of 104 gpcpd was below the 140 gpcpd threshold set by the Water Planning Group. Water reuse was not considered because the Liberty-Danville FWSD 2 area does not have a centralized wastewater collection system. Surface water alternatives were not considered since no supply source is within close proximity to the area, and surface water treatment is not economically feasible for a system of this size. Liberty-Danville FWSD 2 currently purchases treated water from the City of Kilgore, so a purchase agreement alternative was considered.

Recommendations

The recommended strategy for Liberty-Danville FWSD 2 to meet their projected deficits would be to extend and increase their water purchase contract with the City of Kilgore. The recommended supply source for the water purchase would be the Sabine Run of the River (ROR) in Gregg County, which is projected to have an adequate supply availability for Liberty-Danville FWSD 2. The water purchase contract should be amended as deficits arise yielding 40 ac-ft/yr by 2060.

4.8.8.5 Starrville-Friendship WSC (CO)

Description / Discussion of Needs

Starrville-Friendship WSC provides water service in western Gregg County and northeastern Smith County. The SFWSC service area is bounded on the west by Star Mountain WSC, on the north and east by the Sabine River, and on the south by Liberty City WSC. In 2003, the WSC served 530 connections. The projected population is 1,247 in the year 2010 and is projected to be 2,386 in the year 2060. Starrville-Friendship WSC is included in the County Other water user group for Gregg and Smith Counties. The system is served by three wells from the Carrizo-Wilcox Aquifer with a total pumping capacity of 385 gpm, or 207 ac-ft/yr on an average annual basis. Starrville-Friendship WSC is projected to have a water supply deficit of 19 ac-ft/yr in 2040 increasing to a deficit of 101 ac-ft/yr in 2060.

Evaluated Strategies

Advanced water conservation was not considered because the per capita use per day did not exceed the 140 gpcpd threshold set by the water planning group. Water reuse was omitted from consideration because the WSC does not have a centralized sewerage collection system. Surface water alternatives were not considered since surface water treatment for an entity of this size is not practical.

Recommendations

The recommended strategy for Starrville-Friendship WSC to meet their projected deficit of 19 ac-ft in the year 2040 and 101 ac-ft in the year 2060 would be to construct one additional water well in the Carrizo-Wilcox Aquifer. One well with a total rated capacity of 200 gpm would provide approximately 108 ac-ft/yr. The well will need to be constructed by the year 2040. The supply source will be the Carrizo-Wilcox Aquifer in the Sabine Basin, Smith County. The aquifer has an adequate supply to meet the projected needs of SF WSC.

4.8.9 Harrison County

4.8.9.1 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 2003, the system had 957 residential connections. The population is projected to increase from 2,872 persons in 2010 to 4,240 persons in 2060. The City is included in the County Other WUG for 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 586 GPM, or 315 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 55 ac-ft/yr in 2010 increasing to a deficit of 231 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was not considered because the per capita use per day was below the 140 gpcpd threshold set by the water planning group. Water reuse was not considered because the City does not have a demand for non-potable water. Surface water alternatives were not considered 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.

Recommendations

The recommended strategy for the City of Waskom to meet their projected deficit of 55 ac-ft/yr in 2010 and 231 ac-ft/yr in 2060 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 Harrison County. Five wells with rated capacity of 86 gpm each would provide approximately 46 acre-feet each or 231 ac-ft/yr. The Carrizo-Wilcox 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.

4.8.9.2 Blocker-Crossroads WSC (CO)

Description / Discussion of Needs

Blocker-Crossroads WSC is located in southeastern Harrison County and serves an area east of US Hwy. 59 and south of Interstate Highway 20. In 2003 the system had 383 members. The population is projected to increase from 835 persons in 2010 to 1,225 persons in 2060. The BCWSC is included in the County Other water user group for Harrison County. The system's current water supply consists of two water wells that provide water from the Carrizo-Wilcox Aquifer. The total rated capacity of these two wells is 56 GPM, which equates to 30 ac-ft/yr on an annual average basis. The system is bounded on the west by Gill WSC, on the north by the City of Scottsville, on the east by Waskom Rural WSC, and on the south by Elysian Fields WSC. BCWSC does not have a water conservation plan. Blocker-Crossroads WSC is projected to have a water supply deficit of 78 ac-ft/yr in 2010 increasing to a deficit of 128 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was omitted from consideration because the per capita use per day was below the 140 gpcpd threshold set by the water planning group. Water reuse was omitted from consideration because the BCWSC does not have a centralized sewerage collection system. Surface water alternatives were not considered since there is not a supply source within close proximity to the BCWSC and surface water treatment is not economically feasible for a system of this size.

Recommendations

The recommended strategy for the Blocker-Crossroads WSC to meet their projected deficit of 78 acre-feet in the year 2010 and 128 acre-feet in the year 2060 would be to construct two additional water wells prior to 2010 and one additional well prior to 2030. The three wells will need to average 80 gpm each. The recommended supply source would be the Carrizo-Wilcox Aquifer in Harrison County. A well with rated capacity of 80 gpm would provide approximately 43 acre-feet on an annualized basis. The Carrizo-Wilcox Aquifer in Harrison County is projected to have a more than ample supply availability to meet the needs of BCWSC for the planning period. BCWSC has already applied for funding for two additional wells.

4.8.9.3 Caddo Lake WSC (CO)

Description / Discussion of Needs

Caddo Lake WSC is located in northeastern Harrison County and serves the community of Uncertain east of Karnack and west of Caddo Lake. In 2003, the system had 427 members. The population is projected to increase from 1,032 persons in 2010 to 1,515 persons in 2060. The CLWSC is included in the County Other water user group for Harrison County. The system's current water supply consists of four water wells that provide water from the Carrizo-Wilcox Aquifer. The total rated capacity of these four wells is 267 gpm, which equates to 143 ac-ft/year on an annual average basis. The system is bounded on the west by Karnack WSC, on the north by the Big Cypress Bayou, on the east by Caddo Lake, and on the south by the Longhorn Army Ammunition Plant. The CLWSC does not have a water conservation plan or a drought management plan. Caddo Lake WSC is projected to have a water supply deficit of 6 ac-ft/yr in 2020 increasing to a deficit of 52 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was omitted from consideration because the per capita use per day was below the 140 gpcpd threshold set by the water planning group. Water reuse was omitted from consideration because the CLWSC does not have a centralized sewerage collection system. Surface water alternatives were not considered since there is not a supply source within close proximity to the CLWSC and surface water treatment is not economically feasible for a system of this size.

Recommendations

The recommended strategy for the Caddo Lake WSC to meet their projected deficit of 6 acre-feet in the year 2020 and 52 acre-feet in the year 2060 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 Carrizo-Wilcox Aquifer in Harrison County. One well with rated capacity of 80 gpm would provide approximately 43 acre-feet on an annualized basis and 86 acre-feet total. The Carrizo-Wilcox Aquifer in Harrison County is projected to have a more than ample supply availability to meet the needs of CLWSC for the planning period.

4.8.9.4 Leigh WSC (CO)

Description / Discussion of Needs

Leigh WSC is located in northeastern Harrison County and serves an area south of Karnack and Caddo Lake, east of the City of Marshall, and North of the City of Waskom. In 2003, the system had 824 members. The population is projected to increase from 1,032 persons in 2010 to 1,515 persons in 2060. The Leigh WSC is included in the County Other water user group for Harrison County. The system's current water supply consists of three water wells that provide water from the Carrizo-Wilcox Aquifer and a contract with the City of Marshall for 184 ac-ft/year. The total rated capacity of the three wells is 290 gpm, which equates to 156 ac-ft/year on an annual average basis. The system is bounded on the west by the City of Marshall, on the north by Karnack WSC and Caddo Lake, on the east by Caddo Lake, and on the south by the City of Waskom. The LWSC does not have a water conservation plan or a drought management plan. Leigh WSC is projected to have a water supply deficit of 1 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was omitted from consideration because the per capita use per day was below the 140 gpcpd threshold set by the water planning group. Water reuse was not considered because the LWSC does not have a centralized sewerage collection system. Surface water alternatives were not considered since there is not a supply source within close proximity to the LWSC and surface water treatment is not economically feasible for a system of this size. Leigh WSC currently purchases treated surface water from the City of Marshall so increasing that contract was considered.

Recommendations

The recommended strategy for the Leigh WSC to meet their projected deficit of 1 acre-feet in the year 2060 would be to construct one additional water well similar to their existing wells just prior to 2060. The recommended supply source will be the Carrizo-Wilcox aquifer in Harrison County. One well with rated capacity of 80 gpm would provide approximately 43 acre-feet on an annualized basis. The Carrizo-Wilcox Aquifer in Harrison County is projected to have a more than ample supply availability to meet the needs of LWSC for the planning period.

4.8.9.5 Waskom Rural #1 & 2 WSC (CO)

Description / Discussion of Needs

Waskom Rural WSC #1 is located in southeastern Harrison County and serves an area around the city limits of Waskom. In 2003, the system had 240 members. The population is projected to increase from 624 persons in 2010 to 916 persons in 2060. Waskom Rural WSC is included in the County Other water user group for Harrison County. The system's current water supply consists of two water wells that provide water from the Carrizo-Wilcox Aquifer. The total rated capacity of the three wells is 210 gpm, which equates to 113 ac-ft/year on an annual average basis. Waskom Rural WSC does not have a water conservation plan or a drought management plan. Waskom Rural WSC is projected to have a water supply deficit of 5 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was not considered because the per capita use per day was below the 140 gpcpd threshold set by the water planning group. Water reuse was omitted from consideration because Waskom Rural WSC does not have a centralized sewerage collection system. Surface water alternatives were not considered 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.

Recommendations

The recommended strategy for Waskom Rural WSC to meet their projected deficit of 5 acre-feet in the year 2060 would be to construct one additional water well similar to their existing wells just prior to 2060. The recommended supply source will be the Carrizo-Wilcox aquifer in Harrison County. One well with rated capacity of 80 gpm would provide approximately 43 acre-feet on an annualized basis. The Carrizo-Wilcox Aquifer in Harrison County is projected to have a more than ample supply availability to meet the needs of Waskom Rural WSC for the planning period.

4.8.9.6 City of Scottsville (CO)

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 2003 the system had 277 residential connections. The population is projected to increase from 720 persons in 2010 to 1,057 persons in 2060. The City is included in the County Other WUG for Harrison 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 240 gpm, or 129 ac-ft/yr. The system is bounded on the east by Waskom Rural Water WSC #1, on the south by Blocker-Crossroads WSC, on the west by the City of Marshall, and on the north by Leigh WSC. The City does not have a water conservation plan or a drought contingency plan. The City of Scottsville is projected to have a water supply deficit of 7 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was considered because the per capita use per day of 155 is above the 140 gpcpd threshold set by the planning group. Water reuse was not considered because the City does not have a demand for non-potable water. Surface water alternatives were not considered 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.

Recommendations

The recommended strategy for the City of Scottville to meet their projected deficit of 7 ac-ft/yr in 2060 would be construct one additional water well prior to 2060. The recommended supply source will be the Carrizo-Wilcox Aquifer in Harrison County. A well with rated capacity of 120 gpm would provide approximately 65 acre-feet on an annualized basis. The Carrizo-Wilcox Aquifer in Harrison County is projected to have a more than ample supply availability to meet the needs of the City of Scottsville for the planning period.

4.8.9.7 Talley WSC (CO)

Description / Discussion of Needs

Talley WSC is located in central Harrison County on the west side of the City of Marshall and serves an area west along SH 154 and US Hwy 80. In 2003, the system had 536 members. The population is projected to increase from 1,376 persons in 2010 to 2,020 persons in 2060. The TWSC is included in the County Other water user group for Harrison County. The system's current water supply consists of two water wells that provide water from the Carrizo-Wilcox Aquifer. The total rated capacity of these two wells is 220 GPM, which equates to 118 ac-ft/yr on an annual average basis. The system is bounded on the west by West Harrison WSC and Gum Springs WSC, on the north by Harleton WSC and Cypress Valley WSC, on the east by the City of Marshall, and on the south by Gill WSC. TWSC does not have a water conservation plan or a drought management plan. Talley WSC is projected to have a water supply deficit of 59 ac-ft/yr in 2010 increasing to a deficit of 142 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was omitted from consideration because the per capita use per day was below the 140 gpcpd threshold set by the water planning group. Water reuse was not considered because the TWSC does not have a centralized sewerage collection system. Surface water alternatives were not considered since there is not a supply source within close proximity to the BCWSC and surface water treatment is not economically feasible for a system of this size.

Recommendations

The recommended strategy for the Talley WSC to meet their projected deficit of 59 acre-feet in the year 2010 and 142 acre-feet in the year 2060 would be to construct one additional water well prior to 2010, one additional well prior to 2020, and one additional well prior to 2050. The three wells will need to average 110 gpm each. The recommended supply source will be the Carrizo-Wilcox Aquifer in Harrison County. A well with rated capacity of 110 gpm would provide approximately 59 acre-feet on an annualized basis. The Carrizo-Wilcox Aquifer in Harrison County is projected to have a more than ample supply availability to meet the needs of TWSC for the planning period. TWSC has been evaluating well sites and plans to construct one additional well in the near future.

4.8.9.8 Steam Electric

Description / Discussion of Needs

The Steam Electric WUG in Harrison County has a demand that is projected to grow from 18,438 ac-ft/yr in 2010 to 38,345 ac-ft/yr in 2060. Northeast Texas Municipal Water District (NETMWD) is a leading wholesale water provider for consumers in Harrison County. NETMWD currently contracts 18,000 ac-ft/yr to the Steam Electric WUG in Harrison County and the City of Longview reuse currently contracts out 6,161 ac-ft/yr to Steam Electric.

Evaluated Strategies

Three strategies were considered to meet the Harrison County Steam Electric WUGs water supply shortages. Water conservation was not selected because it is not applicable for steam electric utilities. Groundwater is also not feasible due to questionable reliability and the large quantity of water required for a steam electric facility. Surface water was considered as a viable alternative to meet projected demands.

Recommendations

The recommended strategy for the Harrison County Steam Electric WUG to meet projected demands during the planning period is to purchase additional water from customers of the Northeast Texas Municipal Water District and additional wastewater from the City of Longview.

4.8.10 Hopkins County

4.8.10.1 Miller Grove WSC (CO)

Description / Discussion of Needs

Miller Grove WSC, which is within the County Other systems in Hopkins County, is a small public water supply located primarily in southwestern Hopkins County. The system serves customers in Hopkins, Hunt and Rains counties. The population served in Hopkins County is projected to be 1019 persons in 2010 and increasing to 1071 persons in 2060. Current sources of supply for the WSC are seven wells into the Nacatoch aquifer with a total rated capacity of 412 gpm, which equates to 222 ac-ft/yr on an annual average basis. All wells are located in Hopkins County. The portion of the WUG in Hopkins County is projected to have a water supply deficit of 24 ac-ft/yr beginning in 2030. No shortage is projected for users in Hunt and Rains County.

Evaluated Strategies

Advanced conservation was not selected for Miller Grove WSC since per capita water use is less than 140 gallons per capita per day. The system is too small to treat its own surface water in a cost-effective manner, but a purchased water supply was considered, from the City of Sulphur Springs. Water reuse was not considered a viable alternative since there is no centralized wastewater collection system. Groundwater was considered as the system's primary source to meet the projected deficit.

Recommendations

Additional groundwater from the Nacatoch aquifer is the recommended strategy for Miller Grove WSC to meet the projected deficit in 2030. One additional well with a rated capacity of 65 gpm would provide approximately 35 ac-ft/y. This additional well, plus the supply from the existing wells, is sufficient to meet demands till 2060.

4.8.11 Hunt County

4.8.11.1 Able Springs WSC

Description / Discussion of Needs

Able Springs Water Supply Corporation is a public water supply located primarily in Kaufman County and supplies consumers in Kaufman, Hunt and Van Zandt counties. Approximately 11% of Able Springs's consumer demand is located in Hunt County. Current water supply is from the Sabine River Authority (SRA) and City of Terrell. Approximately 91% of the supply is from the SRA. In Hunt County, the WSC is projected to have a supply deficit of 47 ac-ft/yr in 2050 and increasing to a deficit of 143 in 2060. Able Springs WSC will need a contract increase in order to supply this projected shortage. Normally, the WSC would request a contract increase from SRA, but the authority has allocated all Lake Tawakoni and Lake Fork water to its existing customers. SRA is proposing to transfer water from the Toledo Bend Reservoir to meet anticipated needs of its customers in the upper Sabine basin. Water from Toledo Bend will be used to meet Able Springs's needs beginning 2050.

Evaluated Strategies

Four strategies were considered to meet Able Springs WSC's water supply shortages. Advanced conservation was not selected since per capita use is less than 140 gpcpd. There are no significant current water needs that could be met by water reuse. Groundwater was not selected because the WSC plans to continue using surface water for its needs. Consequently, surface water was considered as the alternative to meet projected demands.

Recommendations

The recommended strategy for Able Springs WSC to meet their projected deficit from 2050 is to purchase raw water from the Sabine River Authority's proposed Toledo Bend Transfer.

4.8.11.2 Campbell WSC

Description / Discussion of Needs

Campbell WSC is a small public water supply located in eastern Hunt County. The system is projected to serve 610 people in 2010 and 5917 people by the year 2060. The current sources of supply are four wells into the Nacatoch Aquifer with a production capacity ranging from 60 gpm to 120 gpm. The WSC provides water to its own customers in the Sulphur and Sabine basins and also supplies the City of Campbell. Campbell WSC is projected to have a water supply deficit of 9 ac-ft/yr by 2010. The deficit is projected to increase to 773 ac-ft/yr by 2060.

Evaluated Strategies

Four strategies were considered to meet Campbell's water supply shortages. Advanced conservation was not selected since per capita use is less than 140 gpcpd. There are no significant current water needs in Campbell that could be met by water reuse. Groundwater from the Nacatoch Aquifer and purchase of surface water from the City of Commerce were the alternatives selected for this entity.

Recommendations

The recommended strategy for Campbell WSC to meet their projected deficit from 2010 till 2030 is to construct two new wells, each with a rated capacity of 100 gpm, which would provide approximately 108 ac-ft/yr. To meet demand from 2040 till 2060, it is recommended that Campbell WSC enter into a treated water contract with the City of Commerce, the source of water being Lake Tawakoni.

4.8.11.3 Cash SUD

Description / Discussion of Needs

Cash Special Utility District is a public water supply located primarily in Hunt County. The water supply corporation sells water to Aqua Source Utility, City of Lone Oak and City of Quinlan. In addition to meeting the needs of its retail customers, Cash supplies water to consumers in Hunt, Hopkins, Rains and Rockwall counties. Approximately 90% of Cash's demand is located in Hunt County. Current water supply is from the Sabine River Authority (SRA) and North Texas Municipal Water District (NTMWD). Approximately 82% of water supply to Cash SUD is from SRA, and Cash plans to buy additional water from this source to meet their future needs. Cash is projected to have a supply deficit of 1015 ac-ft/yr in 2050 and increasing to 4546 ac-ft/yr in 2060, and will need a contract increase in order to supply this projected shortage. Normally, Cash would request a contract increase from SRA, but the authority has allocated all Lake Tawakoni and Lake Fork water to its existing customers. SRA is proposing to transfer water from Toledo Bend Reservoir to meet anticipated needs of its customers. Water from Toledo Bend will be used to meet Cash SUD needs in 2050 and 2060.

Cash SUD has a contract with NTMWD for 1792 ac-ft/yr. Region C's tabulations show NTMWD as not having sufficient water to meet all their contractual obligation to Cash SUD. Consequently, Region C has developed tables to show current and future allocation to Cash SUD from NTMWD.

Evaluated Strategies

Four strategies were considered to meet Cash SUD's water supply shortages. Advanced conservation was not selected since per capita use is less than 140 gpcpd. There are no significant current water needs in Cash that could be met by water reuse. Groundwater was not selected because it is inadequate in quality and quantity for supplies of this size. Consequently, surface water was selected as the alternative to meet projected demands.

Recommendations

The recommended strategy for Cash SUD to meet their projected deficit in 2050 and 2060 is to purchase raw water from the Sabine River Authority's proposed Toledo Bend Transfer. Also, Region C has developed strategies to meet NTMWD's contractual obligation to Cash SUD.

4.8.11.4 City of Celeste

Description / Discussion of Needs

City of Celeste is a small public water supply located in northwest Hunt County. The system is projected to serve 861 people in 2010 and 2031 people by the year 2060. The current sources of supply are two wells into the Woodbine Aquifer, with a production capacity of 170 gpm and 200 gpm. The City provides water to its own customers in the Sabine basin and is projected to have a water supply deficit of 63 ac-ft/yr in 2060. The system does have a water conservation or drought management plan in place.

Evaluated Strategies

Four strategies were considered to meet Celeste's water supply shortages. Advanced conservation was not selected since per capita use is less than 140 gpcpd. There are no significant current water needs in Celeste that could be met by water reuse. The system is not large enough to treat surface water in a cost-effective manner; however a surface water alternative using purchased water from the City of Greenville was considered. Surface water may also be available by the time needed from the North Texas Municipal Water District. Groundwater from the Woodbine Aquifer was also considered as an alternative for this entity.

Recommendations

Because of the increasing costs to comply with more stringent regulations and decreasing reliability of groundwater as a future supply source, surface water alternative was selected as the strategy to meet Celeste's needs. Comparison of costs show that surface water is the economical alternative compared to drilling wells. To meet the City's projected deficit in 2060 it is recommended that Celeste enter into a surface water purchase contract with the City of Greenville. In this round of planning, Greenville is projected to have adequate surplus that could be used to meet Celeste's needs.

4.8.11.5 Combined Consumers SUD

Description / Discussion of Needs

Combined Consumers Special Utility District is a public water supply located primarily in Hunt County and supplies consumers in both Hunt and Van Zandt counties. Approximately 80% of the SUD's consumer demand is located in Hunt County. Current water supply is from the Sabine River Authority (SRA). The WSC is projected to have a supply deficit of 832 ac-ft/yr in 2050 and increasing to a deficit of 3715 in 2,617. Combined Consumers SUD will need a contract increase in order to supply this projected shortage. Normally, the WSC would request a contract increase from SRA, but the authority has allocated all Lake Tawakoni and Lake Fork water to its existing customers. SRA is proposing to transfer water from the Toledo Bend Reservoir to meet anticipated needs of its customers. Water from Toledo Bend will be used to meet Combined Consumers needs beginning in 2050.

Evaluated Strategies

The four strategies were considered to meet Combined Consumers SUD's water supply shortages. Advanced conservation was not selected since per capita use is less than 140 gpcpd. There are no significant current water needs that could be met by water reuse. Groundwater was not selected because it is inadequate in quality and quantity. Consequently, surface water was considered as a viable alternative to meet projected demands.

Recommendations

The recommended strategy for Combined Consumers SUD to meet their projected deficit from 2050 is to purchase raw water from the Sabine River Authority's proposed Toledo Bend Transfer.

4.8.11.6 Hickory Creek SUD

Description / Discussion of Needs

Hickory Creek SUD is currently supplied by four wells in the Woodbine aquifer. All wells are located in Hunt County and have a total rated capacity of 1,240 gpm or 667 ac-ft/yr. Over 90% of the SUD's demand is located in Region D (Hunt County), with less than 10% in Region C (Collin and Fannin Counties). In both regions, the system is projected to serve a total of 2,567 people in 2010 and 12,923 people by the year 2060. In Hunt County, Hickory Creek is projected to have a water supply deficit of 198 ac-ft/yr in 2040. The deficit is projected to increase to 1,418 ac-ft/yr by 2060. The system does not have either a water conservation plan or a drought management plan.

Evaluated Strategies

Four strategies were considered to meet Hickory Creek's water supply shortages. Advanced conservation was considered because per capita use of 155 gpcpd is more than the 140 gpcpd set by the regional planning group. However, the projected savings is minimal in comparison to the predicted shortage. There are no significant current water needs in Hickory Creek that could be met by water reuse. No surface water alternatives were evaluated because the SUD advised that it would continue adding wells to meet future demands. Groundwater from the Woodbine Aquifer was considered since it is currently the source of supply for the system

Recommendations

Six or more additional wells will have to be drilled during successive decades to ensure that a deficit is not encountered by the SUD.

4.8.11.7 North Hunt WSC

Description / Discussion of Needs

North Hunt WSC provides water service in Hunt County, Fannin County and Delta County. It is projected that the users in Hunt County will have a shortage around 2020. In Hunt County, the WUG population is projected to be 2,631 in 2010 and 14,171 by the year 2060. The WSC 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 115 gpm , and a well in Fannin County that is rated at 350 gpm. In Hunt County, the WSC is projected to have a deficit of 164 ac-ft in 2010 and increasing to a deficit of 1,659 ac-ft by 2060.

Evaluated Strategies

There were four 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 gpcpd 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 WSC is planning on meeting its future needs from water purchase from the City of Commerce.

Recommendations

Surface water purchase from the City of Commerce is the recommended strategy to meet North Hunt WSC's needs.

4.8.11.8 Jacobia WSC (CO)

Description / Discussion of Needs

Jacobia WSC provides water service in Hunt County. The WUG population is projected to be 957 in 2010 and 5,153 in the year 2060. The WSC has a contract for water supply with the City of Greenville for 336 ac-ft/yr. The WSC is projected to have a deficit of 84 ac-ft in 2050 and increasing to a deficit of 328 ac-ft by 2060.

