# Regional Water Plan

**Prepared for**

# Region D - North East Texas Regional Water Planning Group

**January 5, 2006**

**Prepared by**

BUCHER, WILLIS & RATLIFF CORPORATION
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# NORTH EAST TEXAS REGIONAL WATER PLANNING GROUP
## January 2006

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# North East Texas Regional Water Plan
# 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 Adopted Regional Water Plan for the North East Texas Region.

**Chapter 1**
**Description of the Region**

## The Planning Process

The TWDB has developed a set of 10 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. These projections have been updated from the 2001 plan using data from the 2000 census and updated survey information from the various water user groups.

**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. This chapter has been added in this second round of planning as a requirement of Senate Bill 2.

**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, 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. In contrast, Population counts provided by the United States census shows that most of the counties have seen growth of over 25 percent from 1970 to 2000. The region as a whole grew 54 percent compared to 86 percent growth in Texas and a 38 percent growth in the United States over the same period.

### 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 1.9 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 with tourists visiting the region from all over the country. The North East Texas Region boasts many museums, parks, lakes and other places of interest, as well as many annual fairs and festivals.  In the eastern half of the region, the timber, oil and gas industries are important, as is mining. Closer to the Dallas-Ft. Worth Metroplex, many residents of the region are employed there. Major corporate employers in the region include Campbell Soup, International Paper, Raytheon E-Systems, Kimberly Clark, Pilgrim’s Pride and Rubbermaid. Other large employers include the Lowe's Distribution Center, Target Distribution Center, Neiman Marcus Headquarters, and Wal-Mart Distribution Center. Military bases in the region include Camp Maxey, the Lone Star Army Ammunition Plant, and the Red River Army Depot.

## 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. Also, four minor aquifers exist in the region i.e. Blossom, Nacatoch, Queen City and Woodbine aquifers. 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 WSC | |

## 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 2000, total reported usage in the North East Texas Region – both ground and surface – was 487,815 acre-feet, distributed as follows:

| Category | Usage | Percent of Total |
|---|---|---|
| Municipal | 111,537 | 22.9 |
| Manufacturing | 253,206 | 51.9 |
| Power | 73,477 | 15.1 |
| Mining | 7,532 | 1.5 |
| Irrigation | 15,486 | 3.2 |
| Livestock | 26,577 | 5.4 |

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

The RWPG survey of 268 individual systems indicated that 83 of these have water conservation plans and 77 have adopted drought contingency plans. Recent droughts in the mid to late 90's resulted in emergency construction by several systems around Lake Tawakoni to lower intake structures to accommodate the critically low level of the lake. Similarly, a number of groundwater systems found that their rated well capacities were not valid for sustained use over periods of several weeks. Recent droughts have been relatively modest in relation to historically significant droughts of the 1950's and 1960's. In summary, the region as a whole is poorly prepared for a drought of major historical proportions.

## Chapter 2
## Population and Water Demand Projections

For the second round of regional water planning, draft population and water demand projections were prepared in coordination with the Regional Water Planning Group, Texas Water Development Board (TWDB) staff from the Texas Parks and Wildlife Department (TPWD), Texas Commission on Environmental Quality (TCEQ) and Texas Department of Agriculture (TDA). 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.

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

The Region's population is anticipated to grow nearly 72%, from 704,171 people accounted for in the 2000 census to 1,213,000 people by 2060, with the largest percentage growth occurring in Hunt and Smith Counties.

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 GPCD. The statewide average water use for the same baseline year was 173 GPCD.

Over the fifty year period from 2010 to 1060, 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 2001 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 2006 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 68 water user groups with shortages, which will require strategies in this plan. 23 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 45, 33 shortages will be resolved with additional groundwater supplies, and 8 will involve increasing the maximum quantity of taking under existing surface water purchase contracts. 4 of these 8 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 30,671 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 previous noted, strategies were identified for 45 entities in the NETRWPG area. 33 of these strategies involve drilling of wells for use in the immediate vicinity of the well. Eight 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 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 is in excess of the needs of Region I in which Toledo Bend is located. 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 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 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 6.2) 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 before 1992 should be equipped with low flow toilets and fixtures due to the implementation of the Texas Plumbing Efficiency Standards. The savings for these two categories for each WUG are identified and tabulated by entity in Chapter 2.

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

Acre-foot savings from advanced conservation ranged from a low of 7 acre-feet/year for the City of Scottsville to a high of 193 acre-feet/year for the Hickory Creek SUD. Costs per acre-foot saved ranged from $2,412/ac-ft to $3,749/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. Among other tasks, the audit should establish record management systems which allow the utility to readily segregate user classes.

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.