Evaluated Strategies

There were four 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 gpcpd 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 WSC is planning on continuing to purchase surface water from the City of Greenville.

Recommendations

Surface water purchase from the City of Greenville is the recommended strategy to meet Jacobia WSC's needs.

4.8.11.9 Little Creek Acres (CO)

Description / Discussion of Needs

Little Creek Acres, which is within the County Other systems in Hunt County, is a small water supply system located in southern Hunt County. The population served is projected to be 236 persons in 2010 and increasing to 1,272 persons in 2060. Current source of supply for the system is a well into the Nacatoch aquifer with a total rated capacity of 20 gallons per minute, which equates to 11 ac-ft/yr on an annual average basis. Little Creek Acres is projected to have a water supply deficit of 20 ac-ft/yr beginning 2010 and increasing to a deficit of 153 ac-ft/yr by 2060.

Evaluated Strategies

Advanced conservation was not selected since per capita water use is less than 140 gallons per capita per day. Reuse is not a feasible option because there is no centralized wastewater collection system. Existing wells into the Nacatoch Aquifer have a very small capacity of 20 gpm and it would require approximately 15 wells to meet the shortage in 2060. Little Creek Acres is very small geographically and it would not be feasible to drill this many wells within the existing area. Consequently, groundwater is not a suitable alternative to meet Little Creek Acres needs. The system is surrounded by Cash SUD, and a purchased water alternative from Cash was also considered.

Recommendations

Purchase of treated surface water from Cash SUD is the recommended strategy that is cost effective and reliable for Little Creek Acres to meet the deficit beginning in 2010. A supply of 20 ac-ft/yr in 2010 and increasing to 153 ac-ft/yr in 2060 should be adequate to meet estimated demand. Little Creek Acres has total water storage of 0.004 MG. This storage does not meet the TCEQ's total storage requirement of 200 gallons/connection and will not be adequate for the projected growth of the system.

4.8.11.10 Maloy WSC (CO)

Description / Discussion of Needs

Maloy WSC provides water service in Hunt County. The WUG population is projected to be 427 in 2010 and 2,299 in the year 2060. The WSC has a contract for water supply with the City of Commerce for 34 ac-ft/yr. The WSC is projected to have a deficit of 26 ac-ft in 2010 and increasing to a deficit of 263 ac-ft by 2060.

Evaluated Strategies

There were four strategies considered to meet Maloy WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcpd 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 WSC is planning on continuing to purchase surface water from the City of Commerce.

Recommendations

Surface water purchase from the City of Commerce is the recommended strategy to meet Maloy WSC's needs.

4.8.11.11 Poetry WSC (CO)

Description / Discussion of Needs

Poetry WSC provides water service in Hunt County and Kaufman County. In Hunt County, the WUG population is projected to be 333 in 2010 and 1794 in the year 2060. The WSC has a contract for water supply with the City of Terrell. In Hunt County, the WSC is projected to have a deficit of 1 ac-ft in 2040 and increasing to a deficit of 46 ac-ft by 2060.

Evaluated Strategies

There were four strategies considered to meet Poetry WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcpd 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 WSC is planning on continuing to purchase surface water from the City of Terrell.

Recommendations

Surface water purchase from the City of Terrell is the recommended strategy to meet Poetry WSC's needs.

4.8.11.12 Shady Grove WSC (CO)

Description / Discussion of Needs

Shady Grove WSC provides water service in Hunt County. The WUG population is projected to be 1,211 in 2010 and 6,523 in the year 2060. The WSC has a contract for water supply with the City of Greenville for 560 ac-ft/yr. The WSC is projected to have a deficit of 280 ac-ft in 2060.

Evaluated Strategies

There were four strategies considered to meet Shady Grove WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcpd 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 WSC is planning on continuing to purchase surface water from the City of Greenville.

Recommendations

Surface water purchase from the City of Greenville is the recommended strategy to meet Shady Grove WSC's needs.

4.8.11.13 Steam Electric

Description / Discussion of Needs

The Steam Electric WUG in Hunt County has a demand that is projected to grow from 8,639 ac-ft/yr in 2010 to 23,902 ac-ft/yr in 2060. This demand is projected as a result of a proposed Cobisa power plant near Greenville. Greenville currently contracts with the Sabine River Authority for its supply. Sabine River Authority (SRA) is a leading wholesale water provider for consumers in Hunt County. All SRA water from Lake Tawakoni and Lake Fork has been contracted and there is no water available from these lakes to meet the projected steam electric demands. SRA is proposing to transfer water from the Toledo Bend Reservoir to the North Texas region to meet anticipated future needs of its customers. Since there is no other wholesale water provider in the area with adequate amounts of water to meet steam electric demands in Hunt County, SRA water from the Toledo Bend Reservoir will be used to meet future shortages.

Evaluated Strategies

Three strategies were considered to meet the Hunt County Steam Electric WUG's water supply shortages. In this round of planning, estimates were not made for electric power water conservation because data on operating strategies for each power plant was not available. Groundwater is not feasible due to the limited capacity of aquifers in the Greenville area. Surface water was considered as a viable alternative to meet projected demands.

Recommendations

The recommended strategy for the Hunt County Steam Electric WUG to meet projected demands during the planning period is to purchase raw water from the Sabine River Authority's proposed Toledo Bend transfer.

4.8.11.14 West Leonard WSC (CO)

Description / Discussion of Needs

West Leonard WSC, which is within the County Other systems in Fannin County, supplies water to users in Collin, Fannin and Hunt counties. Currently, the WSC serves a total population of approximately 1300 people. Over 90% of the population is located in Fannin County. The paragraphs below describe the needs of the 3% population served in Hunt County. The population served is projected to be 45 persons in 2010 and increasing to 245 persons in 2060. Current source of supply for the system are wells into the Woodbine aquifer with a total rated capacity of 530 gpm, which equates to 285 ac-ft/yr on an annual average basis. 9 ac-ft/yr or 3% of the total supply is the water allocated to users in Hunt County. A water supply deficit of 1 ac-ft/yr beginning 2030 and increasing to a deficit of 24 ac-ft/yr by 2060 is projected for Hunt County.

Evaluated Strategies

Advanced conservation was not selected for West Leonard since per capita water use is less than 140 gallons per capita per day. Surface water was not chosen as an alternative for this small water system, because the system is not large enough to cost-effectively treat surface water, and there are currently no surface water wholesalers within close proximity. NTMWD currently has water at Farmersville, about 15 miles away, which could become a viable source much later in the planning period. Water reuse was not selected because there is no centralized collection system. Groundwater was considered as the system's primary source to meet the projected deficit.

Recommendations

Additional groundwater from the Woodbine aquifer is the recommended strategy for West Leonard WSC to meet the projected deficit by 2030. One new well with a capacity of 150 gpm, or a total of 81 ac-ft/yr, should be achievable in Hunt County. Since only a small percentage of the users are located in Region D, the excess capacity from this well could be available for the system's customers in Region C.

4.8.11.15 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 1598 people by 2010, and the population is expected to increase to 2446 by the year 2060. 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. Safe yield from the local lakes is estimated as 140 ac-ft/yr up to 2020 and then reducing to 120 ac-ft/yr thereafter. Based on these yields, water quantity from the lakes and the well will not be sufficient to meet projected demands.

Evaluated Strategies

There are no significant current water needs that could be met by water reuse. Advanced conservation was not selected since per capita use is less than 140 gpcpd. 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 is also an alternative for this entity.

Recommendations

Purchase of treated surface water from Commerce is the recommended strategy to meet the projected demand in Wolfe City.

4.8.12 Lamar County

4.8.12.1 Petty WSC (CO)

Description / Discussion of Needs

Petty WSC is a very small public water supply located in western Lamar County along US Highway 82. It is surrounded on all sides by the Lamar County WSD. In 2003, Petty served 62 connections. The estimated population is 137 in the year 2010, and is projected to be 155 by the year 2060. Petty WSC is included in the County Other water user group for Lamar County. The current source of supply is a single 31 gpm well into the Woodbine formation. Water quality does not meet current TCEQ standards because of high TDS. Backup for the single well is provided through a 6" connection to Lamar County WSD. The system is projected to have a water supply deficit of 1 ac-ft/yr in 2010 and increasing to 20 ac-ft/yr by 2060.

Evaluated Strategies

Advanced conservation was not selected since per capita use is less than 140 gpcpd, the threshold set by the planning group. All uses are for residential purposes, so there are no current water needs that could be met by water reuse. Groundwater is not of suitable quality. The existing well is projected to fail by 2020, and a replacement well will not be a viable option, since water quality is below TCEQ minimum standards. Treatment of the groundwater is not considered viable because of the operational complexity for a system of this size. Conversion to surface water by contracting with LCWSD was the alternative selected for this entity.

Recommendations

The recommended strategy is for Petty WSC to enter into a contract for treated surface water with Lamar County Water Supply District when necessary. LCWSD has adequate supply available, and already has facilities in-place to provide this service. There are no other suppliers in the Petty area with adequate facilities to meet Petty's needs. Given that facilities are in-place, capital costs would be negligible. Since LCWSD already has water available, and no significant construction would be required, environmental impact would be negligible.

4.8.12.2 Steam Electric

Description / Discussion of Needs

The Steam Electric WUG in Lamar County has a demand that is projected to grow from a demand of 5,940 ac-ft/yr in 2010 to 16,435 ac-ft/yr in 2060. Panda's steam electric contract with City of Paris is 8,961 ac-ft/yr. Steam electric is projected to have a deficit of 980 ac-ft/yr in 2030 and increasing to a deficit of 7,474 ac-ft/yr in 2060.

Evaluated Strategies

Three strategies were considered to meet the Lamar County Steam Electric WUG's water supply shortages. In this round of planning, estimates were not made for electric power water conservation because data on operating strategies for each power plant was not available. Groundwater is also not feasible due to questionable reliability and the large quantity required for a steam electric facility. Surface water from surrounding lakes was considered as a viable alternative to meet projected demands.

Recommendations

The recommended strategy for the Lamar County steam electric WUG to meet projected demands during the planning period is to purchase raw water from the City of Paris's Pat Mayse Lake. A capital cost is not included for this alternative since Panda's steam electric facilities are already in place.

4.8.13 Marion County

There are no entities with actual shortages in Marion County.

4.8.14 Morris County

There are no entities with actual shortages in Morris County.

4.8.15 Rains County

South Rains WSC (CO)

Description / Discussion of Needs

South Rains WSC provides water service in Rains County. The WUG population is projected to be 2,706 in 2010 and 3,604 in the year 2060. The WSC has a contract for water supply with the City of Emory for 264 ac-ft/yr. The WSC is projected to have a deficit of 160 ac-ft in 2010 and increasing to a deficit of 277 ac-ft by 2060.

Evaluated Strategies

There were four strategies considered to meet South Rains WSC's water supply shortages. Advanced conservation was considered because the per capita use per day was greater than the 140 gpcpd 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 WSC is planning on continuing to purchase surface water from the City of Emory.

Recommendations

Surface water purchase from the City of Emory is the recommended strategy to meet South Rains WSC's needs.

4.8.16 Red River County

There are no entities with actual shortages in Red River County

4.8.17 Smith County

4.8.17.1 Crystal Systems Inc. (CSI)

Description / Discussion of Needs

Crystal Systems Inc. provides water service in northwestern Smith County in the Hideaway Lake Community. The CSI service area is bounded on the north by Duck Creek WSC, on the east by the City of Lindale and Lindale Rural WSC, and on the south by Southern Utilities Company. Crystal Systems Inc. is 92% in Region D and 8% in Region I. In 2003, the WSC served 1,700 connections. The projected population is 3,740 in the year 2010 and is projected to be 7,204 in the year 2060. The projected population in Region D is 3,419 in the year 2010 and is projected to be 6,649 in the year 2060. This evaluation is for the Region D portion and assumes demands in Region D will be met with supplies in Region D. Crystal Systems Inc. is included as a water user group for Smith County. The system is served by three wells from the Carrizo-Wilcox Aquifer with a total pumping capacity of 1,940 gpm, or 1,043 ac-ft/yr on an average annual basis. The Region D portion would be 960 ac-ft/yr. Crystal Systems Inc. is projected to have a water supply deficit of 45 ac-ft/yr in 2040 increasing to a deficit of 425 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was considered because the per capita use per day of 186 is greater than the 140 gpcpd threshold set by the water planning group. Water reuse was omitted from consideration because CSI does not have a centralized sewerage collection system. Surface water alternatives were not considered since a surface water supply source is not available within reasonable proximity.

Recommendations

The recommended strategy for Crystal Systems Inc. to meet their projected deficit of 45 ac-ft in the year 2040 and 425 ac-ft in the year 2060 would be to construct two additional water wells in the Carrizo-Wilcox Aquifer. One well with a total rated capacity of 500 gpm would provide approximately 269 ac-ft/yr each or 538 ac-ft/yr total for two wells. The wells will need to be constructed prior to the year 2040 and 2060. The supply source will be the Carrizo-Wilcox Aquifer in the Sabine Basin, Smith County. The aquifer has an adequate supply to meet the projected needs of Crystal Systems Inc.

4.8.17.2 Lindale Rural WSC

Description / Discussion of Needs

Lindale Rural WSC provides water service in northern Smith County. The LR WSC service area is bounded on the west by Duck Creek WSC, Crystal Systems Inc., and the

City of Lindale, on the north by the Sabine River, on the east by Sand Flat WSC, and on the south by Southern Utilities Company. Lindale Rural is 48% in Region D and 52% in Region I. In 2003, the WSC served 2,346 connections. The projected population is 5,135 in the year 2010 and is projected to be 9,828 in the year 2060. The projected population in Region D is 2,421 in the year 2010 and is projected to be 4,709 in the year 2060. This evaluation is for the Region D portion and assumes demands in Region D will be met with supplies in Region D. Lindale Rural WSC is included as a water user group for Smith County. The system is served by five wells from the Carrizo-Wilcox Aquifer with a total pumping capacity of 2,045 gpm, or 1,100 ac-ft/yr on an average annual basis. The Region D portion would be 528 ac-ft/yr. Lindale Rural WSC is projected to have a water supply deficit of 77 ac-ft/yr in 2050 increasing to a deficit of 189 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was considered because the per capita use per day of 149 is greater than the 140 gpcpd threshold set by the water planning group. Water reuse was omitted from consideration because the WSC does not have a centralized sewerage collection system. Surface water alternatives were not considered since surface water supply source is not available within reasonable proximity.

Recommendations

The recommended strategy for Lindale Rural WSC to meet their projected deficit of 77 ac-ft in the year 2050 and 189 ac-ft in the year 2060 would be to construct one additional water well in the Carrizo-Wilcox Aquifer. One well with a total rated capacity of 400 gpm would provide approximately 215 ac-ft/yr. The well will need to be constructed by the year 2050. The supply source will be the Carrizo-Wilcox Aquifer in the Sabine Basin, Smith County. The aquifer has an adequate supply to meet the projected needs of LR WSC.

4.8.17.3 City of Lindale

Description / Discussion of Needs

The City of Lindale provides water service within its corporate boundaries in northern Smith County. The City of Lindale service area is bounded on the north and west by Duck Creek WSC and Crystal Systems Inc., and the Lindale Rural WSC on the east and the south. The City of Lindale is 91% in Region D and 9% in Region I. In 2003, the City served 1,860 connections. The projected population is 3,724 in the year 2010 and is projected to be 7,683 in the year 2060. The projected population in Region D is 3,051 in the year 2010 and is projected to be 7,010 in the year 2060. This evaluation is for the Region D portion and assumes demands in Region D will be met with supplies in Region D. The City of Lindale is included as a water user group for Smith County. The system is served by four wells from the Carrizo-Wilcox Aquifer with a total pumping capacity of 2,300 gpm, or 1,237 ac-ft/yr on an average annual basis. The Region D portion would be 1,126 ac-ft/yr. The City of Lindale is projected to have a water supply deficit of 101 ac-ft/yr in 2050 increasing to a deficit of 374 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was considered because the per capita use per day of 204 is greater than the 140 gpcpd threshold set by the water planning group. Water reuse was omitted from consideration because the City does not have an industrial end user needing that capacity. Surface water alternatives were not considered since groundwater is less expensive to treat and is available in larger quantities in this area.

Recommendations

The recommended strategy for the City of Lindale to meet their projected deficit of 101 ac-ft in the year 2050 and 374 ac-ft in the year 2060 would be to construct one additional water well in the Carrizo-Wilcox Aquifer. One well with a total rated capacity of 700 gpm would provide approximately 376 ac-ft/yr. The well will need to be constructed by the year 2050. The supply source will be the Carrizo-Wilcox Aquifer in the Sabine Basin, Smith County. The aquifer has an adequate supply to meet the projected needs of the City of Lindale.

4.8.17.4 City of Winona

Description / Discussion of Needs

The City of Winona provides water service to the residents within its corporate boundary in central northern Smith County. The City of Winona service area is bounded on the north, west and south by Sand Flat WSC and on the east by Star Mountain WSC. In 2003, the City served 270 connections. The projected population is 586 in the year 2010 and is projected to be 1,135 in the year 2060. The City of Winona is included as a water user group for Smith County. The system is served by one well from the Carrizo-Wilcox Aquifer with a total pumping capacity of 400 gpm, or 215 ac-ft/yr on an average annual basis and a water purchase contract with Smith County WCID No. 1. The City of Winona is projected to have a water supply deficit of 5 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was considered because the per capita use per day of 147 is greater than the 140 gpcpd threshold set by the water planning group. Water reuse was omitted from consideration because the WSC does not have a centralized sewerage collection system. Surface water alternatives were not considered since surface water treatment is not practical for a system of this size.

Recommendations

The recommended strategy for the City of Winona to meet their projected deficit of 5 ac-ft in the year 2060 would be to increase their contract with Smith County WCID No. 1. The supply source will be the Carrizo-Wilcox aquifer in the Sabine Basin, Smith County. The aquifer has an adequate supply to meet the projected needs of City of Winona.

4.8.17.5 Star Mountain WSC (CO)

Description / Discussion of Needs

Star Mountain WSC provides water service in northeastern Smith County. The SMWSC service area is bounded on the west by Sand Flat WSC, on the north by the Sabine River, on the east by Starrville WSC, and on the south by Smith County WCID No. 1. In 2003, the WSC served 452 connections. The projected population is 1,190 in the year 2010 and is projected to be 2,313 in the year 2060. Star Mountain WSC is included in the County Other water user group for Smith County. The system is served by three wells from the Carrizo-Wilcox Aquifer with a total pumping capacity of 400 gpm, or 215 ac-ft/yr on an average annual basis. Star Mountain WSC is projected to have a water supply deficit of 1 ac-ft/yr in 2040 increasing to a deficit of 83 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was considered because the per capita use per day of 161 is greater than the 140 gpcpd threshold set by the water planning group. Water reuse was omitted from consideration because the WSC does not have a centralized sewerage collection system. Surface water alternatives were not considered since surface water supply source is not available within reasonable proximity.

Recommendations

The recommended strategy for Star Mountain WSC to meet their projected deficit of 1 ac-ft in the year 2040 and 83 ac-ft in the year 2060 would be to construct one additional water well in the Carrizo-Wilcox Aquifer. One well with a total rated capacity of 200 gpm would provide approximately 108 ac-ft/yr. The well will need to be constructed by the year 2040. The supply source will be the Carrizo-Wilcox Aquifer in the Sabine Basin, Smith County. The aquifer has an adequate supply to meet the projected needs of SM WSC.

4.8.18 Titus County

4.8.18.1 Steam Electric

Description / Discussion of Needs

The Steam Electric WUG in Titus County has a demand that is projected to grow from 51,804 ac-ft/yr in 2010 to 101,329 ac-ft/yr in 2060. Both Luminant and SWEPCO have plants in Titus County. Steam electric is projected to have a deficit of 4,681 ac-ft/yr in 2040 and increasing to a deficit of 33,914 ac-ft/yr in 2060.

Evaluated Strategies

Three strategies were considered to meet the Titus County Steam Electric WUGs water supply shortages. In this round of planning, estimates were not made for electric power water conservation because data on operating strategies for each power plant was not available. Groundwater is also not feasible due to questionable reliability and the large quantity required for a steam electric facility. Surface water from surrounding lakes was considered as a viable alternative to meet projected demands.

Recommendations

The recommended strategy for the Titus County steam electric WUG to meet projected demands during the planning period is to purchase raw water from the Northeast Texas MWD. The MWD receives supplies from several lakes, and Lake O the Pines has the largest yield. At this stage it is assumed that the steam electric water needs will be met from this lake.

4.8.19 Upshur County

There are no entities with actual shortages in Upshur County.

4.8.20 Van Zandt County

4.8.20.1 City of Canton

Description / Discussion of Needs:

The City of Canton provides water service in Van Zandt County. The TWDB estimated population is 3,537 in the year 2010 and is projected to be 4,613 in the year 2060. The City relies on groundwater from the Carrizo-Wilcox with a total pumping capacity of 530 GPM, or 285 ac-ft/yr and from Mill Creek Lake with 706 ac-ft/yr. Canton is projected to have a water supply deficit of 29 ac-ft/yr beginning 2030 and increasing to a deficit of 161 ac-ft/yr by 2060. The system is bordered by Myrtle Springs WSC to the Northwest and Mac Bee WSC to the Southwest.

The City's per capita water consumption is quite high for Region D, at 238 gpcpd. This could very likely be the result of the First Monday Trades Days, which occur each month. The City through its consulting engineer has expressed disagreement with the TWDB population projections, suggesting that the 2060 service population may be as high as 34,000. The City filed the following comment:

"The population projections do not take into account the additional water demand resulting from the monthly First Monday Trades Days. Depending on the month or season, this recurring event brings 200,000 to 400,000 visitors to the City for four consecutive days each month. Many of these visitors stay overnight."

Evaluated Strategies

Advanced conservation was considered because the 238 gallons per capita per day use was above the 140 gpcpd threshold set by the water planning group. However, the projected savings is minimal in comparison to the predicted shortage and the cost of conservation is higher than that of groundwater. Water reuse including both direct and indirect reuse, was evaluated as a feasible water conservation and supply strategy. Groundwater and surface water alternatives were also considered because the City is currently using well water and also looking at the feasibility of constructing another lake.

Recommendations

One recommended strategy for the City of Canton to meet their projected water deficit of 29 ac-ft in the year 2030 and 161 ac-ft in the year 2060 would be to construct two additional wells. These would be similar to their existing well with a capacity of 180 gpm each for a total of 194 ac-ft/yr. The recommended wells would be in the Carrizo-Wilcox aquifer in Van Zandt County. 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.

Copies of resolution of support from Grand Saline, Willis Point, and Edgewood are included in the Appendix C.

4.8.20.2 Corinth WSC (CO)

Description / Discussion of Needs:

Corinth WSC provides water service in Van Zandt County south of U.S.80 and north of I-20. In 2004, the WSC served 310 connections. The estimated population is 901 in the year 2010 and is projected to be 1,511 in year 2060. The system relies on three groundwater wells, which provide water from the Carrizo-Wilcox Aquifer with a total rated pumping capacity of 320 GPM or 172 ac-ft/yr. The system is projected to have a deficit of 6 ac-ft/yr in 2050 and increasing to a deficit of 23 ac-ft/yr in 2060. Corinth WSC is included in the County Other water user group for Van Zandt County.

Evaluated Strategies

There were four strategies considered to meet Corinth WSC water supply. Advanced conservation was not selected because the per capita use per day was below 140 gpcpd threshold set by the water planning group. Water reuse was omitted from consideration because the WSC does not have a centralized sewerage collection system. Surface water alternatives were omitted since there is not a supply source within close proximity to the WSC. A groundwater alternative was considered.

Recommendations

The recommended strategy for Corinth WSC to meet their projected deficit of 6 ac-ft in the year 2050 and 23 ac-ft in the year 2060 would be to construct one additional well in the Carrizo-Wilcox aquifer about 500 ft deep. A well with a total pumping capacity 50 gpm or 27 ac-ft/yr has sufficient capacity to meet their shortages through the year 2060.

4.8.20.3 Crooked Creek WSC (CO)

Description / Discussion of Needs:

Crooked Creek WSC provides water service in Van Zandt County. In 2004, the WSC served 265 connections. The estimated population is 717 in the year 2010 and is projected to be 1,204 in the year 2060. Crooked Creek WSC is included in the County Other water user group for Van Zandt County. The system relies on one well in the Carrizo-Wilcox aquifer with a total pumping capacity of 185 gpm, or 99 ac-ft/yr. The system is projected to have a water supply deficit of 8 ac-ft/yr in 2020 and increasing to 56 ac-ft/yr by 2060 The WSC is adjacent to rural roads between FM 859 and state highway 9.

Evaluated Strategies

There were four strategies considered to meet Crooked Creek WSC water supply shortages. Advanced conservation was not selected because the per capita use per day was below 140 gpcpd threshold set by the water planning group. Water reuse was omitted because the WSC does not have a demand for non-potable water and there is no central wastewater treatment facility. The WSC is considering contracting with City of Canton for surface water. A groundwater alternative was also considered for the WSC.

Recommendations

Comparison of cost shows that groundwater is the economical alternative compared to surface water. The recommended strategy for the Crooked Creek WSC would be to construct a groundwater well. The recommended supply source will be the Carrizo-Wilcox aquifer in Van Zandt County. A well with a rating of 110 gpm would provide approximately 59 acre-feet on an annualized basis.

4.8.20.4 Edom WSC (CO)

Description / Discussion of Needs:

Edom WSC is included in the County Other water user group and provides water service in Van Zandt and Henderson Counties. In 2004, the WSC served a total of 470 connections. Approximately 78% of the population served resides in Van Zandt County. The estimated population in Van Zandt County is 1,056 in the year 2010 and is projected to be 1,771 in the year 2060. The system relies on four wells with a total pumping capacity of 340 gpm, or 183 ac-ft/yr. Edom WSC is planning a future well with a total pumping capacity of 80 to 120 gpm in the year 2006. In Van Zandt County, the system is projected to have a water supply deficit of 16 ac-ft/yr in 2020 and increasing to 86 ac-ft/yr in 2060.

Evaluated Strategies

There were four strategies considered to meet Edom WSC water supply shortages. Advanced conservation was not selected because the per capita use per day was below 140 gpcpd threshold set by the water planning group. Water reuse is not feasible because the WSC does not have a centralized sewerage collection system. Groundwater was considered. Surface water from the City of Tyler, which is 16 miles away, was also considered.

Recommendations

The recommended strategy for Edom WSC to meet their projected deficit of 86 ac-ft would be to construct one 80 gpm well, in addition to the 80 to 100 gpm well already in their plan. These two wells have a yield of 86 ac-ft/yr, sufficient to meet projected demand up to 2060. Edom WSC currently has a total storage that exceeds TCEQ requirements.

4.8.20.5 Fruitvale WSC (CO)

Description / Discussion of Needs:

Fruitvale WSC provides water service in Van Zandt County. In 2004, the WSC served 1063 connections. The estimated population is 3,087 in the year 2010 and is projected to be 5,179 in the year 2060. Fruitvale WSC is included in the County Other water user group for Van Zandt County. The system relies on twelve wells into the Carrizo Wilcox with a total pumping capacity of 742 gpm, or 398 ac-ft/yr. The WSC is projected to have a deficit of 64 ac-ft/yr in 2020 and increasing to a deficit of 269 ac-ft/yr in 2060.

Evaluated Strategies

There were four strategies considered to meet Fruitvale WSC water supply. Advanced conservation was omitted because the per capita use per day was below 140 gpcpd threshold set by the water planning group. Water reuse was not selected because the WSC does not have a centralized sewer collection system. Surface water alternatives were omitted since there is no viable supply source within close proximity to the WSC. The system plans to continue adding water wells, which are 500 feet deep and have an average capacity of 80 gpm to meet their requirements.

Recommendations

The recommended strategy for Fruitvale WSC to meet their projected water deficit of 64 ac-ft in the year 2020 and 269 ac-ft in the year 2060 would be to construct seven additional 80 gpm, 43 ac-ft/yr, wells. It is recommended that two wells be constructed before 2020, followed by one well before 2030 and then one well around 2040.

Additional wells should be constructed as needed. Fruitvale's existing total storage of 0.305 MG exceeds TCEQ requirements.

4.8.20.6 City of Grand Saline

Description / Discussion of Needs:

The City of Grand Saline provides water service in Van Zandt County. Grand Saline served a population of 3,028 in the year 2000. The population is projected to be 3,312 in 2010 and 4,560 in the year 2060. The City relies on four wells in the Carrizo-Wilcox aquifer with a total rated pumping capacity of 1,175 gpm, or 632 ac-ft/yr. Grand Saline is projected to have a water supply deficit of 39 ac-ft/yr in 2020 and increasing to 185 ac-ft/yr by 2060. The City is bounded by Golden WSC to the east, Pruitt-Sandflat WSC and Corinth WSC to the south, and Fruitvale WSC to the west.

Evaluated Strategies

Advanced conservation was considered because the per capita use per day of 173 gpcpd was above the 140 gpcpd threshold set by the water planning group. Savings resulting from conservation was found to be very small and the cost much higher than other alternatives. Water reuse was not selected because there is no major user for the recycled supply. Surface water alternatives were considered. However the nearby WUGs with surface water surplus do not have adequate capacity for Grand Saline, and there is no regional entity in this vicinity.

Recommendations

The recommended strategy for the City of Grand Saline to meet their projected water deficit of 39 ac-ft in the year 2020 and 185 ac-ft in the year 2060 would be to construct two wells. The first well with a capacity of 300 gpm (161 ac-ft/yr) could be constructed before 2020, and another well with a similar capacity constructed before 2060.

4.8.20.7 Little Hope Moore WSC (CO)

Description / Discussion of Needs:

Little Hope-Moore WSC provides water service in Van Zandt County. In 2004, the WSC served about 550 connections. The population of the WSC is estimated as 1,702 in 2010 and is projected to be 2,855 in the year 2060. Little Hope-Moore WSC is included in the County Other water user group for Van Zandt County. The system relies on five groundwater wells, which provide water from the Carrizo-Wilcox Aquifer. The five wells have a total rated pumping capacity of 384 gpm, or 207 ac-ft/yr. The WSC is projected to have a water supply deficit of 13 ac-ft/yr in 2010 and increasing to 161 ac-ft/yr in 2060.

Evaluated Strategies

There were four alternative strategies considered to meet Little Hope-Moore WSC's water supply shortages. Water conservation was omitted because the per capita use per day was below the 140 gpcpd threshold set by the water planning group. Water reuse was not selected because the WSC does not have a centralized sewer collection system. Surface water and groundwater from the Carrizo Wilcox were also considered as alternatives for the WSC.

Recommendations

The recommended strategy for Little Hope-Moore WSC to meet their projected water deficit of 13 ac-ft in the year 2010 and 161 ac-ft in the year 2060 would be to drill additional wells. A 70 gpm well would yield approximately 38 ac-ft/yr, which is enough to meet needs in 2010. Four other wells of similar capacity should be drilled in successive decades to meet projected demands. The alternative would be to purchase water from the City of Edgewood.

4.8.20.8 RPM WSC

Description / Discussion of Needs:

RPM WSC provides water services in southeast Van Zandt County. The system is projected to serve 1556 people in 2010 and 2610 people by the year 2060. The current sources of supply are four wells into the Carrizo Wilcox with a total production capacity of 606 gpm. RPM provides water to its own customers in the Neches river basin and is projected to have a water supply deficit of 10 ac-ft/yr in 2060. The system does have a water conservation plan or drought management plan in place.

Evaluated Strategies

Four strategies were considered to meet RPM's water supply needs. Advanced conservation is not applicable since per capita use is less than 140 gpcpd. There are no significant water needs in RPM that could be met by water reuse. Surface water alternatives were omitted since there are no nearby entities with enough water to sale. Groundwater from the Woodbine Aquifer was the alternative selected for this entity.

Recommendations

In order to meet the projected deficit in 2060, a new well with a rated capacity of 120 gpm should be drilled before 2060. This well will provide an additional 65 ac-ft/yr sufficient to meet the demand up to 2060.

4.8.20.9 City of Van

Description / Discussion of Needs:

The City of Van provides water service in Van Zandt County. The estimated population is 2,725 in the year 2010 and is projected to be 4,319 in the year 2060. The City relies on groundwater from the Carrizo-Wilcox with a total pumping capacity of 1,205 GPM, or 648 ac-ft/yr. Van is projected to have a water supply deficit of 25 ac-ft/yr beginning 2050 and increasing to a deficit of 83 ac-ft/yr by 2060.

Evaluated Strategies

Advanced conservation was considered because the 164 gallons per capita per day use was above the 140 gpcpd threshold set by the water planning group. However, the projected savings is minimal in comparison to the predicted shortage and the cost of conservation is much higher than that of groundwater. Water reuse was omitted because the City does not have a demand for non-potable water at this time. The surface water alternative was omitted because of the small deficit which occurs later in the planning period. Groundwater from the Carrizo-Wilcox was the strategy selected for this entity.

Recommendations

The recommended strategy for the City of Van to meet their projected water deficit of 25 ac-ft in the year 2050 and 83 ac-ft in the year 2060 would be to construct one additional well, similar to their existing well, with a capacity of 250 gpm, or a total of 134 ac-ft/yr. The recommended wells will be in the Carrizo-Wilcox aquifer in Van Zandt County.

4.8.21 Wood County

4.8.21.1 City of Mineola

Description / Discussion of Needs

The City of Mineola is located in southwestern Wood County and serves the incorporated city limits and approximately 175 connections adjacent to the city. In 2003 the system had 2,123 residential connections. The population is projected to increase from 5,681 persons in 2010 to 6,858 persons in 2060. The City of Mineola is included in the City and County Other water user groups for Wood County. The system's current water supply consists of three water wells in the Carrizo-Wilcox Aquifer. The total rated capacity of these three wells is 1750 gpm, which equates to 941 ac-ft/yr on an annual average basis. The city provides 22 ac-ft/yr to the Manufacturing WUG in Wood County. The system is bounded on the north and west by Ramey WSC, on the east by New Hope WSC and on the south by the Sabine River. The City of Mineola does have a water conservation plan and a drought management plan. The City of Mineola is projected to have a water supply deficit of 203 ac-ft/yr in 2010 increasing to a deficit of 360 ac-ft/yr in 2060.

Evaluated Strategies

Advanced conservation was considered because the per capita use per day of 184 is greater than the 140 gpcpd threshold set by the water planning group. Water reuse was omitted from consideration because the City does not have a demand for non-potable water at this time. Surface water alternatives were not considered since surface water treatment is not economically feasible for a system when groundwater is readily available.

Recommendations

Since the water conservation alternative does not provide sufficient savings to overcome the deficits, the recommended strategy for the City of Mineola to meet their projected deficit of 203 acre-feet in the year 2010 and 360 acre-feet in the year 2060 would be to construct one additional water well similar to their largest existing well. The recommended supply source will be the Carrizo-Wilcox Aquifer in Wood County. A well with rated capacity of 750 gpm would provide approximately 403 acre-feet on an annualized basis. The Carrizo-Wilcox Aquifer in Wood County is projected to have a more than ample supply availability to meet the needs of the City of Mineola for the planning period.

Table 4.41 Recommended Strategies and Cost for WUG's with Actual Shortages

			Shortage (ac-ft/yr)				Capital Cost
Year	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**	
Bowie County							
Camp County							
Cass County							
Delta County							
Franklin County							
Gregg County							
Clarksville City	162	162	162	242	242	242	$1,686,494
Liberty City WSC	0	0	0	94	188	376	$1,535,841
West Gregg SUD	0	0	70	140	210	350	$1,973,197
Harrison County							
Waskom	92	138	138	185	231	231	$718,665
Hopkins County							
Hunt County							
Campbell WSC	108	108	108	108	108	108	$805,668
Celeste	0	0	0	0	0	63	$2,547,115
Hickory Creek SUD	0	0	0	269	807	1,613	$7,831,144
Wolfe City	0	0	20	34	66	114	$3,652,074
Lamar County							
Steam Electric			980			7474	
Marion County							
Morris County							
Rains County							
Red River County							
Smith County							
Crystal Systems Inc.	0	0	0	269	269	269	$1,303,789
Lindale Rural WSC	0	0	0	0	215	215	$413,194
Lindale	0	0	0	0	376	376	$669,409
Titus County							
Steam Electric							
Upshur County							
Van Zandt County							
Canton	0	0	97	97	194	194	$939,729
Canton (alternate)	0	0	5,825	5,825	5,825	5,825	$6,530,924
Grand Saline	161	161	161	161	161	161	$749,549
R P M WSC	0	0	0	0	0	65	$449,135
Van	0	0	0	0	134	134	$562,963
Wood County							
Mineola	403	403	403	403	403	403	$313,958
TOTALS (all counties)	**926**	**972**	**6,984**	**7,827**	**9,429**	**10,739**	**$32,712,848**

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CHAPTER 5.0 IMPACTS OF WATER MANAGEMENT STRATEGIES ON KEY PARAMETERS OF WATER QUALITY AND IMPACTS ON MOVING WATER FROM RURAL AND AGRICULTURAL AREAS

5.1 IMPACTS – WATER QUALITY

The NETRWPG has identified 61 water user groups with shortages, which will require strategies The North East Texas Regional Water Planning Group (NETRWPG) has identified 61 Water User Groups with shortages, which will require strategies in this plan. Twenty-one of these shortages will be resolved by simply extending existing water purchase contracts, and will not require capital expenditure or new sources of supply. Of the remaining 40, 31 shortages will be resolved with additional groundwater supplies, one with both groundwater and surface water, one will require Texas Commission on Environmental Quality (TCEQ) water right permit, and 13 will involve increasing the maximum quantity of taking under existing surface water purchase contracts. Four of these 13 will require additional surface water provided by the Toledo Bend Pipeline project of the Sabine River Authority.

Chapter 357.7(a)(12) of the regional water planning guidelines provide that the plan shall include

> "a description of the major impacts of the recommended water management strategies on key parameters of water quality identified by the regional water planning group as important to the use of water resources and comparing conditions with the recommended water management strategies to current conditions using best available data."

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 TCEQ, and are summarized in Tables 5.1 through 5.4.

Table 5.1 Parameters of Water Quality – Inorganic Compounds

Contaminant	Max Contaminant Level (MCL) (mg/L)
Antimony	0.005
Arsenic	0.05
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 5.2 Parameters of Water Quality – 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 5.3 Parameters of Water Quality – Volatile Organic Compounds

Contaminant	MCL (mg/L)
1,1-Dichloroethylene	0.007
1,1,1-Trichloroethane	0.2
1,1,2-Trichloroethane	0.005
1,2-Dichloroethane	0.005
1,2-Dichloropropane	0.005
1,2,4-Trichlorobenzene	0.07
Benzene	0.005
Carbon tetrachloride	0.005
Cis-1,2-Dichloroethylene	0.07
Dichloromethane	0.005
Ethylbenzene	0.7
Monochlorobenzene	0.1
o-Dichlorobenzene	0.6
para-Dichlorobenzene	0.075
Styrene	0.1
Tetrachloroethylene	0.005
Toluene	1.0
trans-1,2-Dichloroethylene	0.1
Trichloroethylene	0.005
Vinyl chloride	0.002
Xylenes (total)	10.0

Table 5.4 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

The 31 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 groundwater availability models where possible, and the capacities of the aquifer have been determined adequate 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 eleven 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 5.5:

Table 5.5 WUGs Needing Additional Contractual Supply

WUG	Reservoir	Reservoir Capacity (ac-ft/yr)	Additional Needed (ac-ft/yr) 2060	% of Permitted Capacity
Bi-County WSC	Lake Bob Sandlin	213,350	653	0.3
Ben Franklin WSC	Big Creek Lake	4,890	36	0.7
Steam Electric, Harrison	Lake O' The Pines	254,900	12,914	5.1
Campbell WSC	Lake Tawakoni	927,440	665	0.1
Celeste	Lake Tawakoni	927,440	108	0.0
Wolf City	Lake Tawakoni	927,440	114	0.0
Little Creek Acres	Lake Tawakoni	927,440	153	0.0
Petty WSC	Pat Mayse Lake	124,500	20	0.0
Manufacturing, Cass	Lake O' The Pines	254,900	50,471	19.8
Steam Electric, Lamar	Pat Mayse Lake	124,500	7,474	6.0
Steam Electric, Titus	Lake O' The Pines	254,900	40,992	16.1

Four surface water strategies involve moving water by pipeline from Toledo Bend Reservoir in the lower Sabine River Basin to Lake Tawakoni or Lake Fork in the upper Sabine. These strategies are summarized in Table 5.6:

Table 5.6 WUGs Moving Water from Toledo Bend

WUG	Needed from Toledo Bend (2060) (ac-ft/yr)
Able Springs WSC	143
Cash SUD	4,922
Combined Consumers SUD	3,715
Steam Electric, Hunt Co.	23,902
TOTAL	**32,682**

By the end of the 50 year planning period, the NETRWPG area needs due to these strategies will total 32,682 ac-ft per year. The capacity of the Toledo Bend Reservoir is 4,412,300 ac-ft. While it is anticipated that the detailed environmental and water quality studies will be performed by the project sponsors during the development of the project, for planning purposes the annual withdrawal of 0.7% of the reservoir contents can be considered negligible.

The pipeline project could result in the addition of Toledo Bend Water to Lake Fork and/or Lake Tawakoni. Detailed studies will be required to determine the water quality impacts. Water chemistry will likely be different in the various reservoirs. For example, Lake Fork and Toledo Bend are located in the Piney Woods physiographic region, while Tawakoni is in the Blackland Prairie. Thus the runoff quality may differ. All 3 reservoirs are currently used for water supply, however, demonstrating that the various waters are treatable with conventional techniques. Table 5.7 compares key water quality parameters for the upper and lower basins, and shows no significant difference in water quality.

Table 5.7 Water Quality Comparison

7-year average (September 2002-August 2009)

Parameter	Units	Upper Sabine Basin		Lower Sabine Basin
		Lake Fork	Lake Tawakoni	Toledo Bend
Temperature,	C^o	19.57	19.14	21.59
pH		7.6	8.18	7.57
DO	mg/l	8.27	8.76	8.6
Turbidity	NTU	2.58	5.78	2.22
Nitrite	mg/l	0.02	0.02	0.03
Nitrate	mg/l	0.09	0.13	0.06
TOC	mg/l	7	6	5.95
Chlorides	mg/l	15.36	5.21	16.66
Sulfates	mg/l	19.5	9.4	17.9

Source: Sabine River Authority of Texas (SRA-TX) Monthly Water Quality Monitoring Program (WQMP) data used in Texas Clean Rivers Program (TCRP) water quality analysis for the "Sabine River Basin Highlights 2009" Report (http://www.sratx.org/srwmp/tcrp/state_of_the_basin/basin_highlights/). Seven year averages of monthly data, September 2002 - August 2009. This report was prepared in cooperation with the Texas Commission on Environmental Quality under the authorization of the Texas Clean Rivers Act.

The "Sabine River Basin Highlights 2009" Report indicates that all three reservoirs have uses including aquatic life, contact recreation, public water supply, fish consumption and general uses. According to that report Lake Fork is fully supporting for all listed uses. Lake Tawakoni is fully supporting for all uses except the aquatic life category. This category is of concern because of depressed dissolved oxygen levels in certain areas of the reservoir. Toledo Bend is fully supportive of contact recreation, public water supply and general uses. Aquatic life uses are of concern in that fish consumption is impacted by mercury levels in largemouth bass and freshwater drum species.

The project is still in conceptual phase, so the exact withdrawal and discharge locations and details are unknown. It is possible that there could be no impact at all on Lake Fork or Tawakoni if Toledo Bend water is piped directly to the treatment facility. If the Toledo Bend water is discharged into one or both of the reservoirs, the effect on dissolved oxygen levels could be positive or negative, depending on factors such as initial D.O., intake and discharge locations, discharge details, and others, most of which are not presently known.

5.2 IMPACTS OF MOVING WATER FROM RURAL AND AGRICULTURAL AREAS

Chapter 357.7 rules require that the plan include an analysis of the impacts of strategies which move water from rural and agricultural areas. As previously noted, strategies were identified for 40 entities in the NETRWPG area. Thirty-one of these strategies involve drilling of wells for use in the immediate vicinity of the well. Nine of these strategies involve surface water which is taken from a reservoir within the same proximity as the water user group.

Table 5.8 Surface Water Strategies – WUG and Supplier

WUG	County of Use	Reservoir	County of Origin
Bi-County WSC	Titus/Upshur/Camp	Lake Bob Sandlin	Titus
Ben Franklin WSC	Delta	Big Creek Lake	Delta
Steam Electric, Harrison	Harrison	Lake O' The Pines	Marion/Morris
Campbell WSC	Hunt	Lake Tawakoni	Hunt/Rains
Celeste	Hunt	Lake Tawakoni	Hunt/Rains
Wolf City	Hunt	Lake Tawakoni	Hunt/Rains
Little Creek Acres	Hunt	Lake Tawakoni	Hunt/Rains
Petty WSC	Lamar	Pat Mayse Lake	Lamar
Manufacturing, Cass	Cass	Lake O' The Pines	Marion/Morris
Steam Electric, Lamar	Lamar	Pat Mayse Lake	Lamar
Steam Electric, Titus	Titus	Lake O' The Pines	Marion/Morris

The four remaining strategies move water from the Toledo Bend Reservoir, which would be considered a rural and agricultural area, to Lake Tawakoni and/or Lake Fork, for use in Hunt County which is also a rural and agricultural area. The water remains in the same river basin, and under control of the same river authority. The amount being moved for use in Region D is less than 0.7% of the capacity of Toledo Bend, and are in excess of the needs of Region I in which Toledo Bend is located. The impacts of moving the proposed quantity of water would be negligible on agricultural interests in the Toledo Bend area.

While not a strategy of the NETRWPG, it should be noted that Region C may propose construction of Marvin Nichols Reservoir in the NETRWPG area. Transfer of water from Marvin Nichols to 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 the last 3 studies, which reached widely divergent conclusions. Impacts of the Marvin Nichols project are further discussed in Chapter 7.

5.3 SOCIOECONOMIC IMPACTS OF UNMET NEEDS

Section 357.7 of the regional water planning rules requires the planning groups to evaluate the social economic impacts of failure to meet projected water shortages. At the request of the NETRWPG, the Texas Water Development Board provided technical assistance in the

preparation of socioeconomic impact assessment. This assessment is included in its entirety in the Appendix of this plan.
Quoting from the TWDB analysis:

> "If drought of record conditions return and water supplies are not developed, the study results indicate that Region D could suffer significant losses. If such conditions occurred in 2010 lost income to residents in the region could approach $135 million with associated job losses of 1,060. State and local governments could lose $23 million in tax receipts. If such conditions occurred in 2060 income losses could run $321 million and job losses could be as high as 2,595. Nearly $50 million worth of state and local taxes would be lost. The majority of the impacts stem from projected water shortages for manufacturing firms. Reported figures are probably conservative because they are based on estimated costs for a single year; but in much of Texas the drought of record lasted several years. For example in 2030 models indicate that shortages would cost residents and businesses in the region $175 million in lost income. Thus, if shortages lasted for three years, total income losses related to unmet needs could easily approach $525 million."

Table 5.9 Annual Economic Impacts of Unmet Water Needs
(years 2010, 2020, 2030, 2040, 2050 and 2060, constant year 2000 dollars)

Year	Sales ($millions)	Income ($millions)	Jobs	State and Local Taxes ($millions)
2010	$163.97	$134.65	1,060	$22.58
2020	$178.69	$145.47	1,150	$23.93
2030	$228.12	$175.03	1,460	$27.44
2040	$270.88	$208.58	1,735	$32.68
2050	$340.95	$267.03	2,190	$42.23
2060	$404.47	$321.01	2,595	$50.02
*Impacts at the county level are in the main body of the report (see Attachment A). Source: Texas Water Development Board, Office of Water Resources Planning				

Other findings from the analysis include:

- The lost income would occur principally in the steam electric category (about 273 million dollars), with measurable losses in the manufacturing and municipal categories as well.
- Failure to meet projected water needs would result in a population loss of 4,520 people over the planning period.
- No unmet needs were reported to the NETRWPG for livestock, mining, or irrigations needs, and thus there are no predicted impacts.
- By 2060, failure to meet projected water needs would result in the loss of 2,130 jobs in the steam-electric industry, and 450 lost in manufacturing jobs in the NETRWPG area.

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CHAPTER 6.0 WATER CONSERVATION AND DROUGHT MANAGEMENT RECOMMENDATIONS

The Texas Administrative Code (TAC) defines conservation as "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." According to the 2007 State Water Plan, "conservation accounts for nearly 23% of the projected additional water supply needed in 2060 – a total of about two million acre-feet per year, which is enough to supply half of the current annual municipal use in Texas." Municipal water use accounts for 30%, and agricultural water use for 70%, of the total water savings attributable to water conservation strategies recommended in the 2007 State Water Plan. Agricultural savings will have limited impact on Region D, as only 6% of total water use is for agricultural purposes in the North East Texas Region. A history of legislation relating to water conservation in regional planning is provided below.

In 2001, the 77th Legislature began to focus on water conservation and drought management by requiring regions to consider water conservation strategies to meet projected water shortages. In addition, regions were to develop model water conservation and drought contingency plans and include them in the regional water plans as a tool for local entities to use in preparation of their own required plans. 30 TAC Chapter 288 was created, outlining minimum requirements for the plans as well as rules stipulating who was required to develop the plans and when they should be submitted.

In 2003, the 78th Legislature continued the focus on issues related to water conservation. One of the results was the passage of Senate Bill 1094, which established the Water Conservation Implementation Task Force. This task force was a 32-member group representing 16 different entities and interest groups from throughout the state. The Texas Water Development Board (TWDB) Executive Administrator served as the presiding officer of the Task Force. Its charge was to review, evaluate, and recommend optimum levels of water use efficiency and conservation for the State, and to develop a best management practices guide for use by planning groups and political subdivisions responsible for water delivery service. Issues considered were (1) best management practices, (2) implementation of conservation strategies contained in regional water plans, (3) a statewide public awareness program, (4) state funding of incentive programs, (5) goals and targets for per capita water use considering climatic and demographic differences, and (6) evaluation of state oversight and support of conservation.