3. The planning group encourages funding and implementation of educational water conservation 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.

## 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 Chapter 7 is to describe how the 2006 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 2006 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. Surface water accounts for the majority of the total water use in the region. There are no planned additional reservoirs by the North East Texas Regional Water Planning Group area other than Prairie Creek Reservoir. The Carrizo-Wilcox Aquifer is the most important groundwater resource in North East Texas Regional Water Planning Group area. 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.

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 2001 and was included in the 2001 State Water Plan. Marvin Nichols 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 Region and the impacts to agricultural and natural resources would be greatest in this Region, it is important and necessary to review the impacts that Marvin Nichols 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.

It is the position of the North East Texas Regional Water Planning Group that Marvin Nichols I Reservoir should not be included in any 2006 regional plan as a water management strategy and not be included in the 2007 State Water Plan as a water management strategy.

## 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. RWPG's may include in adoption 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 RWPG's 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 May 4, 2005 meeting, considered nominating stream segments for the designation as an Ecologically Unique Stream Segment. After due deliberation, the NETRWPG elected to forgo designating any of the considered stream segments as ecologically unique. Reasons for this decision include the following:

1. The Regional Water Planning Group feels 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.

**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 1997 State Water Plan and the *2001 North East Texas Regional Water Plan,* including information from the *Reservoir Site Assessment Study* (Appendix B) 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**
Little Cypress (Harrison)

**Sabine River Basin**
Big Sandy (Wood and Upshur)
Carl Estes (Van Zandt)
Carthage (Harrison)
Kilgore II (Gregg and Smith)
Prairie Creek ( Gregg and Smith)
Waters Bluff (Wood)

**Red River Basin**
Barkman (Bowie)
Big Pine (Lamar and Red River)
Liberty Hills (Bowie)

**Sulphur River Basin**
George Parkhouse I (Delta and Hopkins)
George Parkhouse II (Delta and Lamar)
Marvin Nichols I (Red River & Titus)
Marvin Nichols II (Titus)
Pecan Bayou (Red River)

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 2007 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 recently 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.

## Legislative Recommendations

TWDB rules for the 2006 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 2006 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 Marvin Nichols reservoir site in the Sulphur River Basin as a water management strategy for providing water outside the Region. The North East Regional Water Planning Group amended the wording in the 2001 Regional Water Plan to change Marvin Nichols Reservoir site from a proposed site to a potential site. Other issues that were addressed by resolution were the apparent disregard of the regional water planning process by the General Land Office; standards for arsenic; and the mandating and managing of mitigation lands by the USACE. Issues that remained from the 2001 plan are future interbasin transfers from the North East Texas Region; conversion from groundwater to surface water supplies; groundwater policy; 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 this Chapter. Also presented are the recommendations adopted by the NETRWPG on each issue.

**Recommendation: Marvin Nichols I Reservoir Site**

The Marvin Nichols Reservoir Site in the Sulphur River Basin as designated in the 2001 plan has been of great concern in the meetings for the 2006 plan preparations. In December 2002 the NETRWPG amended the 2001 plan to change the designation of the site from a proposed site to a potential site but the issue has remained at each of the subsequent planning meetings. The NETRWPG recommends that this reservoir not be included in the 2007 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.

**Recommendation: Mitigation Lands Jurisdiction by the USACE**

The NETRWPG recommends that the total concept of mandating and managing mitigation lands be removed from the USACE and turned over to the individual states. The NETRWG believes that in the current form the regulations and requirements for the mitigation of certain developments in environmentally sensitive area are both restrictive and onerous in their application. In a December 2002 USACE news release entitled *Protecting and Restoring America's Wetlands: Agency Actions to Improve Mitigation and Further the Goal of "No Net Loss" of Wetlands* the USACE states that "In combination with the Department of Agriculture's Wetlands Reserve and Conservation Reserve Programs, these restoration efforts are expected to take the country from annual net loss to net wetlands gain." The NETRWPG does not support the net loss of wetlands but believes that the removal of productive forest lands from the economy is best left to the individual states to determine a proper and just mitigation.

**Recommendation: Toledo Bend Reservoir and Pipeline**

At the request of the Sabine River Authority the NETRWPG recommendes 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.

**Recommendation: Mitigation**

Any Planning group or entity proposing a new reservoir or any other water management strategy should address the subject of mitigation as early in the process as practical and as fully as possible. A study on possible mitigation effects should be undertaken and completed at the earliest practical date. Information should include estimates of mitigation, predication ratios, and other information useful to landowners potentially affected by mitigation requirements.