A product of this task force was a report published in 2004 entitled, "Water Conservation Implementation Task Force Report to the 79th Legislature." This report made 25 recommendations, several of which are summarized here. The "Best Management Practices (BMP) Guide" was created, and consists of 21 municipal, 14 industrial, and 20 agricultural BMPs (TWDB Report 362). The Task Force did not suggest a mandatory set of BMPs across the state, preferring for individual groups to choose the practices that best fit their needs. The report further examined implementation of water conservation strategies, and determined that "lack of adequate funding posed a significant barrier to many entities trying to implement strategies." In addition, the report discussed unanimous support for a Statewide Public Awareness Program as the foundation of the other recommendations in the report. The Task Force unanimously supported this program, noting that, "Unless the people of Texas can be convinced that everyone needs to routinely practice water conservation, actual conservation success from the other recommendations will be limited." Though this recommendation was not passed by the Legislature, a limited campaign was developed in 2006 called "WATER IQ – Know Your Water" and is in use by several water providers. Another proposition that the task force unanimously supported was the funding of incentive programs which reward water conservation. In addition, the report recommended a standardized methodology for determining total water use and municipal water use in gpcpd, which would provide for more accurate data collection and the determination of effectiveness of programs. Systems should use these water use figures when determining water use targets and goals in water conservation plans. Finally, the report recommended several statutory changes supporting water conservation goals. A recommendation not included in the six main issues was the creation of a standing council to advise the Texas Legislature, TWDB, Texas Commission on Environmental Quality (TCEQ), other state agencies, water suppliers and other political subdivisions, and the public, on matters regarding water conservation. This would be known as the Water Conservation Advisory Council. The Water Conservation Implementation Task Force expired in 2005, as its charge was complete.

Senate Bill 312 was enacted into law in 2001, and directed the TWDB and the Texas State Soil and Water Conservation Board (TSSWCB) to conduct a study of ways to improve and/or expand water conservation efforts in Texas. That study was produced in 2006, and is entitled, "An Assessment of Water Conservation in Texas, Prepared for the 80th Texas Legislature." The agencies utilized the Implementation Task Force's report as well as the 2006 Regional Water Plans as reference, along with their own knowledge and experience to complete the study. This study resulted in four main findings, including: 1) "The 2007 State Water Plan places a greater emphasis on municipal water conservation measures to meet future water supply needs and provides a strong argument for a continued and/or expanded state role in support of municipal water conservation efforts in Texas." TWDB's municipal water conservation programs cannot be continued without general revenue funding from the Legislature, and consideration of restoring that funding was recommended; 2) "Agricultural water conservation has emerged as a significant strategy for meeting the state's future water supply needs and for ensuring that the state's agricultural interests can sustain economic viability into the 21st Century." Several recommendations were made regarding increased funding for agricultural programs, as well as a recommendation to implement a statewide irrigation water use data collection program; 3) "The TSSWCB and TWDB regard the Water Conservation Implementation Task Force recommendation that the state create and fund a statewide water conservation public awareness campaign as a high priority for the Texas Legislature to consider to improve and expand water conservation in Texas", and, finally 4) "The 2007 State Water Plan cites reservoir sedimentation as the primary reason for the decline in surface water availability." Because watershed flood control structures assist in preventing sediment from reducing the capacity of major drinking water reservoirs, it is recommended that funding be established to assist soil and water conservation districts with operation, maintenance, and structural repair for small flood control structures.

Study Commission on Region C Water Supply

During the 80th Legislature session, Senate Bill 3 was approved and the Study Commission on Region C Water Supply was created. The purpose of the Study Commission was to carry out the related responsibilities described by S.B. 3, Section 4.04. As prescribed in S.B. 3, Section 4 (a) the members were appointed as follows:

1. Three members appointed by Region C Regional Water Planning Group; and
2. Three members appointed by Region D Regional Water Planning Group.

The appointments were made as follows:

Region C Members	**Region D Members**
Senator Florence Shapiro	Representative Stephen Frost
Representative Jodie Laubenberg	Thomas F. Ducket
James (Jim) M. Parks	Richard LeTourneau

The related responsibilities as placed on the Study Commission by S.B. 3, Section 4.04 are as follows:

- Review the water supply alternatives available to the Region C Regional Water Planning Area;
- Analyze the socioeconomic effect on the area where the water supply is located that would result from the use of the water to meet the water needs of the Region C Regional Water Planning Area;
- Determine whether water demand in the Region C Regional Water Planning Area may be reduced through additional conservation and reuse measures;
- Evaluate measures that would need to be taken to comply with the mitigation requirements of the United States Army Corps of Engineers in connection with any proposed new reservoirs;
- Consider whether the mitigation burden may be shared by the Regions C and D Regional Water Planning Areas in proportion to the allocation to each region of water in any proposed reservoir;
- Review innovative methods of compensation to affected property owners;
- Evaluate the minimum number of surface acres required for the construction of proposed reservoirs; and
- Identify the locations of proposed reservoir sites and proposed mitigation sites, as applicable, as selected in accordance with existing state and federal law, in the Regions C and D Regional Water Planning Areas.

The Study Commission then hired a consultant, Espey Consultants, Inc., to provide the necessary water planning services for the group. The scope of work described as the primary work of the Region C initially was to demonstrate viable water supply alternatives available to Region C. These alternatives had been identified as Lake Texoma, Toledo Bend Reservoir, Lake Wright Patman, Lake O' the Pines, other existing supplies such as groundwater, or proposed reservoirs. The initial objective was to compile, organize, and summarize existing studies and analysis that have evaluated Region C water supply alternatives. The work was separated into two Tasks: 1) Water Supply Alternatives, 2) Project Approach: Socioeconomic Impacts. Special consideration was given to Lake Wright Patman and Lake O' the Pines by adding an addendum to the original contract. Phase II has been prepared in draft form and presented to the Study Commission.

In 2007, the 80th Legislature passed Senate Bill 3 and House Bill 4, which created the Water Conservation Advisory Council. It consists of 23 members representing a cross-section of water user groups, state agencies, and industry representatives, and its purpose is to provide the Governor, Speaker of the House, Legislature, TWDB, TCEQ, political subdivisions, and the public a select council with expertise in water conservation. Members are appointed by the TWDB. The Council's first report was submitted in 2008 and is entitled, "A Report on Progress of Water Conservation in Texas." This report focuses on three elements that the Council considers essential for success in conservation. Implementation and measurement is the first element, and includes collecting quality data regarding the effectiveness of water conservation programs. The report suggests that there is need for more accurate and more frequent data collection at every level so that the true benefits of conservation efforts can be quantified. The second element is public awareness and recognition. Agreeing with the Implementation Task Force and the TWDB/TSSWCB report, the Water Conservation Advisory Council sees public knowledge and recognition of the need to conserve as paramount to effective conservation programming. It recommends consistent messaging campaigns supported with research and data, as well as public recognition of effective programs. Finally, the Council sees limited training, expertise, and information as a deterrent to effective water conservation planning. It encourages collaboration with existing national efforts to improve resources available to Texans. "WaterSense" is an example of a national water conservation program that could be helpful to Texans.

6.1 EXISTING WATER CONSERVATION & DROUGHT PLANNING

As the State develops its efforts to promote water conservation and to develop funding for water conservation programming, water suppliers continue to be responsible for implementation of water conservation and drought contingency plans at a local level. Since these plans should have been initially completed by 2005, entities have had time to implement the plans and to determine what is working and what is not. Mandated water conservation plan revisions in early 2009 focused attention on tangible results of programs as entities filled out the required implementation reports. These reports led some entities to reassess their programs because they were asked to show quantifiable results of the amount of water conserved.

Title 30 TAC, Chapter 288 (January 10, 2008) requires that all water users holding an existing permit, certified filing, or certificate of adjudication for surface water in the amount of 1,000 acre feet or more for municipal, industrial, and other non-irrigation uses develop, submit, and implement a water conservation plan meeting the requirements of Subchapter A of that chapter. Holders of existing permits, certified filings, or certificates of adjudication for surface water for irrigation uses in the amount of 10,000 acre-feet per year or more shall also develop, submit and implement a plan meeting the same requirements. All water conservation plans were due to the Executive Director of the TCEQ and to the TWDB by May 1, 2009, and every 5 years after that date to coincide with the regional water planning cycle. Plans must include implementation reports, which discuss what strategies were used to conserve water, when they were used, and how effective they were. TCEQ provides an implementation report form on its website at www.tceq.state.tx.us.

All water user groups are required to have a drought contingency plan. For entities serving over 3,300 connections and 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 borrowing more than $500,000 through its various programs.

Databases are maintained on water conservation and drought contingency plans submitted to the Region D Administrator, the TCEQ Resource Protection Division, and the TWDB. These databases were reviewed to determine how many entities in the Region have plans. It is recognized that this is not a complete listing; however, it does give some idea of the level of cooperation in the region. Out of 255 total WUGs in the region, 113 have submitted water conservation and/or drought contingency plans. This represents 44% of the region.

In part, the failure of some systems to emphasize conservation measures is because the North East Texas Region is relatively rich in water resources, and ample rainfall often masks the need for conservation. In addition, some systems see conservation as contrary to their financial goals, since water sales form the backbone of their budgets. Many systems have limited staff and monetary resources, and priorities other than conservation/drought planning consume all available resources. Finally, data compiled through the two rounds of regional planning shows that Region D continues to have one of the lower per capita municipal ratios in the State.

The North East Texas Region has updated its model water conservation plan and drought contingency plans to meet 30 TAC Chapter 288 (revised 2008), and these are provided as Sections 6.5, 6.6 and 6.7 later in this Chapter.

6.2 WATER CONSERVATION STRATEGIES

The planning group determined 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 – should be established at 140 gpcpd. The 140 gpcpd target was selected to coincide with recommendations of the statewide Water Conservation Implementation task force. Using these concepts, a decision matrix was developed (Figure 6.1) to guide consideration of water conservation strategies.

For all municipal use entities, water savings are anticipated in this plan due to plumbing code requirements for low flow fixtures and water saving toilets. Water saving toilets are toilets that use 1.6 gallons per flush as compared to high volume toilets which use 3.5 to 7 gallons per flush. Low flow fixtures include low flow showerheads and faucet aerators. Homes built after 1992 must contain low flow toilets and fixtures due to the implementation of the Texas Plumbing Efficiency Standards. Homes built before 1992 will be converted gradually as older fixtures are replaced. The savings from this “passive conservation” is estimated to be 6.6%, or 587,000 acre-feet statewide by 2060.

Entities for which this plan's demand projections are greater than 140 gpcpd were considered candidates for additional conservation strategies beyond plumbing code requirements. Of 37 municipal water groups with identified actual shortages, 11 were found to have per capita consumption greater than 140 gpcpd. Additional strategies considered were based upon a report commissioned in 2001 by TWDB, performed by GDS Associates, Inc. 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

A clothes washer rebate strategy would include single family, multi-family and commercial (coin-operated) applications. Any family or commercial laundry using high-efficiency clothes washers would be provided a monetary rebate. The cost of these rebates could be shared with the local energy utilities. A washer is considered high-efficiency if is has a water use factor of not more than 9.5 gallons per cubic foot of washer capacity or, on average, 27 gallons per load. Most conventional washers on the market have a water use factor of 13 gallons per cubic foot, or 40.9 gallons per load.

The irrigation audit strategy would allow water utility personnel to identify ways to increase the efficiency and reduce water use in single family, multi-family, and commercial underground irrigation systems. Some recommendations may include, but are not limited to, proper scheduling, repairing breaks or leaks, and replacing broken sprinkler heads. Water utilities could also offer rebates to customers for renovations that would allow sprinkler systems to operate more efficiently, such as installation of rain sensor devices.

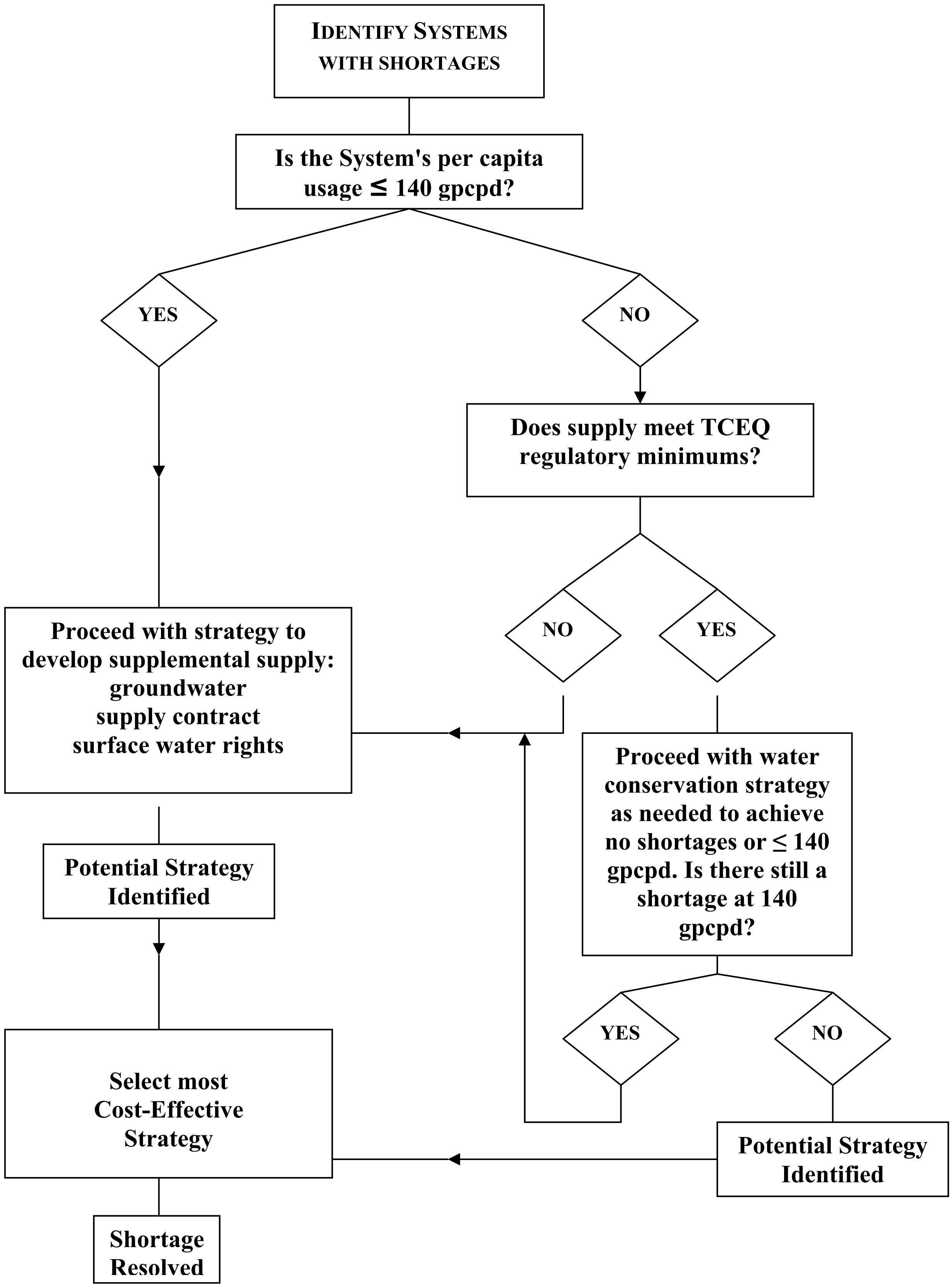
Rainwater harvesting rebates would provide a rebate to single family, multi-family, and commercial customers that install rainwater collection tanks for potable and non-potable water uses. According to GDS Associates' study, a 1,000 gallon tank would be used for a single family application and a 10,000 gallon tank would be used for multi-family and commercial applications. Pumping and pressurization facilities are used to recycle the rainwater from the collection tanks to the end use.

Single-family rain barrels are a water conservation strategy that can be explored by water utilities. In this strategy, water utilities would provide a 75-gallon rain barrel at a reduced cost or offer a rebate on the purchase of a rain barrel. These barrels could be used by families for watering landscaping, trees, and gardening, and other non-potable uses.

In addition to the water conservation strategies outlined above, the TWDB "Report 362 - Water Conservation Best Management Practices Guide" can be used as a reference to create a successful water conservation program. The guide is organized into three subgroups - municipal, industrial, and agricultural - and outlines best management practices for each specific subgroup. Each best management practice is further organized into nine subsections: applicability, description, implementation, schedule, scope, documentation, determination of water savings, cost-effectiveness, and references. This document can be found on the TWDB website at: http:www.twdb.state.tx.us/assistance/conservation/TaskForceDocs/WCITFBMPGuide.pdf.

For each WUG with a shortage and a consumption greater than 140 gpcpd, a water conservation strategy was considered, and a water conservation worksheet for the entity has been included in the Chapter 4 appendix. Acre-foot savings from advanced conservation ranged from a low of 7 acre-feet/year to a high of 49 acre-feet/year. Costs per acre-foot saved ranged from $685/ac-ft to $730/ac-ft. These costs are relatively high due to the small size of the entities and the small amounts of water involved. The conservation savings were not adequate to completely alleviate the shortage for any of the entities.

Figure 6.1: Region D -Water Conservation Strategy Decision Tree



6.3 MODEL WATER CONSERVATION AND DROUGHT CONTINGENCY PLAN

The planning group has developed:

1. A model water conservation plan for use by holders of 1000 acre feet or more of water rights.
2. A model drought contingency plan for use by wholesale water providers.
3. A model drought contingency plan for use by retail water providers.

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 was developed. These plans are provided in Sections 6.5 of this report.

6.4 WATER CONSERVATION AND DROUGHT MANAGEMENT RECOMMENDATIONS

Despite the abundant rainfall in this Region, a need exists in some systems for water conservation, and throughout the Region for drought management planning. While weather patterns vary widely from year to year, it should be noted that it has been over 50 years since the "drought of record" for much of this area, and utilities should not become complacent.

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 gpcpd. Systems which experience a per capita usage greater than 140 gpcpd should perform a water audit to more clearly identify the source of the higher consumption. 140 gpcpd 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 3-page water audit worksheet has been prepared by the Texas Water Development Board (http://www.twdb.state.tx.us/assistance/conservation/Municipal/Water_Audit/2008WaterAuditWorksheet.pdf), and 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.state.tx.us/assistance/conservation/Municipal/Water_Audit/documents/WCITFBMPGuide.pdf).

2. Higher per capita consumption figures are often related to "unaccounted-for" water – water which is produced or purchased, but not metered 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 water conservation education programs and campaigns for the water water-using public, and continued training and technical assistance to enable water utilities to reduce water losses and improve accountability.

6.5 MODEL WATER CONSERVATION PLAN

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…use 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, 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 Texas Water Development Board's (TWDB) 'Water Conservation Plan Guidance Checklist,' and the TWDB and Texas Commission on Environmental Quality (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 gpcpd.

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:

- 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.
- 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."
- Set up a water conservation booth at local fairs and festivals. Offer conservation oriented handouts.
- 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.

- Create a running banner on your website with water conservation tips that change periodically.
- Present a water conservation program at local service club meetings and industry group meetings. Free brochures from TWDB could be dispersed.
- Offer field trips of your water treatment facility to local schools, and use the opportunity to talk about conservation.
- Include "Keep Texas Beautiful" affiliate groups in conservation projects.
- 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:

- Conservation-oriented rate structures.
- Requiring structures undergoing substantial modification or addition to install water conserving plumbing fixtures
- Creating a program for the replacement or retrofit of water-conserving plumbing fixtures in existing structures
- Reusing and/or recycling of wastewater and/or graywater
- Creating a program for pressure control and/or reduction in the distribution system and/or for customer connections

- 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 Sections 6.6 and 6.7 herein, and use the one that is appropriate for you – either wholesale or retail.

6.6 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 2008, 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 than we've been able to in the past, 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

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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.

***Industrial water use**: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.*

***Landscape irrigation use**: 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.*

***Non-essential water use**: 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.*

***Odd numbered address**: 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 1996. If your system does not have records for 1996, use the time period in your records when your system was the most strained by dry weather conditions.

During each stage, it will need to be determined what will trigger initiation, what the water use reduction target goal is, what water management strategies will be put into place, and, finally, what will terminate the stage. Keep in mind that a supplier which is also a customer of its wholesale provider must comply with its provider's Drought Contingency Plan (DCP). Do not develop stages or management strategies that are in conflict with your water provider's DCP.

Stage 1 – Mild Water Shortage

Initiation: The ______________________(water supplier) will consider that a mild water shortage exists when_________________________________ (i.e. water levels in the reservoir reach_____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc***.), or when requested by __________*** (entity's water provider) if applicable.

Target Goal: When a mild water shortage exists, the ____________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to __________________________(i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 1 shall be rescinded when ___________________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.), ***or when Stage I is rescinded by __________________________***(entity's water provider) if applicable.

Water Management Strategies: During Stage 1, we will take the following steps to reduce water use:_______________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

- Request voluntary water conservation from all customers
- Reduce operating procedures that use water (i.e. flushing of mains) as appropriate
- Cease providing potable water for dust control, road building and similar construction purposes
- Enhance water supply and demand monitoring, as well as leak detection and repair efforts
- Request that water customers voluntarily limit the irrigation of landscaped areas
- 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).

Stage 2 – Moderate Water Shortage

Initiation: The ______________________(water supplier) will consider that a moderate water shortage exists when__________________________________(i.e. water levels in the reservoir reach_____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc.), ***or when requested by __________*** (entity's water provider) if applicable.

Target Goal: When a moderate water shortage exists, the ____________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to ___________________________(i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 2 shall be rescinded when ____________________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.), ***or when Stage 2 is rescinded by*** ___________________________(entity's water provider) if applicable. ***Upon termination of Stage 2, Stage 1 becomes operative.***

Water Management Strategies: During Stage 2, we will take the following steps to reduce water use:________________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

- Modify reservoir operations if applicable
- Cease providing potable water for dust control, road building and similar construction purposes
- Enhance water supply and demand monitoring, as well as leak detection and repair efforts
- Limit use of water from hydrants to fire fighting, related activities, or other activities necessary to maintain public health, safety, and welfare
- 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.
- 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.
- Prohibit use of water to fill, refill, or add to any indoor or outdoor swimming pools, wading pools, or Jacuzzi-type pools.
- Prohibit operation of any ornamental fountain or pond for aesthetic or scenic purposes except where necessary to support aquatic life.
- 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.

- All of the strategies in Stage 2 are appropriate in Stage 3, except that landscape watering may need to be prohibited
- Implement water rate surcharges *(i.e. a set charge for any use above average monthly use)*
- Implement price adjustments *(i.e. increase the price per 1,000 gallons of water used above the average monthly use)*
- Utilize alternate or emergency water sources

<u>Stage 4 – Emergency Water Shortage</u>

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.

6.7 MODEL DROUGHT CONTINGENCY PLAN – WHOLESALE 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 2008, 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 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 than we've been able to in the past, 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 retail supply in addition to wholesale supply, you will also need to develop a retail drought contingency plan. Please see the Northeast Texas Region's guidance for retail 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) and its wholesale customers use 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 _____. Our customers include ____________________________, and their current contracted amounts are ______. 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 wholesale 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. Proof of submittal is attached hereto as Figure ___.

Informing the Public/Requesting Input

According to 30 TAC Chapter 288, Subchapter B.a.1, "Preparation of the plan shall include provisions to actively inform the public and to affirmatively provide opportunity for user input in the preparation of the plan and for informing wholesale customers about the plan. 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."

The __________________________________(water supplier) gave the public and its wholesale customers an opportunity to provide input into this plan by ____________________________(public notice, public hearing, letter requesting comments, etc.). Public comments included _________________.

Efforts to inform wholesale customers and the public about each stage of the plan, and when stages are implemented or rescinded, will be through ____________________________ (certified letter, newspaper articles, radio announcements, website announcements, etc.).

Authorization/Applicability

The _______________ (mayor, president, city administrator, etc.) is hereby authorized to monitor weather conditions 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, "Wholesale public water suppliers shall submit a drought contingency plan meeting the requirements of Subchapter B of this chapter to the executive director not later than May 1, 2005, after adoption of the drought contingency plan by the governing body of the water supplier. Thereafter, the wholesale public water suppliers 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 governing body of the wholesale public water supplier."

This plan was submitted to the executive director of the Texas Commission of 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.).

For questions to the TCEQ, see 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 agreement with a water provider, then complete this section. If you have your own water rights or otherwise own your supply, this section does not apply.

This plan has been created with our water provider, _______________'s drought contingency plan in mind. 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:

Aesthetic water use: water use for ornamental or decorative purposes such as fountains, reflecting pools, and water gardens.

Commercial and institutional water use: 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.

Conservation: 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.

Customer: any person, company, or organization using water supplied by __________________ (name of water supplier).

Domestic water use: 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.

Even number address: street addresses, box numbers, or rural postal route numbers ending in 0, 2, 4, 6, or 8 and locations without addresses.

Industrial water use: the use of water in processes designed to convert materials of lower value into forms having greater usability and value.

Landscape irrigation use: 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.

Non-essential water use: 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.

Odd numbered address: 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 the 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 1996. If your system does not have records for 1996, use the time period in your records when your system was the most strained by dry weather conditions.

The drought contingency plan must include a minimum of three drought or emergency response stages providing for the implementation of measures in response to water supply conditions during a repeat of the drought-of-record. – 30 TAC Chapter 288

The drought contingency plan must include specific, quantified targets for water use reductions to be achieved during periods of water shortage and drought. The entity preparing the plan shall establish the targets. The goals established by the entity under this paragraph are not enforceable. – 30 TAC Chapter 288

A minimum of three drought stages is required in this plan. 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 who is also a customer of its wholesale provider must comply with its provider's Drought Contingency Plan. Do not develop stages or management strategies that are in conflict with your water provider's DCP. Also note that the NETRWPG has developed water management strategies for all providers who are projected to have a water shortage within the planning period (50 years). You should review the latest version of the Regional Water Plan to determine if you have had strategies prepared for you.

Include an opening paragraph in this section that describes what information should be monitored in order to initiate the stages, and a rationale of why you chose the triggering criteria that you chose.

The drought contingency plan must include a provision in every wholesale water contract entered into or renewed after adoption of the plan, including contract extensions, that in case of a shortage of water resulting from drought, the water to be distributed shall be divided in accordance with Texas Water Code, §11.039. – 30 TAC Chapter 288

Texas Water Code, §11.039 states, "DISTRIBUTION OF WATER DURING SHORTAGE. (a) If a shortage of water in a water supply not covered by a water conservation plan prepared in compliance with Texas Natural Resource Conservation Commission or Texas Water Development Board rules results from drought, accident, or other cause, the water to be distributed shall be divided among all customers pro rata, according to the amount each may be entitled to, so that preference is given to no one and everyone suffers alike. (b) If a shortage of water in a water supply covered by a water conservation plan prepared in compliance with Texas Natural Resource Conservation Commission or Texas Water Development Board rules results from drought, accident, or other cause, the person, association of persons, or corporation owning or controlling the water shall divide the water to be distributed among all customers pro rata, according to: (1) the amount of water to which each customer may be entitled; or (2) the amount of water to which each customer may be entitled, less the amount of water the customer would have saved if the customer had operated its water system in compliance with the water conservation plan.(c) Nothing in Subsection (a) or (b) precludes the person, association of persons, or corporation owning or controlling the water from supplying water to a person who has a prior vested right to the water under the laws of this state.

Stage 1 – Mild Water Shortage

Initiation: The ______________________(name of 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.

The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following: (A) pro rata curtailment of water deliveries to or diversions by wholesale water customers as provided in Texas Water Code, §11.039; and (B) utilization of alternative water sources with the prior approval of the executive director as appropriate, e.g. interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.). – 30 TAC Chapter 288

- Request voluntary water conservation from all customers
- Recommend that customers initiate Stage 1 of their Drought Contingency Plans
- Reduce operating procedures that use water (i.e. flushing of mains) as appropriate

Stage 2 – Moderate Water Shortage

Initiation: The ______________________(water supplier) will consider that a moderate water shortage exists when __________________________________(i.e. water levels in the reservoir reach_____; average daily water use reaches ___% of capacity for three consecutive days; water level in elevated storage tank is at or below ____ for more than 12 hours, etc.)***, or when requested by __________ (entity's water provider)*** if applicable.

Target Goal: When a moderate water shortage exists, the ____________________(water supplier) will implement water management strategies in an attempt to reduce daily water use to ___________________________ (i.e. 2 MGD; ___% of average daily water use, etc.) Please note that this goal must be quantifiable. Goals established in this section are not enforceable.

Termination: Stage 2 shall be rescinded when ____________________________ (i.e. water levels in the reservoir rise above ___ for 7 consecutive days; average daily water use falls below ___% of capacity for three consecutive days; storage facilities return to normal levels for 24 consecutive hours, etc.)***, or when Stage 2 is rescinded by*** ___________________________ (entity's water provider) if applicable. ***Upon termination of Stage 2, Stage 1 becomes operative.***

Water Management Strategies: During Stage 2, we will take the following steps to reduce water use:_______________.

The following are examples of strategies that are commonly used during this stage. These are not mandatory, only suggestive. When determining strategies, remember the type of constraint you expect on your system and plan accordingly.

The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following: (A) pro rata curtailment of water deliveries to or diversions by wholesale water customers as provided in Texas Water Code, §11.039; and (B) utilization of alternative water sources with the prior approval of the executive director as appropriate, e.g. interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.). – 30 TAC Chapter 288

- Recommend that customers initiate Stage 2 of their Drought Contingency Plans, which should, at a minimum, contain lawn watering restrictions
- Modify reservoir operations if applicable
- Initiate strong public awareness campaign in service area to warn of impending shortages

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.

The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not *limited to, the following: (A) pro rata curtailment of water deliveries to or diversions by wholesale water customers as provided in Texas Water Code, §11.039; and (B) utilization of alternative water sources with the prior approval of the executive director as appropriate, e.g. interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.). – 30 TAC Chapter 288*

- Recommend that customers initiate Stage 3 of their Drought Contingency Plans, which, at a minimum, must include a ban on lawn watering
- Begin pro rata water allocation (Pro rata curtailment of water deliveries to or diversions by wholesale water customers must be considered in a wholesale DCP according to 30 TAC Chapter 288, Subchapter B. Rules for pro rata curtailment are provided in Texas Water Code, §11.039.)
- Implement water rate surcharges (i.e. a set charge for any use above average monthly use)
- Implement price adjustments (i.e. increase the price per 1,000 gallons of water used above the average monthly use)
- 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.

The drought contingency plan must include the specific water supply or water demand management measures to be implemented during each stage of the plan including, but not limited to, the following: (A) pro rata curtailment of water deliveries to or diversions by wholesale water customers as provided in Texas Water Code, §11.039; and (B) utilization of alternative water sources with the prior approval of the executive director as appropriate, e.g. interconnection with another water system, temporary use of a non-municipal water supply, use of reclaimed water for non-potable purposes, etc.). – 30 TAC Chapter 288

- 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
- Strategies listed in Stage 3

PLAN EXECUTION

Public Involvement

This section should discuss the ways in which the supplier will inform its wholesale 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 supplies, and determining when to initiate and terminate stages of the DCP.

The drought contingency plan must include procedures for the enforcement of any mandatory water use restrictions including specification of penalties (e.g., liquidated damages, water rate surcharges, discontinuation of service) for violations of such restrictions. – 30 TAC Chapter 288, Subchapter B.a.10.

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 re-evaluated and updated every five years based on updated information; especially the latest adopted NETRWPG Regional Water Plan.

CHAPTER 7.0 DESCRIPTION OF HOW THE REGIONAL WATER PLAN IS CONSISTENT WITH LONG-TERM PROTECTION OF THE STATE'S WATER RESOURCES, AGRICULTURAL RESOURCES, AND NATURAL RESOURCES, AND THE INCONSISTENCY OF ANY MARVIN NICHOLS I RESERVOIR PROPOSED BY REGION C IN PROTECTING THESE RESOURCES

7.1 INTRODUCTION

31 TAC Chapter 357.14(2)(C) requires that regional water plans evaluate the consistency with the long term protection of the State's water resources, agricultural resources, and natural resources. This regulation states, in part:

> "The regional water plan is consistent with the guidance principles if it is developed in accordance with §358.3 of this title (relating to Guidelines), §357.5 of this title (relating to Guidelines for Development of Regional Water Plans), §357.7 of this title (relating to Regional Water Plan Development), §357.8 of this title (relating to Ecologically Unique River and Stream Segments), and §357.9 of this title (relating to Unique Sites for Reservoir Construction).

The primary purpose of Chapter 7 is to describe how the 2011 North East Texas Regional Water Plan is consistent with the long-term protection of the State's water resources, agricultural resources, and natural resources. Additionally, the chapter will specifically address consistency of the 2011 North East Texas Regional Water Plan (NETRWPG) with the State's water planning requirements. This chapter will also address the impact of the Marvin Nichols I Reservoir on the long-term protection of the State's water resources, agricultural resources, and natural resources. The Marvin Nichols I Reservoir is a proposed water management strategy of Region C in the 2006 State Water Plan. The Marvin Nichols I Reservoir, if constructed, would be located in the North East Texas Regional Water Planning Group area. It is the position of the NETRWPG that inclusion of the Marvin Nichols I Reservoir is not consistent with the long-term protection of the State's water resources, agricultural resources, and natural resources.

7.2 CONSISTENCY WITH THE PROTECTION OF WATER RESOURCES

The North East Texas Regional Water Plan protects water contracts, option agreements, and special water resources. The North East Texas Regional Water 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 used, 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 Regional Water Planning Group area include four river basins providing surface water and six aquifers providing groundwater. The four major river basins within the North East Texas Regional Water Planning Group area boundaries include the Cypress River Basin, the Red River Basin, the Sabine River Basin, and the Sulphur River Basin. The respective boundaries of these basins are depicted in Figure 1.17, 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. In the Sulphur River Basin, 91 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, 81 percent of the need is met by surface water. In the portion of the Red River Basin in the region, 88 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, 10 in the Sabine River Basin, and 6 in the Sulphur River Basin. There are no planned additional reservoirs by the North East Texas Regional Water Planning Group other than Prairie Creek Reservoir. Currently, the majority of the available surface water supply in North East Texas Regional Water Planning Group comes from the Sabine River Basin.

The Carrizo-Wilcox Aquifer is the most important groundwater resource in the North East Texas Regional Water Planning Group area, accounting for a total of 76% 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 in Chapter 4 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 North East Texas Regional Water Planning Group area 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 Reuse**. The City of Longview, 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. 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 North East Texas Regional Water Planning Group area indicate adequate availability of surface water in the region.
- **Expanded Use of Groundwater**. This strategy has generally been recommended for entities with sufficient groundwater supply available to meet needs, but currently without adequate infrastructure (i.e., well capacity). Groundwater availability reported in the plan is based on the long-term sustainability of the aquifer. No strategies are recommended to use water above the acceptable sustainable level.

7.2.1 Resources

Agriculture is a significant contributor to local economies in the North East Texas Regional Water Planning Group 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.

7.3 CONSISTENCY WITH PROTECTION OF AGRICULTURAL RESOURCES

The WAMs indicate adequate availability of surface water to meet the projected irrigation demands for the planning period. The Marvin Nichols I Reservoir as proposed by Region C, is not consistent with the plan for Region D, as it does not protect the agricultural resources of Region D.

7.4 CONSISTENCY WITH PROTECTION OF NATURAL RESOURCES

The North East Texas Regional Water Planning Group area contains many natural resources that must be considered in water planning. Some of the natural resources include threatened or endangered species; local, state, and federal parks and public lands; and energy/mineral reserves. The North East Texas Regional Water Plan is consistent with the long-term protection of these resources, although the Marvin Nichols I Reservoir, proposed by Region C, is not consistent with the Region D plan. Following is a brief discussion of consistency of the plan with protection of natural resources.

7.4.1 Threatened/Endangered Species

A list of species of special concern, including threatened or endangered species, located within the North East Texas Regional Water Planning Group area is contained in Table 7.3 (Table 7.3 only lists the Counties with strategies 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 13 species of birds, 6 mammals, 6 reptiles/amphibians, 7 fish, and 1 mollusk. The majority of strategies identified in the North East Texas Regional Water Planning Group area 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 North East Texas Regional Water 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.

7.4.2 Parks and Public Lands

The North East Texas Regional Water Planning Group area 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 North East Texas Regional Water Plan is 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. Reducing the need for diversions from surface water sources may enhance recreational opportunities.

7.4.3 Timber Resources

Much of the eastern portion of the North East Texas Regional Water Planning Group area is heavily forested and timber is an important economic resource for the region. There are no strategies recommended by the North East Texas Regional Water Planning Group that would have a significant impact on timber resources.

7.4.4 Energy Reserves

Numerous oil and gas wells are located within the North East Texas Regional Water Planning Group area, 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 North East Texas Regional Water Planning Group area 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 is expected to significantly impact oil, natural gas, or coal production in the Region D area.

7.5 CONSISTENCY WITH STATE WATER PLANNING GUIDELINES

To be considered consistent with long-term protection of the State's water, agricultural, and natural resources, the North East Texas Regional Water Planning Group Water Plan must be determined to be in compliance with Texas Administrative Code (TAC) 31, Chapters 357.5, 357.7, 357.8, 357.9 and 358.3.

The information, data evaluations, and recommendations included in Chapters 1 through 6 and Chapter 8 of the North East Texas Regional Water Plan collectively comply with these regulations.

The following pages contain Table 7.1 - Summary of Evaluation of Water Management Strategies, Table 7.2 - Summary of Environmental Assessment of Water Management Strategies and Table 7.3 - Summary of Endangered Species.

Table 7.1: Summary of Evaluation of Water Management Strategies

County	WUG/ CO	Entity	Strategy	Quantity (Ac-Ft/Yr)	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on:				Key Water Quality Parameters	Political Feasibility
							Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources		
				#	*(1-5)	$	**(1-5)	**(1-5)	**(1-5)	**(1-5)	**(1-5)
Bowie	WUG	Central Bowie WSC	Increase Existing Contract	$482	1	$430	1	1	1	1	1
Bowie	WUG	Hooks, City of	Increase Existing Contract	$215	1	$430	1	1	1	1	1
Bowie	WUG	Macedonia-Eylau MUD	Increase Existing Contract	$482	1	$430	1	1	1	1	1
Bowie	WUG	New Boston, City of	Increase Existing Contract	$215	1	$430	1	1	1	1	1
Bowie	WUG	Redwater, City of	Increase Existing Contract	$482	1	$430	1	1	1	1	1
Bowie	WUG	Wake Village	Increase Existing Contract	$215	1	$430	1	1	1	1	1
Bowie	CO	Burns - Redbank WSC	Increase Existing Contract	$283	1	$430	1	1	1	1	1
Bowie	CO	Oak Grove WSC	Increase Existing Contract	$482	1	$430	1	1	1	1	1
Bowie	CO	Red River Development Authority	Water Purchase	$482	1	$430	1	1	1	1	1
Camp	WUG	Bi-County WSC	New Surface Water Contract	653	1	$657	1	1	1	1	1
Camp	CO	Woodland Harbor	Drill 2 New Wells	65	1	$764	1	1	1	1	1
Cass	WUG	Manufacturing	Increase Existing Contract	50,471	1	$652	1	1	1	1	1
Delta	CO	Ben Franklin WSC	New Surface Water Contract	36	1	$2,310	1	1	1	1	1
Gregg	WUG	Clarksville City, City of	Drill 3 New Wells	242	1	$803	1	1	1	1	1
Gregg	WUG	Liberty City WSC	Drill 4 New Wells	376	1	$835	1	1	1	1	1
Gregg	WUG	West Gregg SUD	Drill 5 New Wells	350	3	$378	1	1	1	3	3
Gregg	CO	Liberty-Danville FWSD No. 2	Increase Existing Contract	40	1	$815	1	1	1	1	1
Gregg	CO	Starrville-Friendship WSC	Drill New Well	108	3	$295	1	1	1	3	3
Harrison	WUG	Waskom, City of	Drill 5 New Wells	231	3	$581	1	1	1	3	3
Harrison	WUG	Steam Electric	Increase Existing Contract	12,914	1	$652	1	1	1	1	1
Harrison	CO	Blocker-Crossroads WSC	Drill 3 New Wells	129	3	$386	1	1	1	3	3
Harrison	CO	Caddo Lake WSC	Drill 2 New Wells	86	3	$325	1	1	1	3	3
Harrison	CO	Leigh WSC	Drill New Well	43	3	$353	1	1	1	3	1
Harrison	CO	Scottsville, City of	Drill New Well	65	1	$331	1	1	1	1	1
Harrison	CO	Talley WSC	Drill 3 New Wells	177	3	$404	1	1	1	3	1
Harrison	CO	Waskom Rural WSC #1	Drill New Well	80	3	$302	1	1	1	3	3
Hopkins	CO	Miller Grove WSC	Drill New Well	35	1	$1,226	1	1	1	1	1
Hunt	WUG	Able Springs WSC	New Surface Water Contract	143	1	$95	1	1	1	1	1
Hunt	WUG	Campbell WSC	Drill 2 New Wells & New Surface Water Contract	773	3	$1,735	1	1	1	3	1
Hunt	WUG	Cash WSC	New Surface Water Contract	3121	1	$95	1	1	1	1	1
Hunt	WUG	Celeste, City of	New Surface Water Contract	63	1	$7,069	1	1	1	1	1
Hunt	WUG	Combined Consumers WSC	New Surface Water Contract	2,617	1	$95	1	1	1	1	1
Hunt	WUG	Hickory Creek SUD	Drill 6 New Wells	1,613	1	$985	1	1	1	1	1
Hunt	WUG	North Hunt WSC	Increase Existing Contract	1,659	1	$1,085	1	1	1	1	1
Hunt	WUG	Steam Electric	New Surface Water Contract	23,902	1	$190	1	1	1	1	1
Hunt	WUG	Wolfe City	New Surface Water Contract	114	1	$3,794	1	1	1	1	1
Hunt	CO	Jacobia WSC	Increase Existing Contract	328	1	$1,049	1	1	1	1	1
Hunt	CO	Little Creek Acres	New Surface Water Contract	153	1	$1,537	1	1	1	1	1
Hunt	CO	Maloy WSC	Increase Existing Contract	263	1	$1,085	1	1	1	1	1
Hunt	CO	Poetry WSC	Increase Existing Contract	46	1	$1,668	1	1	1	1	1
Hunt	CO	Shady Grove WSC	Increase Existing Contract	280	1	$1,049	1	1	1	1	1
Hunt	CO	West Leonard WSC	Drill a New Well	81	1	$747	1	1	1	1	1
Lamar	CO	Petty WSC	New Surface Water Contract	21	1	$1,032	1	1	1	1	1
Lamar	WUG	Steam Electric	Increase Existing Contract	7,474	1	$65	1	1	1	1	1
Rains	CO	South Rains WSC	Increase Existing Contract	295	1	$1,093	1	1	1	1	1
Smith	WUG	Crystal Systems Inc.	Drill 2 New Wells	538	1	$610	1	1	1	1	1
Smith	WUG	Lindale Rural WSC	Drill a New Well	215	3	$330	1	1	1	3	1
Smith	WUG	Lindale, City of	Drill a New Well	376	3	$319	1	1	1	3	1
Smith	WUG	Winona, City of	Increase Existing Contract	5	1	$1,150	1	1	1	1	1
Smith	CO	Star Mountain WSC	Drill a New Well	108	3	$330	1	1	1	3	1
Titus	WUG	Steam Electric	Increase Existing Contract	29,350	1	$508	1	1	1	1	1
Van Zandt	WUG	Canton, City of	Drill 2 New Wells	194	3	$244	1	1	1	3	1
Van Zandt	WUG	Grand Saline, City of	Drill 2 New Wells	323	1	$366	1	1	1	1	1
Van Zandt	WUG	R-P-M WSC	Drill a New Well	65	3	$451	1	1	1	3	1
Van Zandt	WUG	Van, City of	Drill a New Well	134	1	$727	1	1	1	3	1
Van Zandt	CO	Corinth WSC	Drill a New Well	27	3	$1,752	1	1	1	3	1
Van Zandt	CO	Crooked Creek WSC	Drill a New Well	59	3	$431	1	1	1	3	1
Van Zandt	CO	Edom WSC	Drill 2 New Wells	86	1	$833	1	1	1	1	1
Van Zandt	CO	Fruitvale WSC	Drill 7 New Wells	301	3	$1,015	1	1	1	3	1
Van Zandt	CO	Little Hope-Moore WSC	Drill 5 New Wells	188	3	$920	1	1	1	3	1
Wood	WUG	Mineola, City of	Drill a New Well	403	1	$247	1	1	1	1	1

* 1-Very Reliable, 5-Not Reliable
**1-Little or No Impact, 5-Significant Impact

Table 7.2: Summary of Environmental Assessment

County	WUG/ CO	Entity	Strategy	Environmental Factors: Total Acres Impacted	Wetland Acres	Envir Water Needs	Habitat	Threat and Endanger Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Overall Environmental Impacts
				#	#	(1-5)	(1-5)	#	(1-5)	(1-5)	(1-5)	(1-5)
Bowie	WUG	Central Bowie WSC	Increase Existing Contract	1	0	1	1	19	1	N/A	1	1
Bowie	WUG	Hooks, City of	Increase Existing Contract	1	0	1	1	19	1	N/A	1	1
Bowie	WUG	Macedonia-Eylau MUD	Increase Existing Contract	1	0	1	1	19	1	N/A	1	1
Bowie	WUG	New Boston, City of	Increase Existing Contract	1	0	1	1	19	1	N/A	1	1
Bowie	WUG	Redwater, City of	Increase Existing Contract	1	0	1	1	19	1	N/A	1	1
Bowie	WUG	Wake Village	Increase Existing Contract	1	0	1	1	19	1	N/A	1	1
Bowie	CO	Burns-Redbank WSC	Increase Existing Contract	1	0	1	1	19	1	N/A	1	1
Bowie	CO	Oak Grove WSC	Increase Existing Contract	1	0	1	1	19	1	N/A	1	1
Bowie	CO	Red River Development Authority	Water Right Permit from TCEQ	1	0	1	1	19	1	N/A	1	1
Camp	WUG	Bi-County WSC	Drill 2 New Wells & New Surface Water Contract	2	0	1	1	17	1	N/A	1	1
Camp	CO	Woodland Harbor	Drill 2 New Wells	2	0	1	1	16	1	N/A	1	1
Cass	WUG	Manufacturing	Increase Contract	1	0	1	1	23	1	N/A	1	1
Delta	CO	Ben Franklin WSC	New Surface Water Contract	3	0	1	1	20	1	N/A	1	1
Gregg	WUG	Clarksville City, City of	Drill 3 New Wells	3	0	1	1	18	1	N/A	1	1
Gregg	WUG	Liberty City WSC	Drill 4 New Wells	4	0	1	1	18	1	N/A	1	1
Gregg	WUG	West Gregg SUD	Drill 5 New Wells	5	0	1	1	21	1	N/A	1	1
Gregg	CO	Liberty-Danville FWSD No. 2	Increase Existing Contract	1	0	1	1	18	1	N/A	1	1
Gregg	CO	Starrville-Friendship WSC	Drill New Well	1	0	1	1	18	1	N/A	1	1
Harrison	WUG	Waskom, City of	Drill 5 New Wells	5	0	1	1	23	1	N/A	1	1
Harrison	WUG	Steam Electric	Increase Existing Contract	1	0	1	1	23	1	N/A	1	1
Harrison	CO	Blocker-Crossroads WSC	Drill 3 New Wells	3	0	1	1	23	1	N/A	1	1
Harrison	CO	Caddo Lake WSC	Drill 2 New Wells	2	0	1	1	23	1	N/A	1	1
Harrison	CO	Leigh WSC	Drill New Well	1	0	1	1	23	1	N/A	1	1
Harrison	CO	Scottsville, City of	Drill New Well	1	0	1	1	23	1	N/A	1	1
Harrison	CO	Talley WSC	Drill 3 New Wells	3	0	1	1	23	1	N/A	1	1
Harrison	CO	Waskom Rural WSC #1	Drill New Well	1		1	1	23	1	N/A	1	1
Hopkins	CO	Miller Grove WSC	Drill New Well	1	0	1	1	19	1	N/A	1	1
Hunt	WUG	Able Springs WSC	New Surface Water Contract	1	0	1	1	15	1	N/A	1	1
Hunt	WUG	Campbell WSC	Drill 2 New Wells & New Surface Water Contract	2	0	1	1	15	1	N/A	1	1
Hunt	WUG	Cash WSC	New Surface Water Contract	1	0	1	1	15	1	N/A	1	1
Hunt	WUG	Celeste, City of	Drill 2 New Wells	2	0	1	1	15	1	N/A	1	1
Hunt	WUG	Combined Consumers WSC	New Surface Water Contract	1	0	1	1	15	1	N/A	1	1
Hunt	WUG	Hickory Creek SUD	Drill 11 New Wells	6	0	1	1	15	1	N/A	1	1
Hunt	WUG	North Hunt WSC	Increase Existing Contract	1	0	1	1	15	1	N/A	1	1
Hunt	WUG	Steam Electric	New Surface Water Contract	1	0	1	1	15	1	N/A	1	1
Hunt	WUG	Wolfe City	Drill 3 New Wells	3	0	1	1	15	1	N/A	1	1
Hunt	CO	Jacobia WSC	Increase Existing Contract	1	0	1	1	15	1	N/A	1	1
Hunt	CO	Little Creek Acres	Drill 8 New Wells	5	0	1	1	15	1	N/A	1	1
Hunt	CO	Maloy WSC	Increase Existing Contract	1	0	1	1	15	1	N/A	1	1
Hunt	CO	Poetry WSC	Increase Existing Contract	1	0	1	1	15	1	N/A	1	1
Hunt	CO	Shady Grove WSC	Increase Existing Contract	1	0	1	1	15	1	N/A	1	1
Hunt	CO	West Leonard WSC	Drill a New Well	1	0	1	1	15	1	N/A	1	1
Lamar	WUG	Steam Electric	Increase Exising Contrcat	1	0	1	1	22	1	N/A	1	1
Lamar	CO	Petty WSC	New Surface Water Contract	1	0	1	1	22	1	N/A	1	1
Rains	CO	South Rains WSC	Increase Existing Contract	1	0	1	1	22	1	N/A	1	1
Smith	WUG	Crystal Systems Inc.	Drill 2 New Wells	2	0	1	1	21	1	N/A	1	1
Smith	WUG	Lindale Rural WSC	Drill a New Well	1	0	1	1	21	1	N/A	1	1
Smith	WUG	Lindale, City of	Drill a New Well	1	0	1	1	21	1	N/A	1	1
Smith	WUG	Winona, City of	Increase Existing Contract	1	0	1	1	21	1	N/A	1	1
Smith	CO	Star Mountain WSC	Drill a New Well	1	0	1	1	21	1	N/A	1	1
Titus	WUG	Steam Electric	Increase Existing Contract	1	0	1	1	15	1	N/A	1	1
Van Zandt	WUG	Canton, City of	Drill 2 New Wells	4	0	1	1	21	1	N/A	1	1
Van Zandt	WUG	Grand Saline, City of	Drill 2 New Wells	2	0	1	1	21	1	N/A	1	1
Van Zandt	WUG	R-P-M WSC	Drill a New Well	1	0	1	1	21	1	N/A	1	1
Van Zandt	WUG	Van, City of	Drill a New Well	1	0	1	1	21	1	N/A	1	1
Van Zandt	CO	Corinth WSC	Drill a New Well	1	0	1	1	21	1	N/A	1	1
Van Zandt	CO	Crooked Creek WSC	Drill a New Well	1	0	1	1	21	1	N/A	1	1
Van Zandt	CO	Edom WSC	Drill 2 New Wells	2	0	1	1	21	1	N/A	1	1
Van Zandt	CO	Fruitvale WSC	Drill 7 New Wells	3	0	1	1	21	1	N/A	1	1
Van Zandt	CO	Little Hope-Moore WSC	Drill 5 New Wells	5	0	1	1	21	1	N/A	1	1
Wood	WUG	Mineola, City of	Drill a New Well	1	0	1	1	19	1	N/A	1	1

---1 Indicates Little or No Impact, 5 Indicates Significant Impact

Table 7.3: Summary of Endangered Species

	Camp	Bowie	Titus	Morris	Cass	Delta	Gregg	Smith	Harrison	Marion	Hopkins	Hunt	Lamar	Van Zandt	Wood
Birds															
American Peregrine Falcon	1	1	1	1	1	1	1	1	1	1	1		1	1	1
Arctic Peregrine Falcon	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Bachmans Sparrow	1	1	1	1	1	1	1	1	1	1	1		1	1	1
Bald Eagle	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Cerulean Warbler		1											1		
Henslows Sparrow	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Interior Least Tern		1				1					1	1	1		
Migrant Loggerhead Shrike												1			
Mountain Plover						1					1	1	1		
Western Burrowing Owl						1						1			
White-faced Ibis												1			
Whooping Crane												1			
Wood Stork	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Fishes															
Blackside Darter		1			1	1			1	1	1	1		1	
Bluehead Shiner					1				1	1					
Blue Sucker													1		
Creek Chubsucker	1	1	1	1	1	1	1	1	1	1	1		1	1	1
Paddlefish	1	1	1	1	1	1	1	1	1	1	1		1	1	1
Shovelnose Sturgeon													1		
Western Sand Darter		1					1	1					1	1	
Mammals															
Black Bear	1	1	1	1	1	1	1	1	1	1	1		1		
Louisiana Black Bear	1		1	1	1	1	1	1	1	1	1				
Plains Spotted Skunk	1		1	1	1	1	1	1	1	1	1	1	1	1	1
Rafinesque's Big-eared Bat		1			1		1		1	1					
Red Wolf					1								1	1	
Southeastern Myotis Bat		1			1		1	1	1	1					1
Mollusks															
Ouachita Rock Pocketbook Mussel													1		
Reptiles															
Alligator Snapping Turtle	1	1	1	1	1	1	1	1	1	1	1		1	1	1
Louisiana Pine Snake							1	1						1	1
Northern Scarlet Snake	1				1			1	1	1				1	1
Texas Garter Snake	1		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
Timper/Canebrake Rattlesnake	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Plants															
Arkansas meadow-rue		1				1							1		
Chapmans yellow-eyed grass														1	1
Neches River rose-mallow									1						
Rough-stem aster								1			1			1	1
Small-headed pipewort														1	
Southern Lady's Slipper					1				1						
Texas Trillium					1			1	1	1					1

7.6 MARVIN NICHOLS I RESERVOIR AND IMPACTS ON WATER RESOURCES, AGRICULTURAL RESOURCES AND NATURAL RESOURCES

Although not a recommended water planning strategy for North East Texas Regional Water Planning Group for this round of planning, Marvin Nichols I Reservoir was a recommended water management strategy for Region C in 2006 and was included in the 2006 State Water Plan. Marvin Nichols I has also been included in Region C's drafts as a proposed water management strategy for this round of planning. Since Marvin Nichols I would be located exclusively in the North East Texas Regional Water Planning Group area and the impacts to agricultural and natural resources would be greatest in this Region, the North East Texas Regional Water Planning Group feels it is important and necessary to review the impacts that Marvin Nichols I would have to this area. This is particularly true since the spirit of Texas' regional water planning process included a ground up, localized approach to the planning process.

Based on the reasons set forth below, it is the position of the North East Texas Regional Water Planning Group that Marvin Nichols I Reservoir should not be included in any 2011 regional plans as a water management strategy and not be included in the 2012 State Water Plan as a water management strategy.

7.6.1 Impacts on Agricultural Resources

Agriculture as a whole and timber in particular are vital and important industries throughout the North East Texas Regional Water Planning Group area. See Figure 1.11 wherein timber is listed in 12 of the 19 counties as a principal crop. Estimates reflect that Marvin Nichols I Reservoir would flood 66,000 to 70,000 acres mainly in Red River County and including portions of Bowie, Titus and Morris Counties. Included in the flooded acreage would be 33,000 to 53,000 acres of forest lands, including Priority 1 bottomland hardwoods and wetlands. See "Texas Water and Wildlife" prepared by Texas Parks and Wildlife and U.S. Fish and Wildlife Service, "An Analysis of Bottomland Hardwood Areas at Three Proposed Reservoir Sites in Northeast Texas" dated February 1997 prepared for Texas Water Development Board, and Table 2, Summary of Environmental Assessment included in the Region C Regional Water Plan.

In addition to the timber and agricultural land lost as a result of the reservoir, mitigation requirements are anticipated to greatly impact agricultural resources. After a detailed study, the Texas Parks and Wildlife Department (TPWD)/United States Fish and Wildlife Service (USFWS) Study 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 Sulphur River Basin Authority 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 North East Texas Regional Water Planning Group 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 1: Summary of Evaluation of Water Management Strategies" for Region C as follows: Impacts of Marvin Nichols I upon "agricultural resources/rural areas" are rated "high" and "possible third party impacts" are rated "high". Third Party impacts are considered to be social and economic impacts resulting from redistribution of water.

7.6.2 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 North East Texas Regional Water Planning Group has received oral and written commentary from 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 Texas Water Development Board 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.

7.6.3 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 North East Texas Regional Water Planning Group 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.

7.6.4 Impacts on Natural Resources

Additional commentary has been received from the North East Texas Regional Water Planning Group 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 1: Summary of Evaluation of Water Management Strategies" used in Region C's water planning process 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 corroborated in "Table 1: Summary of Evaluation of Water Management Strategies" from Region C rates the impacts of Marvin Nichols I upon "agricultural resources/rural areas" as "high" and "possible third party impacts" are rated high.

In addition if Marvin Nichols I Reservoir is built, the foot print will sit squarely on top of the outcrop of the Nacatoch Aquifer. Local residents report there are dozens of springs and thousands of 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.

7.6.5 Impacts on Environmental Factors

Region C's planning process provides the following summation of significant negative environmental impacts, in "Table 2: Summary of Environmental Assessment": Marvin Nichols I would cause "high" overall environmental impacts. "High" is the highest category for negative impacts given to any strategy. This includes 14,422 acres of wetlands and 33,000 acres of forested lands, as well as 19 threatened/endangered species (second highest of any strategy listed). According to the Table, specific environmental factors that would experience "high" negative impacts include habitat and cultural resources.

7.7 CONCLUSION

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 2011 regional water plan or the 2012 State Water Plan. Accordingly, inclusion of the Marvin Nichols I Reservoir in any regional water plan would be inconsistent with the Region's efforts to ensure the long-term protection of the State's water resources, agricultural resources and natural resources, also violating Sections 16.051 and 16.053 of the Texas Water Code.

NOTE: In referencing Marvin Nichols I, the region D plan incorporates Marvin Nichols I, Marvin Nichols IA, and any dam sites on the main stem of the Sulphur River.

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CHAPTER 8.0 UNIQUE STREAM SEGMENTS/RESERVOIR SITES/ LEGISLATIVE RECOMMENDATIONS

The Texas Administrative Code allows for the Regional Water Planning Groups (RWPG) to include legislative recommendations in the regional water plan with regard to legislative designation of ecologically unique river and streams segments, unique sites for reservoir construction, and legislative recommendations (31 TAC, Sections 357.8 and 357.9). Regional water planning groups 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 regional planning groups 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. TWDB rules (30 Texas Administrative Code 367.8) state:

> *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 regional water planning area 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

TWDB rules (TAC 357.8) also specify the criteria that are to be applied in the evaluation of potentially ecologically unique river or stream segments. These are:

- **Biological Function:** Stream segments that display significant overall habitat value, including both quantity and quality, considering the degree of biodiversity, age, and uniqueness observed, and including terrestrial, wetland, aquatic or estuarine habitats;

- **Hydrologic Function:** Stream segments that are fringed by habitats that perform valuable hydrologic functions relating to water quality, flood attenuation, flow stabilization or groundwater recharge and discharge;

- **Riparian Conservation Areas:** Stream segments that are fringed by significant areas in public ownership including state and federal refuges, wildlife management areas, preserves, parks, mitigation areas or other areas held by governmental organizations for conservation purposes, or segments that are fringed by other areas managed for conservation purposes under a governmentally approved conservation plan;

- **High Water Quality/Exceptional Aquatic Life/High Aesthetic Value:** Stream segments and spring resources that are significant due to unique or critical habitats and exceptional aquatic life uses dependent on or associated with high water quality; or

- **Threatened or Endangered Species/Unique Communities:** Sites along streams where water development projects would have significant detrimental effects on state or federally-listed threatened and endangered species, and sites along segments that are 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 in Region I). Figure 8.1 shows the location, in red line, of all 14 segments in Region D. Particulars of these river and stream segments may be found in either the TWDB report or the 2006 Region D Plan.

During the preparation of the 2011 Planning Report the planning group 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)

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).

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).

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.

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.

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).

Little Sandy Creek - From Lake Hawkins upstream to its headwaters in Wood County.
Pine Creek - From the confluence with the Red River in Red River County upstream to Crook Lake Dam in Lamar County.

Purtis Creek - From the Van Zandt/Henderson County line upstream to its headwaters in Van Zandt County.

Sabine River - From US 59 in south Harrison County upstream to Easton on the Rusk/Harrison County line (within TCEQ classified stream segment 0505).
Sabine River - From FM 14 in Wood/Smith County upstream to FM 1804 in Wood/Smith County (within TCEQ classified stream segment 0506).

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.

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.

Table 8.2 NETRWPG Ecologically Unique Stream Segments – Region D (North East Texas)

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.

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)

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)
- 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:

- 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)
- Timber Rattlesnake (*Crotalus horridus* G4 State Threatened*)*

8.4 CONFLICTS WITH WATER MANAGEMENT STRATEGIES

As a part of the planning effort, the TPWD candidate streams from the TPWD report and the current 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 was supported by the planning group in Round 1 and 2 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 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.

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 North East Texas Regional Water Planning Group elected not to recommend unconditionally that any stream segments from the TWDB 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 this planning session 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 North East Texas Regional Water Planning Group further elected to conditionally recommend to the Legislature that the Pecan Bayou stream segment in the Red River Basin and Black Cypress Bayou/Creek in the Cypress Creek Basin be identified as an Ecologically Unique Stream Segments. It is believed that these segments exhibit sufficient ecological features and meets the TWDB 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 or substantially similar provisions approved by the South Central Texas Regional Water Planning Group (Region L):

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) 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) 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 2011 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.

Figure 8.1 Ecologically Significant River and Stream Segments

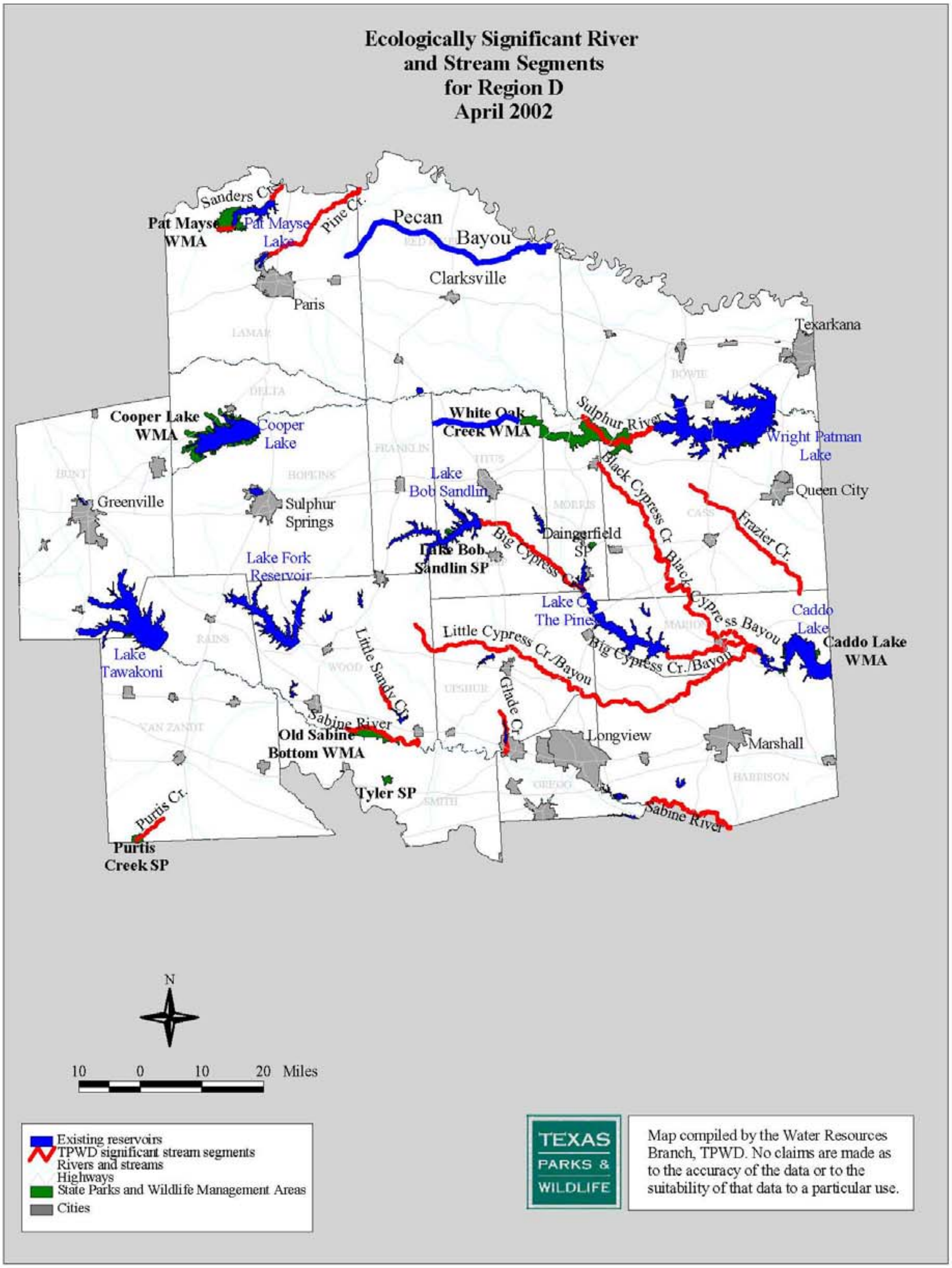


Figure 8.2 Black Cypress Creek/Black Cypress Bayou

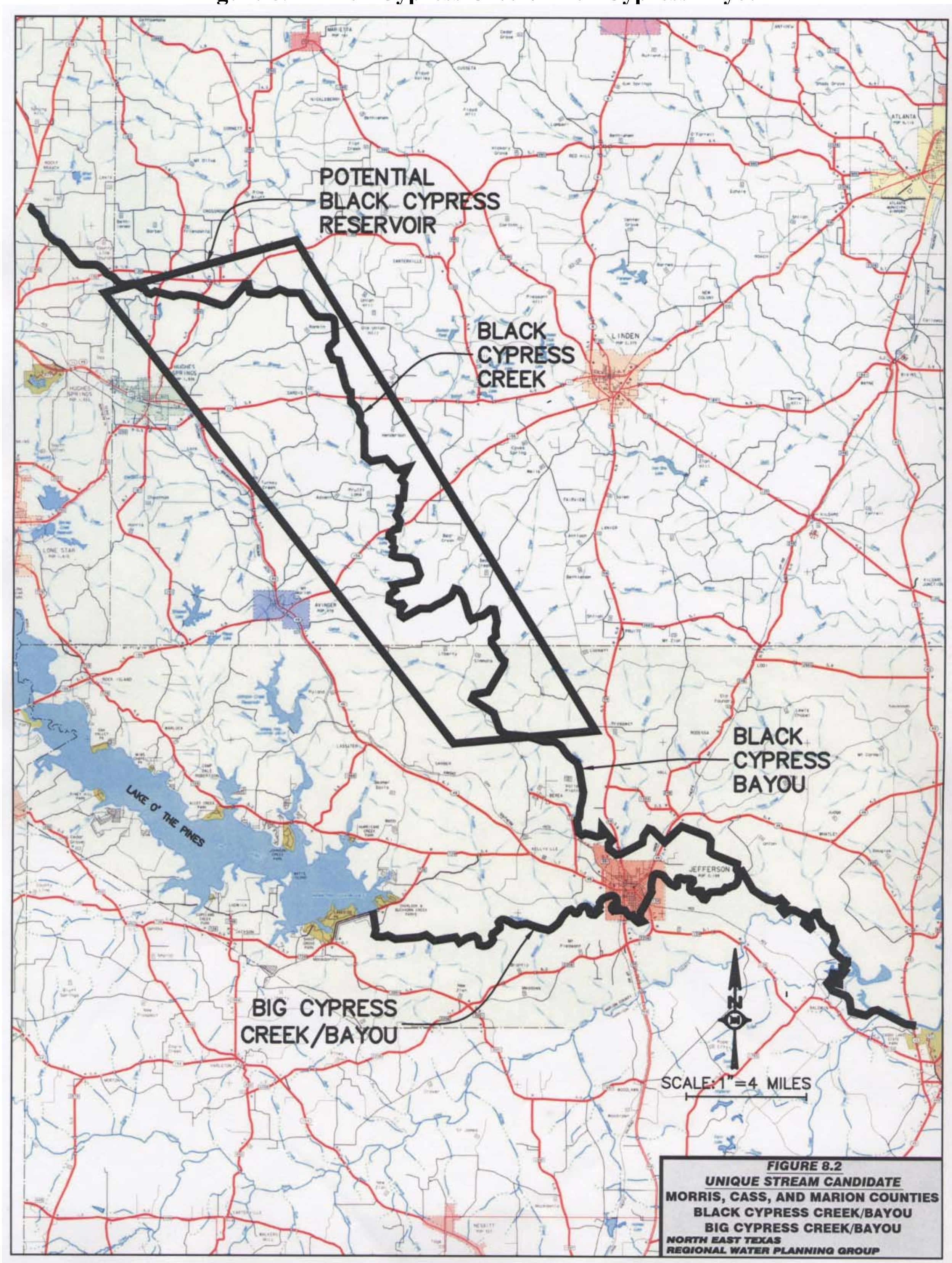


Figure 8.3 White Oak Creek Proposed

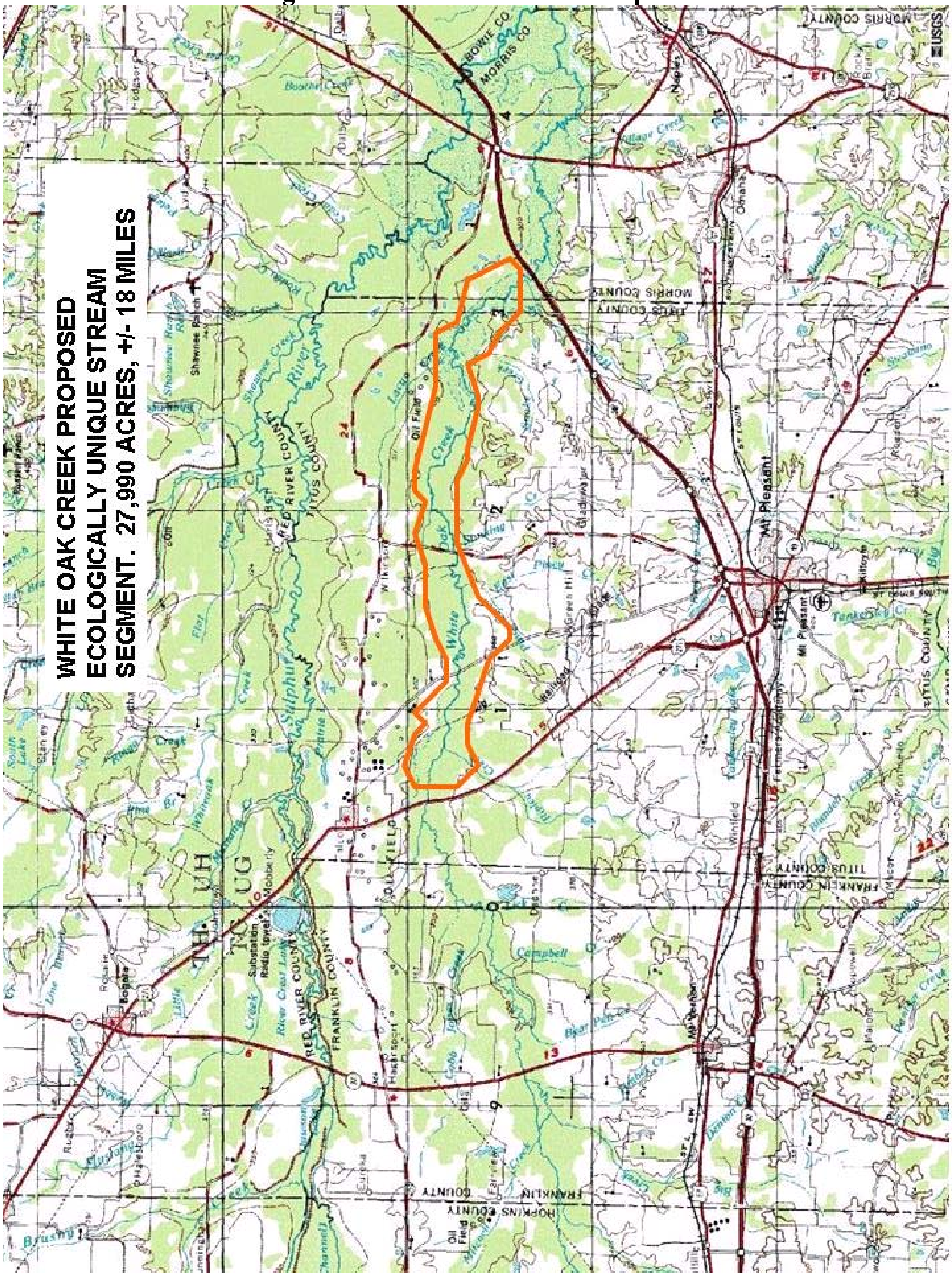


Figure 8.4 Reach of the Pecan Bayou in Red River County

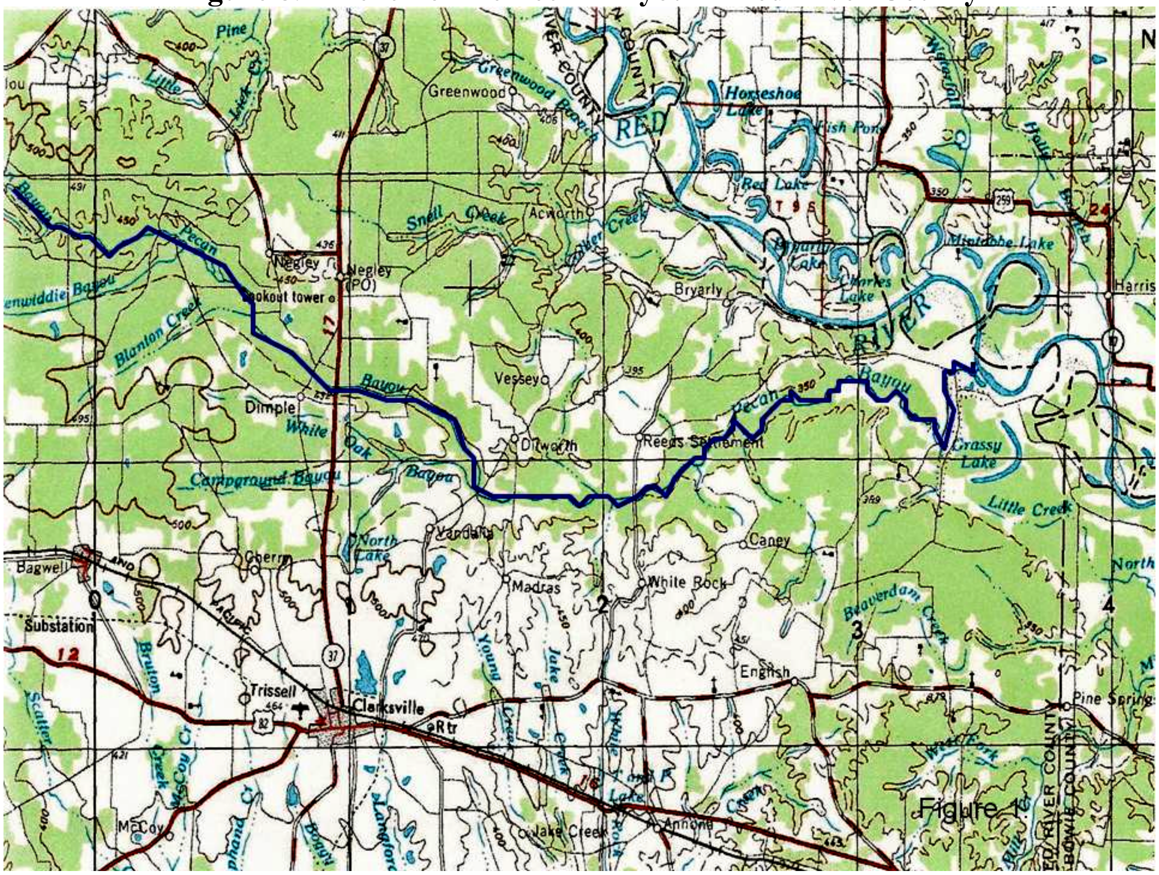


Figure 8.5 Primary Boundary of Lennox Woods Site

8.7 RESERVOIR SITES

Regional Water Planning Guidelines (31 TAC, Section 357.9), readopted December 12, 2001 and amended effective December 6, 2004, for the preparation of regional water plans provide 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 following criteria shall be used to determine if a site is unique for reservoir construction:*

(1) Site-specific reservoir development is recommended as a specific water management strategy or in an alternative long-term scenario 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:

a) Reservoir development to provide water supply for the current planning period; or

b) *Where it might reasonably be needed to meet needs beyond the 50-year planning period*."

Pursuant to TWDB rules, the approved scope of work for the preparation of the North East Texas Regional Water Plan included a subtask to *"…determine which sites for future reservoir development to include in the regional water plan."* Accordingly, consultants to 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 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 would be the Sabine River Authority's top priority project 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 12 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)

Sabine River Basin
Big Sandy (Wood and Upshur)
Carl Estes (Van Zandt)
Carthage (Harrison)
Kilgore II (Gregg and Smith)
Waters Bluff (Wood)

Sulphur River Basin
George Parkhouse II (Delta and Lamar)
Marvin Nichols II (Titus)

Figure 8.6 shows the approximate location of the previously proposed and potential reservoir sites in the North East Texas 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;
- Potential land use conflicts;
- Environmental conditions and impacts from reservoir development;
- Local, state, and federal permitting requirements; and,
- Project costs updated to third quarter 2009 price levels using the Engineering *News Record* Construction Cost Index (ENR) from the original ENR values of the second quarter of 1999.

8.8 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*.

The North East Texas Regional Water Planning Group 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.

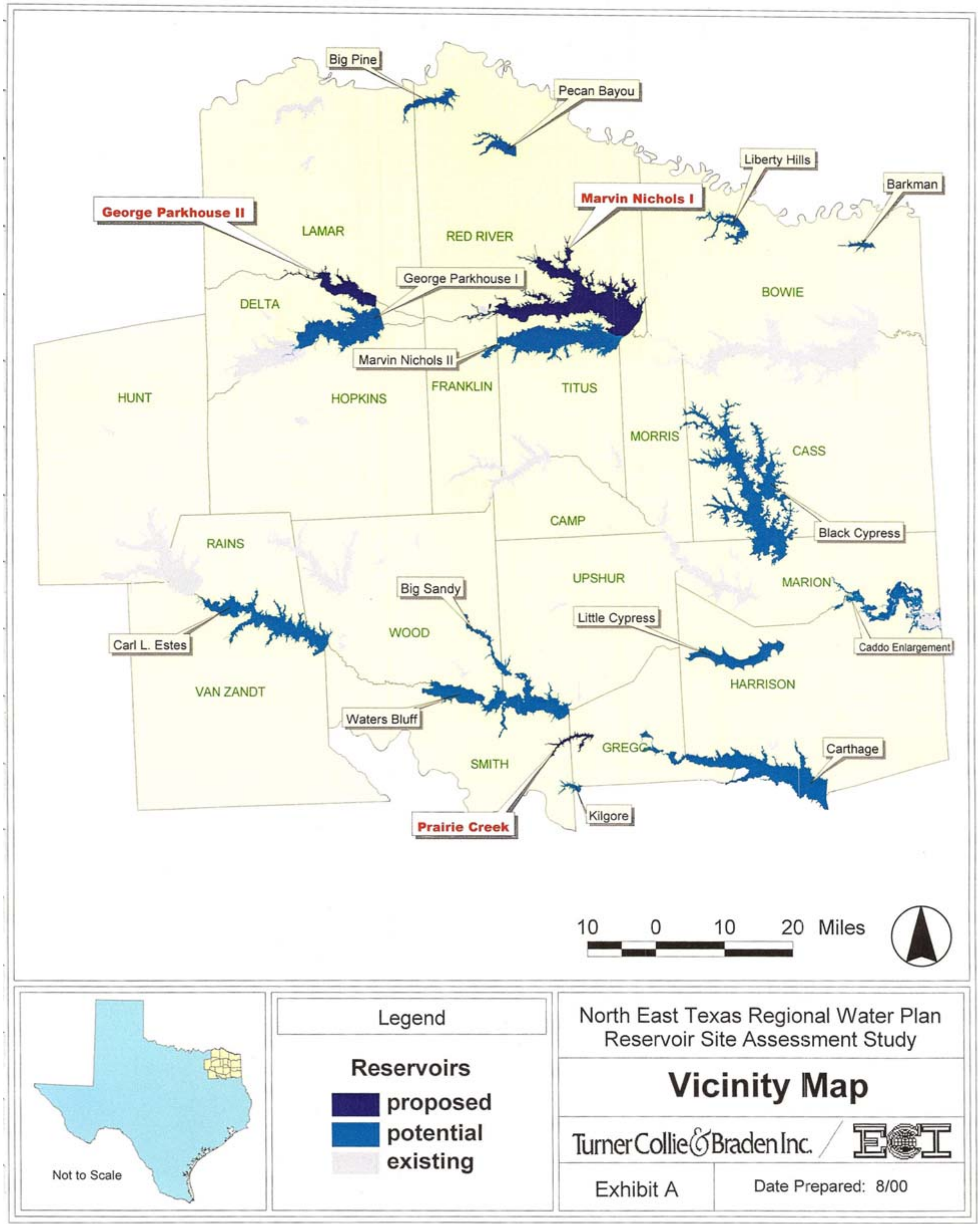
It is the position of the North East Texas Regional Water Planning Group that unless such proposed reservoirs or transfers include explicit recognition that the needs for environmental flows in the North East Texas Region must be satisfied first consistent with Senate Bill 3, that these strategies create direct conflicts between the plans of such other group(s) and the plan of the North East Texas Regional Water Planning Group.

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. There is, however, sufficient unappropriated water in the Cypress Basin to meet the environmental flow needs and unused or unsold water from Lake O' the Pines is one potential source for the additional needs, should appropriate strategies be developed to protect the interests of the NETMWD member cities and others in the Basin that will need such water.

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.

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.

Figure 8.6 Potential Reservoir Vicinity Map, Site Assessment Study 2000



8.8.1 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 (2009), the total cost to develop the reservoir would be approximately $431.6 million with an annualized cost of nearly $27 million. The unit cost of water from the project on an annualized basis would be $214 per ac-ft ($0.67/1,000 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 was 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	$431,600	$214

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.

8.9 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.

Potential beneficiaries of new reservoirs in the Red River Basin portion of the North East Texas Region include municipal and industrial users within the basin and/or users outside of the basin. Other potential benefits include recreation, hydroelectric power generation, and flood control.

8.9.1 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 eight birds, three fish, two mammals, three reptiles, and one vascular plant to potentially occur or have habitat within the potential Barkman reservoir project location. Current 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.

8.9.2 Liberty Hill

The Liberty Hill site is also located in Bowie County on Mud Creek. The preferred alternative site is located about three miles upstream of the authorized site, near the Davenport Road crossing at river mile 7.8. This site has apparently not been studied in detail as no information was found with regard to type and size of the dam, project firm yield or costs.

The USFWS and TPWD combined lists for threatened, endangered, or rare species lists eight birds, three fish, two mammals, three reptiles, and one vascular plant 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 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. Current NRCS (Natural Resource Conservation Service) data shows one 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.

8.9.3 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 $74.6 million dollars. The cost per ac-ft of firm yield on an annualized basis is $179 ($0.55/1,000 gallons). This site has apparently not been studied in detail as no information was found with regard to type and size of the dam, project firm yield or costs.

The USFWS and TPWD combined lists for threatened, endangered, or rare species lists seven birds, four fish, three mammals, one mollusk, four reptiles, and one vascular plant 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. Current NRCS (Natural Resource Conservation Service) data shows no hydric soil associations within the potential Big Pine reservoir footprint. 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.

8.9.4 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 $19.7 million. The unit cost of water from the reservoir would be $906 per ac-ft of firm yield ($2.78/1,000). 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 is a 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, three mammals, one mollusk, four reptiles, and one vascular plant species that potentially occur or have habitat in or near the project location. Also, available data indicates that there are three 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 was not available.

Table 8.4 Potential Reservoir Site 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	$ 15,000	$ 689
Big Pine	NA	9200	35,840	$75,600	$179

8.10 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.

8.10.1 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 $113.3 million. The annualized cost per ac-ft of firm yield would be $188 ($0.58/1,000 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 seven birds, four fish, three mammals, one mollusk, four reptiles, and one vascular plant 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, available data indicates that there are two 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.

8.10.2 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 $553.3 million. The project would provide water at a unit cost of approximately $427 per ac-ft ($1.32 /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 seven birds, four fish, three mammals, one mollusk, four reptiles, and one vascular plant species potentially occur or have habitat in the project location. Also, available data indicates that there are four 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.

8.10.3 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 $658.9 million. On an annualized basis, the unit cost of water from the project would be approximately $92 per ac-ft of firm yield ($0.28/1,000 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, four fish, three mammals, one mollusk, four reptiles, and one vascular plant species that potentially occur or have habitat in or near the project location. Also, available data indicates that there are four 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.

8.10.4 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 two fish 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.

8.10.5 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 reevaluated 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 S*tate 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 reduces the estimated yield to 17,215 ac-ft/yr.

The Sabine River Authority is considering 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 $80.3 million, which would provide water at an annualized cost of $366 per ac-ft of firm yield ($1.12/1,000 gallons). The diversion of flows from the Sabine River would increase the project development costs to $97.2 million and would reduce the unit cost of water to $258 per ac-ft ($0.80/1,000 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 $237 per ac-ft of firm yield ($0.73/1,000 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 as 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, four fish, three mammals, one mollusk, four reptiles, and one vascular plant species potentially occur or have habitat in or near the project location Also, available data indicates that there are four 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.

8.10.6 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 $663.7 million, with an annualized unit cost of water of $221 per ac-ft of firm yield ($0.48/1,000 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 seven birds, four fish, three mammals, one mollusk, four reptiles, and one vascular plant species that potentially occur or have habitat in or near the project location. Also, available data indicates that there are six 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 six 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	$ 113,300	$188
Carl Estes	393,000	44,900	95,630	$ 553,300	$427
Carthage	651,914	41,200	537,000	$ 658,900	$ 92
Kilgore II	16,270	817	5,500	NA	NA
Prairie Creek	45,164	2,280	17,215	$ 80,300	$ 366
Prairie Creek with Diversion	45,164	2,280	29,685	$ 97,200	$ 258
Prairie Creek with Pipeline	45,164	2,280	115,000	$ 248,300	$ 237
Waters Bluff	525,163	36,396	324,000	$ 663,700	$ 221

8.11 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.

8.11.1 Marvin Nichols I

In the interim since the 2001 plan there have been two 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 had prepared "The Economic, Fiscal, and Developmental Impacts of the Proposed Marvin Nichols Reservoir Project". These two studies along with previous studies have been presented to the NETRWPG and reviewed. The results of the two studies present differing views of effects on the area concerning reservoir development in the Sulphur River Basin.

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,* indicate 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 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 performed for the NETRWPG involves 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 2009 dollars, is $635.3 million. The total annualized cost of the project, including debt service and operations and maintenance costs, is $48.1 million, which results in a unit cost of roughly $87 per ac-ft of firm yield ($0.27/1,000 gallons).

Based on available information, there do not appear to be potential ecologically unique streams of high importance, wetland mitigation banks, or conservation easements within or adjacent to the site. 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 seven birds, four fish, three mammals, one mollusk, four reptiles, and one vascular plant species 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 six 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 I or Marvin Nichols IA reservoir sites as a unique reservoir site.

8.11.2 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.

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 project is approximately $356 million in 2009 dollars.

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 seven birds, four fish, three mammals, one mollusk, four reptiles, and one vascular plant several species 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 eight 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.

8.11.3 George Parkhouse I

The George Parkhouse I reservoir site is located approximately 110 miles east of the City of Dallas 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.

The conservation storage capacity of the George Parkhouse I reservoir would be 685,706 ac-ft and the reservoir would have a surface area of 29,740 acres at a pool elevation of 401.0 feet msl. At an elevation of 414.2 feet msl, which is the elevation for the probable maximum flood (PMF), the reservoir surface area would be 31,240 acres. 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 113,500 ac-ft/yr. The cost to develop the project would be $320 million and the project would provide water at an annualized unit cost of approximately $214 per ac-ft of firm yield ($0.67/1,000 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, three mammals, one mollusk, four reptiles, and one vascular plant several species that potentially occur or have habitat in or near the project location. Also, available data indicates that there are two 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 George Parkhouse I reservoir site as a unique reservoir site.

8.11.4 George Parkhouse II

The George Parkhouse II reservoir site is located on the North Sulphur River at River Mile 5.0. The reservoir site is approximately 110 miles east of the City of Dallas and would straddle the county line between Delta and Lamar Counties. The Parkhouse II site is recommended for development in the 1997 *State Water Plan*. 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.

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 indicates a firm yield with environmental releases of 131,850 ac-ft. At a cost of approximately $228 million to develop the reservoir, the annualized cost of water from the project would be $132 per ac-ft of firm yield ($0.41/1,000 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, four fish, three mammals, one mollusk, four reptiles, and one vascular plant species that potentially occur or have habitat in or near the project location. Also, available data indicates that there are six 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 George Parkhouse II reservoir site as a unique reservoir site.

A summary of key characteristics of the four reservoir sites that were 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)	Total Project Development Cost ($1,000)	Annualized Cost Per ac-ft
Nichols I	1,369,717	62,128	550,842	$ 635,300	$ 87
Nichols II	772,000	35,900	280,100	$ 356,100	NA
Parkhouse I	685,706	29,740	113,500	$ 319,700	$ 214
Parkhouse II	243,600	12,300	131,850	$ 227,700	$ 132

8.12 RECOMMENDATIONS FOR UNIQUE RESERVOIR SITE IDENTIFICATION, DEVELOPMENT AND RESERVOIR SITE PRESERVATION

8.12.1 Comments on the Texas Administrative Code With Regard to Reservoir Development

The North East Texas Regional Water Planning Group has 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 357.7 (a) (8) (A) of the Texas Administrative Code 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 environmental interests 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. The TAC Rule 357.7 (a) (8) (A) cited above includes the requirement that the regional water planning group evaluate all water management strategies to determine the potential of feasibility by including a quantitative report of several specific factors as follows:

(i) the quantity, reliability, and cost of water delivered and treated for the end user's requirements, incorporating factors to be used in the calculation of infrastructure debt payments, present costs, and discounted present value costs provided by the executive administrator;

(ii) 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;

(iii) 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 included further development of additional reservoirs in the Sulphur River Basin as a recommended water management strategy or as an alternative strategy. Further, it is the position of the North East Texas Regional Planning Group that the development of such reservoirs is in direct conflict with the stated TAC Rule and thereby impacts negatively the agricultural and environmental resources within the North East Texas Region. Furthermore, due to these foreseeable detrimental impacts, the North East Texas Regional Planning Group asserts strongly that the option of pursuing any new reservoir in the Sulphur River Basin as a water management strategy or an alternative strategy should be viewed as directly inconsistent with the protection of natural resources within the region under that rule.

8.12.2 Recommendations for Unique Reservoir Site Identification and Preservation

The North East Texas Regional Water Planning Group 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 2011 State Water Plan.

The NETRWPG recognizes that there are 15 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 roles. 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, S.B. 1 includes provisions (Texas Water Code, 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. S.B. 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 receiving basin;
- Factors identified in the applicable regional water plan(s);
- The amount and purposes of use in the receiving basin;
- Any feasible and practicable alternative supplies in the receiving basin;
- Water conservation and drought contingency measures proposed in the receiving basin to the highest practicable extent;
- The projected economic impact that is expected to occur in each basin;
- The projected impacts on existing water rights, instream uses, water quality, aquatic, and riparian habitat, and bays and estuaries;
- Proposed mitigation and compensation to the basin of origin.

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 recently 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 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.

8.12.3 Environmental Protection Agency and Corps of Engineers

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 NETWPG 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.

8.12.4 Environmental Flows

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 North East Texas Regional Water Planning Group 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 North East Texas Regional Water Planning Group that unless such proposed reservoirs or transfers include explicit recognition that the needs for environmental flows in the North East Texas Water Planning Region must be satisfied first consistent with Senate Bill 3, that these strategies create direct conflicts between the plans of such other group(s) and the plan of the North East Texas Regional Water Planning Group.

Development of new reservoirs prior to determination of the water demands required for environmental flows in the Sulphur River Basin would be premature. Once the State has set aside water for such needs, the State will have made its determinations on such needs. Proposals for new reservoirs or interbasin transfers can then be made consistent with the environmental flow needs in the basin.

8.13 LEGISLATIVE RECOMMENDATIONS

TWDB rules for the 2011 regional water planning activities (31 TAC Chapter 357.7(a) (10) also provide that regional water planning groups may include in their regional water plans:

> *…regulatory, administrative, or legislative recommendations the regional water planning group believes are needed and desirable to: facilitate 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 protect the agricultural and natural resources of the state and the regional water planning area. The regional water planning group may develop information as to the potential impact once proposed changes in law are enacted.*

The approved scope of work for the development of the regional water plan 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 2011 planning process, the one major policy issue that remained dominate 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 2006 plan are future interbasin transfers from the North East Texas Region; conversion from groundwater to surface water supplies; various regulatory policies of the Texas Commission on Environmental Quality; 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.

8.13.1 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 2011 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 Region D Plan states that the Marvin Nichols I reservoir should not be included in any regional water plan as a water management strategy and not be included in the State Water Plan as a water management strategy. The NETRWPG stated that the Marvin Nichols I Reservoir was not consistent with protecting the timber, agricultural, environmental and other natural resources as well as third parties in the Region D area. Among the specific issues are basic rights of the property owners and the local governmental entities.

Based on the reasons set forth in Section 7.6 of this regional plan, it is the position of the North East Texas Regional Water Planning Group that the inclusion in the regional plans of any other regional water planning group of the Marvin Nichols I reservoir or any similarly located reservoir would create an interregional conflict as described in Section 16.053 of the Texas Water Code. Further, the North East Texas Regional Water Planning Group takes the position that any such Marvin Nichols reservoir should not be included in the 2011 State Water Plan as a water management strategy. The North East Texas Regional Water Planning Group is prepared to work with the Texas Water Development Board to resolve any conflict pursuant to Section 16.053(h)(6) of the Texas Water Code.

Subject to the comments in Chapter 7, 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 reservoir's 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 North East Texas Regional Water Planning Group 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 North East Texas Water planning group for designation as a unique Reservoir Site.

8.13.2 Recommendation: The Growth of Giant Salvinia

The North East Texas Water Planning Group 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 world wide. 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.

8.13.2.1 Background on Giant Salvinia

The North East Texas Regional Water Planning Group 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.

8.13.2.2 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.

8.13.2.3 Local, State, and Federal Government Efforts

The North East Texas Water Planning Group 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 North East Water Planning Group 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; and
- Promote reporting of new Giant Salvinia infestations.

The North East Texas Regional Water Planning Group 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.

8.13.3 Recommendation: Toledo Bend Reservoir and Pipeline

At the 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 be used as a supply source for the upper Sabine Basin.

8.13.4 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.

8.13.5 Recommendation: Concerning Mitigation

The North East Texas Regional Planning Group 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. 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 North East Texas Regional Water Planning Group recognizes that the rules concerning mitigation and the method of accomplishing mitigation have changed since the previous plan was prepared. Some suggested references to update for mitigation rules and information are the *National Wetlands Mitigation Action Plan* (www.mitigationactionplan.gov), the EPA *Mitigation Banking Factsheet* (www.epa.gov/owow/wetlands/facts/fact16.html), the EPA *Wetlands Compensatory Mitigation Rule* (www.epa.gov/wetlandmitigation) and the *Corps Regulatory Program* (www.usace.army.mil/inet/functions/cw/cecwo/reg). 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 Banking Factsheet* 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; and
- 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 been recommended to adopt a "watershed-based approach" (although a consensus definition has yet to be established) to compensatory mitigation as stated in the *New Wetlands Mitigation Rules* (www.epa.gov/fedrgstr/EPA-WATER/2006/March/Day-28/w1969.htm). The watershed approach is based on a formal watershed plan being developed jointly by Federal, State and/or local environmental managers in consultation with the affected stakeholders. 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, cumulative impacts of past development activities, current development trends, the presence and needs of sensitive species, site conditions that favor or hinder the success of mitigation projects, chronic environmental problems such as flooding or poor water quality, and local watershed goals and priorities.

8.13.6 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, S.B. 1 includes provisions (Texas Water Code, Section 11.085) requiring the Texas Commission on Environmental Quality (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. S.B. 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 receiving basin;
- Factors identified in the applicable regional water plan(s);
- The amount and purposes of use in the receiving basin;
- Any feasible and practicable alternative supplies in the receiving basin;
- Water conservation and drought contingency measures proposed in the receiving basin to the highest practical extent;
- The projected economic impact that is expected to occur in each basin;
- The projected impacts on existing water rights, instream uses, water quality, aquatic and riparian habitat, and bays and estuaries;
- Proposed mitigation and compensation to the basin of origin.

As an added protection to water rights and water users in a basin of origin, S.B. 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; and
- Mitigation of impacts to Sulphur River Basin and compensation for the interbasin transfer.

8.13.7 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 available surface and groundwater supplies are adequate to meet projected needs through 2050 and beyond. This conclusion also applies for each of the river basins within the region. More importantly, however, the supply and demand assessment indicates that 131 individual water user groups are projected to experience shortages during the planning period, including several in the Sulphur River Basin. However, most 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 Water Planning 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.

Such factors suggest that the RWPG 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.

8.13.8 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 roles 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.

8.13.9 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); and
- 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.

8.13.10 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.

8.13.11 Recommendation: Texas Commission on Environmental Quality (TCEQ) 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 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 the recent incident at Lake Tawakoni illustrated all too well. 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 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.

8.13.12 Recommendation: Improvements to the Regional Water Supply Planning Process

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 North East Texas Regional Water Planning Group 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.

8.13.13 Recommendation: Groundwater Management Areas (GMA)

The North East Texas Regional Water Planning Group recommends that the representation on the Groundwater Management Area governing bodies be reconsidered. This is significant in that the Region is overlain partly by two separate GMA's and as there are no Groundwater Conservation Districts in the Region, a large portion of the Region has no voting representation on either board except as it involves the Groundwater Conservation District contemplated for Harrison County, Texas. It is further recommended that the representation from areas that do not have a Groundwater Conservation District could be based on the particular area's population, the amount of groundwater used in the particular areas, the number of aquifers in the particular area or some other method to provide adequate representation for those not represented at the present time.

8.13.14 Recommendation: Wright Patman Lake/Reservoir

The North East Texas Regional Water Planning Group 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.

8.13.15 Recommendation: Standardize Statistics Used For Conservation Assessments

The North East Texas Regional Water Planning Group (Region D) recommends that the Texas Legislature standardize the method used to derive the statistic known as "gpcpd" (gallons per capita per day) and also known as "municipal per capita usage". 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. NETMWD supports conservation as a water management strategy for any entity that has a gpcpd ratio greater than the goal of 140 gpcpd. Assessing the progress of communities engaged in conservation will be more reliable with a standardized method for comparison.

Senator Florence Shapiro, in March 2010 op-ed piece, called for uniform conservation standards for all of Texas. Senator Shapiro stated "…that despite Texas being a state with only one natural body of water, over the years we've been able to meet our wide-ranging water needs through a number of man-made reservoirs.

"Today, the most widely used measurement of water usage is gallons per capita per day. Used as a planning tool gpcd may be used to project the future water needs of each municipality. Currently, the measurements being used to determine gpcpd are not standardized. However, in order for a true comparison of water use and to measure our projected needs, these methods of calculation must be uniform.

"…there is certainly no reason for us to strand ourselves with a short-sighted water plan. As we work to address Texas' demands, it is essential that we create a new system for water conservation."

NOTE: In referencing Marvin Nichols I, the Region D Plan incorporates Marvin Nichols I, Marvin Nichols IA and any other dam site on the main stem of the reaches of the Sulphur River.

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CHAPTER 9.0 INFRASTRUCTURE FINANCING RECOMMENDATIONS

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). From the Texas Administrative Code, 31 TAC 357.7 (a)(14) requires that regional water planning groups (planning groups) include a chapter describing the financing needed to implement the recommended water management strategies. The description shall include how local governments, regional authorities, and other political subdivisions propose to pay for the water management strategies that are included in the Regional Water Plans.

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 Regional Water Planning Groups (RWPG) propose for the State in financing the recommended water supply projects.

9.1.1 Methodology

To begin the IFR, the North East Texas Regional Water Planning Group (NETRWPG) obtained an IFR survey form developed by the 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 (WUG) with water management strategies involving capital costs identified in the second round of planning. WUGs with strategies involving only contract renewals were not contacted, since it is assumed that no capital improvements would be required. The survey form was mailed to the WUGs and at least two follow-up contacts were made, in writing, by telephone, or in person. The information obtained from the surveys is included in Table 9.1.

For county aggregate WUGs (i.e. manufacturing, agriculture, etc.), which showed shortages during the planning period and where no political subdivision is responsible for providing water supplies, the RWPG determined probable funding mechanisms for meeting the water management strategies. These determinations were compiled into discussion paragraphs included herein.

9.2 COUNTY AGGREGATES

In the North East Texas Region, there are four 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 in the third round of planning, information was sought as to the cause of the water supply shortages. This information was utilized by the RWPG in determining what type(s) of funding might be sought to provide water supply. County aggregate shortages in the North East Texas Region are steam electric in Harrison County, steam electric in Hunt County, steam electric in Lamar County, and steam electric in Titus County; probable financing for each is discussed in the following paragraphs.

Water shortages in the steam electric WUG in Harrison County are anticipated due to an increase in customers over the next few years. The recommended water management strategy for this WUG is to purchase raw water from the Northeast Texas Municipal Water District (NETMWD). The NETRWPG has determined that since steam electric generation facilities are normally owned by private companies that are not eligible for State or Federal assistance, financing for this water management strategy will likely come from private funding.

The Steam Electric WUG in Hunt County has a demand that is projected to grow from 8,639 ac-ft/yr in 2010 to 23,902 ac-ft/yr in 2060. Sabine River Authority (SRA) is a leading wholesale water provider for consumers in Hunt County. All SRA water from Lake Tawakoni and Lake Fork has been contracted and there is no water available from these lakes to meet the projected steam electric demands. SRA is proposing to transfer water from the Toledo Bend Reservoir to the North Texas region to meet anticipated future needs of its customers. Since there is no wholesale water provider in the area with adequate amounts of water to meet steam electric demands in Hunt County, SRA water from the Toledo Bend Reservoir is a potential source of water that can be used to meet future shortages.

In Lamar County, Steam Electric WUG has a demand that is projected to grow from 5,940 ac-ft/yr in 2010 to 16,435 ac-ft/yr in 2060. Panda's steam electric contract with City of Paris is 8,961 ac-ft/yr. Steam electric is projected to have a deficit of 980 ac-ft/yr in 2030 and increasing to a deficit of 7,474 ac-ft/yr in 2060. The recommended strategy for the Lamar County steam electric WUG to meet projected demands during the planning period is to purchase raw water from the City of Paris's Pat Mayse Lake. A capital cost is not included for this alternative since Panda's steam electric facilities are already in place.

The Steam Electric WUG in Titus County has a demand that is projected to grow from 51,804 ac-ft/yr in 2010 to 101,329 ac-ft/yr in 2060. Luminant and SWEPCO have plants in Titus County. Steam electric is projected to have a deficit of 951 ac-ft/yr in 2030 and increasing to a deficit of 40,992 ac-ft/yr in 2060. The recommended strategy for the Titus County steam electric WUG to meet projected demands during the planning period is to purchase raw water from NETMWD. NETMWD receives supplies from several lakes, and Lake O the Pines has the largest yield. At this stage it is assumed that the steam electric water needs will be met from this lake. A capital cost cannot be included for this alternative since the location of the future generator facilities is unknown.

9.3 IFR SPREADSHEET

The NETRWPG identified 61 entities with water shortages during this planning round. Twenty-one of these entities have contractual shortages, meaning that a simple renewal of their existing water supply contract or renewal with an increase in supply would solve the WUG water needs. Since there is no capital funding required to meet this type of water need, entities with contractual shortages were not included in the IFR process. Additionally, county aggregate WUGs are discussed in section 9.2 of this report. There were a total of 17 WUGs with water shortages that require capital costs and were involved in the IFR survey process.

The RPWG consultants contacted the 17 entities with water management strategies requiring capital costs by mailing out the TWDB survey form. This form contained the WUG name, water management strategy and associated capital cost for that strategy. It posed a series of questions regarding anticipated funding sources that the WUG might access to implement the water management strategy. After the surveys were sent, consultants made at least two follow-up contacts as necessary to each WUG. Some contacts were made by mail, others by facsimile, electronic mail, telephone, or in person. Once attempts had been made to contact all 17 WUGs, the survey results were compiled into the Table 9.1. Actual completed survey forms have been included in the Appendix to Chapter 9.

Table 9.1 – Capital Costs and Strategies by Political Subdivision

Name of Political Subdivision	Recommended Strategy	Capital Cost	Implementing Strategy? (Y/N)	Alternative Strategy
Bi-County WSC	Surface water, NETMWD	$ 51,585	N	R.U.S. funding
Campbell WSC	City of Commerce, Lake Tawakoni	$ 934,926	Y	
Campbell WSC	Groundwater, Nacatoch	$ 805,668	Y	
Canton, City of	Groundwater, Carrizo-Wilcox	$ 939,728	Y	Reservoir alternative
Celeste, City of	City of Greenville, Lake Tawakoni	$ 1,741,204	N	Will construct more wells or purchase water from local utilities, as req'd..
Clarksville City, City of	Groundwater, Carrizo-Wilcox	$ 1,518,443	Y	
Crystal Systems Inc.	Groundwater, Carrizo-Wilcox	$ 992,200	Y	
Grand Saline, City of	Groundwater, Carrizo-Wilcox	$ 749,549	Y	
Hickory Creek SUD	Groundwater, Woodbine	$ 7,831,144	Y	
Liberty City WSC	Groundwater, Carrizo-Wilcox	$ 1,170,845	Y	
Linden, City of	Groundwater, Carrizo-Wilcox	$ 669,409	Y	
MacBee SUD	WTP expansion	$5,011,000	N/A	
Mineola, City of	Groundwater, Carrizo-Wilcox	$ 313,957	Y	New storage tank with larger capacity
R-P-M WSC	Groundwater, Carrizo-Wilcox	$ 449,135	N	
Van, City of	Groundwater, Carrizo-Wilcox	$ 562,963	Y	
Waskom, City of	Groundwater, Carrizo-Wilcox	$ 718,665	Y	
Wolfe City, City of	City of Commerce, Lake Tawakoni	$ 2,910,914	Y	
West Gregg SUD	Groundwater, Carrizo-Wilcox	$ 1,502,847	N/A	

Survey findings are as follows:

- The 17 WUGs were successfully contacted and were included in the IFR survey process.

- The 17 WUGs who responded to the survey had either secured financing for water management strategies, or anticipate financing the costs of water management strategies through local financial institutions, the sale of bonds, or rate increases, for a total amount of $28,090,182. Of these 17 WUGs, all have either completed or are in the process of completing water management strategies to meet water needs.

- As in Round II of the Water Planning Process the general consensus among those systems that do not intend to utilize State funding is that the State should provide assistance through grants or interest-free loans for smaller projects. Many of the smaller systems could use financial assistance for project less than $300,000. The main concern with the available State programs is the provision of the fiscal and legal cost of issuing bonds and the associated requirements to administer those programs. To the smaller systems these requirements are cost prohibitive. Therefore, systems are forced to seek financing from private sources and pay higher interest rates than systems that utilize State allocated funding.

In addition to regional water supply needs and associated water management strategies, the NETRWPG also considered out of region needs having water management strategies within the region. One strategy includes construction of the Toledo Bend pipeline.

CHAPTER 10.0 ADOPTION OF THE 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. There is a copy of all written public comments received in the Appendix C along with notes of oral comments made during the process.

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 its public and regular meetings at the Civic Center in Mount Pleasant, Titus 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 and was attended by 25-50 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 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 Initially Prepared Plan to solicit public input on aspects of the plan. The hearing was held in Mount Pleasant in Titus County on March 31, 2010, and was attended by approximately 59 persons from the public and 23 NETRWPG members. Comments made at the public hearing are summarized in the Appendix C of this report.

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, especially relating to the "County Other" category, referring to the large portion of the population of the North East Texas Region that is located in rural areas and small towns. Second, the consultant team surveyed water providers 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), the NETRWPG Chairs Richard LeTourneau and Jim Thompson. The public outreach program consisted of three elements: public comment periods at the conclusion of each meeting; distribution of press releases prepared on the day following each monthly meeting to all daily and weekly papers in the region; and, a newsletter published at least three (3) times in 2006, four (4) times in 2007, six (6) times in 2008 and one (1) time in 2009, mailed to public officials, activists, news media outlets, and others who asked to receive the publication. The publication focused on outcomes of the NETRWPG meetings, future projects, issues of public concern and planning strategies.

10.2.6 Hosting by NETRWPG Members of Community Meetings

Some members of the NETRWPG made presentations to business clubs, membership organizations, professional associations, County Commissioner Courts and other groups. These presentations were accompanied by the Administrator and the consultant team members on some occasions. The issues and concerns raised by the public at these sessions were forwarded to the consultant team for inclusion in their research. Several members of the consultant team also made presentations at additional meetings.

10.2.7 Preparation and Distribution of News Releases after RWPG Meetings

A summary of each meeting in the form of a news release was prepared and was distributed to the daily and weekly papers across the region. These news releases were often used as the basis for news stories in papers in Longview, Gilmer, Mount Pleasant, Texarkana, Mount Vernon, Tyler, Paris and other cities, towns and counties in the region and in adjoining regions. These news releases were distributed by e-mail to newspapers in each NETRWPG county. In 2006, five (5) news releases corresponding with Planning Group meetings were distributed to all newspapers within the 19-county region. Five (5) such releases were distributed in 2007, seven (7) news releases were distributed in 2008, four (4) news releases were distributed in 2009, and three (3) news releases were distributed in 2010.

10.2.8 Interviews With NETRWPG Members

An important method of identifying issues of public concern was the opportunity for public comment at the end of all 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.

10.2.9 Contacts with Media

All meetings were posted as required and were 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, several 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 NETRWPG area. 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. The consultant team served as a backup for the administrator and provided guidance for dealing with the news media.

10.2.10 Reports Filed with Public Authorities

Pursuant to the rules, the NETRWPG made copies of the Initially Prepared Plan available for public inspection in the County Clerk's office of each county within the North East Texas Region and in at least one public library in each county. The IPP was also available on the internet, and in the administrator’s office in Hughes Springs in Cass County, but the office is in Morris County.

10.3 PUBLIC MEETINGS AND HEARINGS

10.3.1 Public Hearings and Comments on the Initially Prepared Plan

The NETRWPG conducted public comment sessions at the conclusion of each NETRWPG meeting. The prescribed public hearing was held on March 31, 2010, at Mount Pleasant in Titus County to allow interested persons to comment on issues affecting water planning. All oral and written comments were recorded and were considered by the NETRWPG in the Adopted

Regional Water Plan. This meeting was scheduled to allow the public to make comments prior to the completion of the adopted Regional Water Plan that was being drafted.

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 any of the public sessions were summarized and considered by the NETRWPG prior to adoption of the final Regional Water Plan.

The public comment sessions were well-publicized with news releases, a NETRWPG newsletter distribution, and advance notice at a previous NETRWPG monthly public meeting. Approximately 59 people attended the public comment session in Mount Pleasant. Not all of the individuals, however, chose to make oral or written comments.

10.3.2 Summary of the March 31, 2010, Public Hearing

In advance of the March 31, 2010, public hearing held to solicit comments on the NETRWPG Initially Prepared Plan; the hearing was well-publicized with news releases, a NETRWPG newsletter distribution, and advance notice at a previous NETRWPG monthly public meeting.

The public hearing was widely reported by daily and weekly newspapers in the region.

Most of those attending the public hearing supported exclusion of Marvin Nichols Reservoir No. 1 from the NETRWPG plan. Others attending said, even with the exclusion of the lake from the North East Texas Plan, they were concerned that water planners in the Dallas-Fort Worth area might push for the construction of the reservoir as a water supply source for the Metroplex. George Frost, a former board member of the NETRWPG, said that reservoirs should be a last resort and that no region should be able to take another area's land and use it for water. However, Clarksville Mayor Ann Rushing voiced support for new reservoirs. "With new reservoirs, we can create a better tax base, which will be better for our children," she said. Mount Pleasant Mayor, Jerry Boatner also gave comments in favor of reservoirs. Mr. Ty Abston, North East Texas Water Coalition representative, gave written comments also in favor of reservoirs.

Several leaders of the opposition to Marvin Nichols Reservoir commended the NETRWPG for working with local residents on key water issues and for its attention to public comment, as reflected at the NETRWPG's monthly meetings and public hearing during preparation of the NETRWP. "We thank you for your efforts to build trust in our region, and for your efforts to represent our concerns," said Max Shumake.

10.3.3 Synopsis of the Oral and Written Comments

At the March 31, 2010 Public Hearing in Mount Pleasant, Titus County, there were 19 individuals who requested to speak. Only 16 actually spoke but all commented on the cards provided. After the meeting and prior to the closure date June 1, 2010, there were an additional 36 written comments received. Written responses to the comments were prepared and considered at the June 23, 2010 meeting for action by the NETRWPG.

The following represents a synopsis of the oral comments made at the Public Hearing March 31, 2010 (these are shown in Table 10.1 of Appendix C):

- Pecan Bayou should be designated an Ecologically Unique Stream Segment and others also;
- There should be a Sulphur River Basin Study in the 50 year plan. The Sulphur River has many possibilities and none should be excluded from the long-range usage and planning studies;
- Comments supporting the IPP but not the development of the Marvin Nichols Reservoir;
- The population projection for Region D should be increased as growth is occurring at a faster rate than what has been considered;
- Questioned as to how the proposed plan will affect privately held diversion permits;
- Opposition to the construction of large reservoirs that would destroy local communities and support for voluntary acquisition of mitigation lands;
- Against new reservoir in the Red River County as the future of the County lies in the beauty of the County and its natural resources;
- Comment as to the belief that a priority should be protecting jobs in Northeast Texas; and,
- Langford Lake's silting rate will limit its usefulness; water lines from Wright Patman are too expensive; aquifers are unpredictable due to no accurate record or studies; no cities with actual shortages in Red River County; possible lake sites of Pecan Bayou, Big Pine and Marvin Nichols need to be included in the plan.

After the period to receive written comments to the IPP ended on June 1, 2010 the comments were organized in three categories. These three groups are described as follows:

Group 1 - Comments, fifteen (15), which reflect the opinion of the commenter but do not specifically request any changes in the Initially Prepared Plan (IPP). These comments are typically thought of as being more generic in nature. All nineteen (19) oral comments were included in this group.

Group 2 - Comments, nine (9), which represent facts which are incorrectly stated or need additional clarity to improve the quality of the Initially Prepared Plan (IPP). These comments require changes in the document but are consistent with the intent of the IPP. These items were presented to the voting members of the NETRWPG for concurrence.

Group 3 - Comments, twelve (12), which recommend or request changes in the IPP which require more direction. These comments required more discussion and decision making by the voting members of the NETRWPG. These comments were presented in more detail with suggested language either developed by the commenter or consultant team for the adoption or rejection by the NETRWPG.

These written comments are shown in Appendix C as submitted. Also in Appendix C are the comments and responses as submitted to the NETRWPG on June 23, 2010 with the action as taken by the group for each one considered.

Group 3 comments were presented by topic. The topics list is shown below:

A. Ecologically Unique Streams
B. Unique Reservoir Sites
C. Environmental Flows
D. Small Lake Projects
E. City of Canton Strategy
F. Mitigation
G. Water Usage and Conservation
H. Basin Studies
I. Planning
J. Haynesville Shale
K. Feral Hogs

Action on Topic A was tabled as additional designation of EUSS should be studied more in depth.

No action was taken on Topic B. Unique Reservoir Sites

Comments in Topic C, Environmental Flows, were approved as amended by the NETRWPG.

The comments in Topic D, Small Lake Projects, were approved without comment.

The City of Canton agreed to final wording for the Environmental Strategies and Recommendations prior to the meeting and Topic E was approved.

Topic F, Mitigation, was approved as written as it described the current mitigation process and provided references for research.

Topic G, Water Usage and Conservations, was approved as submitted.

No action was taken on Topic H, Basin Studies, as it was acknowledged that the Special Studies Commission for a Region C Water Supply is working on the topic. It was suggested that deference be extended to that process by the NETRWPG at the time.

The additional language suggested under Topic I, Planning, was not approved by 2/3 of the voting membership.

Topic J, Haynesville Shale, was approved as written.

Topic K, Feral Hogs, was approved as written.

The document as acted upon list by topic is included in Appendix C and also includes the action taken in each instance.

10.4 TEXAS WATER DEVELOPMENT BOARD

The Texas Water Development Board reviewed the Initially Prepared Plan and submitted comments on their findings by letter to Mr. Richard LeTourneau, Chairman, North East Texas Regional Water Planning Group, dated June 28, 2010.

This letter also included Attachment B: Level 1 Comments – Initially Prepared Regional Water Plan vs. Online Planning Database Review and Attachment C: Level 1 Exception Report – Online Planning Database. This letter is shown in Appendix C with the responses.

10.5 ATTACHMENTS

The following attachments are included in Appendix C (see Table of Contents, Appendix C for specific locations):

- Recorded comments at the March 31, 2010, Public Hearing.
- Texas Water Development Board Comments.
- Resolutions passed by various government entities.
- Written comments submitted by individuals and organizations at the public hearing.
- Newsletters published during 2006, 2007, 2008, and 2009.
- News releases published during 2006, 2007, 2008, 2009 and 2010.

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APPENDIX A

Further Evaluation of Sub-Regional Water Supply Master Plans Prepared for North East Texas Regional Water Planning Group

In June 2007, the Texas Water Development Board (TWDB) commissioned the Northeast Municipal Water District (NETMWD) to provide a further study of sub-regional water supply master plans in Region D, North East Texas Regional Water Planning Area (NETRWPA) that was initiated in the 2006 Regional Plan. This report was published under separate cover December 17, 2008 and is not reproduced in this appendix.

Texas is projected to more than double in population in the next 50 years. This growth will increase the vulnerability of our water supplies and lead to a significant decline in quality of life if adequate planning is not undertaken. The investigation of the creation of sub-regional water supply master plans was to allow the smaller systems to consider the economic benefits, regulatory compliance benefits and the ability to better serve their end users with adequate water availability.

The 2006 North East Texas Regional Water Plan (NETRWP) identified 255 public water systems in the region. As the plan developed, it became apparent that many of these were quite small, and that in several cases, a number of small systems were located in close proximity to each other. The planning group expressed that very small systems may lack the financial, managerial, or technical capacity to continue as separate, viable entities over the long term. In 2004, the NETRWPG requested funding from the TWDB to study the possibility of combining identified clusters of small public supply systems, and, in 2005, the TWDB approved the request.

A total of 51 existing public water supply systems were selected for inclusion in the study and they were combined into 10 clusters based upon proximity. These clusters were in six of the most southerly counties in the region – Hopkins County, Rains County, Van Zandt County, Harrison County, Upshur County and Smith County. The final clusters varied in size from 1,252 connections to 4,167 connections with the goal being to have 2,000 more connections. A total of 25,544 connections were included.

This initial work was presented in a volume entitled “Supplemental Tasks” as a part of the 2006 Regional Plan. Physical data on the systems was tabulated, discussion of financial/managerial/technical and political/legal aspects were presented, and rough cost estimates for physical consolidation were presented. The conclusion of the 2006 work was that:

> “ultimately, for very small systems, consolidation will become essential to survival. Increasing regulatory compliance pressures, increasing costs, and limits on water supply are all growing influences which will compel consolidation.”

As a portion of the 2011 planning, the NETRWPG elected to pursue further discussions with the entities identified as potential clusters in the 2006 plan. A second emphasis would expand the scope to include additional very small systems not included in 2006. The 2006 selection was limited to small systems which, by virtue of geographic proximity, might combine with neighboring small systems to create a larger, more viable entity. In the 2011 scope, an additional 93 systems with less than 300 meters were identified which were not positioned geographically so as to suggest consolidation with other small systems. In general, these small entities are adjacent to, or surrounded by, a much larger system which would be the most logical partner.

Based upon the information gathered in the study, the following observations are appropriate:

1. At the end of the 2006 planning period, 144 systems (93 small and 51 clusters) were identified. By the end of 2008, only 95 of these are still independent, stand-alone systems. The remaining systems have either merged with another small system, have been purchased by a larger for profit or governmental system, or were a proposed system which had not developed. No new systems have been identified in these cluster areas.

2. In general, systems desire to remain completely autonomous. Smaller systems do recognize, however, that there are some advantages in working together, and are occasionally willing to do so – for example, shared management or operating staff, or specific programs – provided that each Board retains final approval authority. A merger or consolidation which results in loss of autonomy is the least preferred option.

3. There is a need for regionalization in northern Van Zandt County. It appears that adequate groundwater resources are becoming increasingly difficult to develop, and a contracted or surface water supply alternative will be too expensive for the smaller entities to pursue individually. The City of Canton has conducted some work in this regard, but the NETRWPG may be of assistance in encouraging regional partnerships among the various local entities.

APPENDIX B

Brackish Groundwater Study
Prepared for
North East Texas Regional Water Planning Group

In June 2007, the Texas Water Development Board (TWDB) commissioned the Northeast Municipal Water District (NETMWD) to provide a study of brackish groundwater opportunities in Region D, North East Texas Regional Water Planning Area (NETRWPA). This report was published under separate cover December 17, 2008 and is not reproduced in this appendix.

NETRWPA anticipates a 72% increase in population during the 50-year planning period (2010 to 2060). During the planning period, water demand is estimated to increase by 50%, requiring an additional 277,900 acre-feet of water. It should also be noted that the drought cycle for North East Texas imposes peak demands which could be mitigated by developing additional water supplies. Although it is expected that some of this increased demand can be met through more aggressive water conservation and increased use of existing supplies, utilization of brackish groundwater may be an important supplemental source for the region. There were no strategies proposed in the 2006 Regional Plan involving the treatment and use of brackish groundwater.

Desalination of brackish groundwater involves additional operation and maintenance costs, and is a significant effort. For example, a brine disposal injection well can cost substantially more than the production well. Nevertheless, brackish groundwater may represent an important additional supply for NETRWPA. Municipal needs are projected to increase by 49% between 2010 and 2060, requiring an additional 58,000 acre-feet of water. Smaller municipalities have traditionally relied upon well water where it was available, because of its lower production cost and ease of maintenance when compared to treating surface water. However, some small communities in NETRWPA lack access to fresh groundwater supplies, but do have access to brackish groundwater.

The process of desalinating brackish water most frequently is reverse osmosis, although electro dialysis is also used. Both are membrane processes. In reverse osmosis, water from a pressurized saline solution is separated from the dissolved salts by flowing through a water permeable membrane. The permeable membrane allows the water to pass through, but not the dissolved salts. After reverse osmosis, the processed water requires degasification and pH adjustment to be potable. This type of water treatment is an established technology with known installation costs. Operational costs are decreasing as technology improves.

As noted above, there are potential problems with using brackish water. Brackish water removal from the water sands may impact fresh water resources. After treatment, the waste water from the desalination process contains high concentrations of dissolved solids. Discharge through land application or underground injection may eventually damage existing fresh groundwater supplies. The discharged brine waste could infiltrate through the soil, eventually entering fresh water sands, thereby contaminating these. Discharge near surface streams and reservoirs could create a similar problem. Careful planning and research are required to mitigate this problem. Obtaining appropriate discharge permits is also a time consuming and expensive process.

Cost of desalination was also studied. Although desalination plant costs are declining, recent studies suggest capital costs of $2.76/gpd to $5.52/gpd for the desalination plant, typical capital costs for the well, higher energy costs, and significant costs of brine disposal. While significantly higher than a freshwater well, these costs may still compare favorably to costs for surface water treatment. Generally, overall total treatment costs vary from $0.98/Kgal to $3.80/Kgal in November 2008 dollars.

Recently, TWDB has published *Please Pass The Salt: Using Oil Fields For the Disposal of Concentrate From Desalination Plants*. The study demonstrates that oil fields can accommodate brine waste water, and recommends regulatory changes to improve the permitting process. Use of oil wells would be more beneficial than current methods because it is less expensive, more environmentally friendly, and because the technology for oil well injection already exists. As noted in that report, East Texas is a region which has a great many oil wells, a need for additional water supplies, and brackish water resources. As a general rule if there is oil in the area then there is also brackish water.

Information recently compiled by TWDB, "Brackish Groundwater Manual for Texas Water Planning Groups," suggests that NETRWPA has 55,712,000 acre feet of brackish groundwater. Given the planning period additional water requirement of 277,900 acre-feet, brackish groundwater represents an important potential source. It was not a recommended strategy in the last planning cycle, primarily because of brine disposal costs, and study is now needed to determine where and how it can best be used in the Region.

Review of water system surveys from the previous planning cycle was performed in order to identify potential brackish groundwater user groups. Focus was placed on municipal and non-municipal uses. Brackish groundwater well fields have been identified and production capacities estimated.

Brackish groundwater is available in NETRWPA and desalination technologies are improving and becoming more economical. A primary cost element is the disposal of the waste concentrate. Recent studies have shown that it is feasible to inject the waste concentrate into depleted oil and gas wells. However, the most economical disposal of waste will be direct discharge to waste water treatment facilities. Published studies have shown that total treatment costs range from $0.98/Kgal to $3.80/Kgal. An actual case study in East Texas has shown the cost to be $4.89/Kgal; therefore, while the use of brackish groundwater is feasible, and potential projects exist and user groups have been indentified, it is still more expensive than other current methodologies.