**Recommendation: Regional Planning Process**

The NETRWPG offers the following recommendations with regard to improvements to the Regional Water Planning process:

- TWDB should revise its rules for regional water planning to permit greater flexibility in the calculation of future water demands to allow for the consideration of alternative scenarios of population growth and economic development;
- 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;
- TWDB should revise its rules for regional water planning to allow multiple options to be put forth as recommended strategies for meeting the needs of individual water user groups.
- TWDB should consider the entire text of the Regional Water plans in making consistency determinations of inter-region conflicts.

The NETRWPG made additional recommendations on a varied range of topics ranging from Interbasin Transfers to Future Water Needs that are included in Chapter 8. Also they touched on other topics such as the compensation for water transfer and storage, economic impacts to communities, conversion of public water supply from ground water to surface water, groundwater policies, and arsenic in water.

## 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 (77$^{th}$ 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 64 identified entities with water shortages, 23 entities had contractual shortages and four were county aggregate WUGs. Therefore, 37 WUGs were involved in the IFR survey process. The RPWG consultants contacted the 37 entities with water management strategies requiring capital costs by mailing out the TWDB survey form.

Once attempts had been made to contact all 37 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. Thirty-two of the thirty-seven WUGs were successfully contacted regarding the IFR survey. Twenty-seven of the WUGs who responded to the survey had made arrangements for funding projects in a total amount of $24,090,774. Of these 27 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 Regional Water Plan is to be submitted to the TWDB by January 6, 2006. This chapter contains a summary of the communications and public participation conducted during the RWP development for the North East Texas Region. Also, contained in this chapter are the records of the public participation for the plan review following the submittal of the Initially Prepared Plan.

Chapter 10 summarizes the public participation process used in the development of the North East Regional Water Plan, the methods and procedures in making the public aware of meetings and water planning issues, outreach efforts to groups and individuals interested in water planning issues, the responses expressed in public meetings and hearings, and recommendations concerning issues of implementing the plan.

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 has many news releases, a newsletter from 4-6 times a year, speaker's bureau, and public notices. The NETRWPG has also received 13 petitions containing 165 names in opposition to Marvin Nichols Reservoir.

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 in Gilmer in Upshur County on August 2, 2005 to receive public comments on the IPP. This was in addition to the regular meetings on the NETRWPG that allowed for public comment at the end of each meeting. 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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# 1.0 Introduction

### 1.0 (a) Overview of Senate Bill 1

Water is defined by Webster's dictionary as "a major constituent of all living matter." It is a vital resource for humans and the environment alike, and the importance of water has long been understood. Our very existence depends on the availability of water to sustain life.

The population of Texas is growing rapidly. As industry and commercial development continue, population increases, and, consequently, water demands increase. These ever-increasing water demands are placed on finite resources, which, although renewable, can be exhausted if not prudently managed.

Realizing the need for available water both today and tomorrow, Texans have been involved in water planning for generations. Civil engineers, planners, the Texas Water Development Board (TWDB), 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 TWDB. 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 75$^{th}$ Texas Legislature to consider several avenues in state water resource planning. In 1997, the Texas Legislature enacted Senate Bill 1, comprehensive legislation which addresses water planning. One result of this legislation is 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 the next fifty years. Once these 16 regional plans are submitted to the TWDB, Board staff reviews the plans and molds them into a statewide water plan. Later, 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.

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

This 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 (RWPG) represents the North East Texas Region. 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 RWPG includes representatives of all of the above-mentioned public interest groups; in addition, it was insured that each county has at least one representative. There are currently 23 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.

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 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

### 1.0 (b) <u>The Planning Process</u>

The TWDB has developed a set of 10 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. These projections have been updated from the 2001 plan using data from the 2000 census and updated survey information from the various water user groups.

**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. This chapter has been added in this second round of planning as a requirement of Senate Bill 2.

**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, 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 area entities with identified shortages during the planning period.

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

## 1.1 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).

### 1.1 (a) 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 | | |

The North East Texas Region also includes various agencies interested in water planning.

Councils of Government represented within the region include:

- Ark-Tex Council of Governments
- East Texas Council of Governments
- North Central Texas Council of Governments

River Authorities represented include:

- Red River Authority
- Sabine River Authority
- Sulphur River Basin Authority
- Neches River Authority

At the federal level, the Natural Resource Conservation Service and Rural Development agencies of the United States Department of Agriculture maintain offices in the region. The Corps of Engineers district office in Tulsa covers the Red River Basin, while the remaining basins lie in the Fort Worth District. Navigation studies along the Red River are under the direction of the Vicksburg District.

The counties in the North East Texas Region share some similar traits such as location, climate, recreational activities, and a predominately rural economy and culture. Differences among the counties include size, population, vegetation, and types of business/industry. The following table compares the size and population of the counties and lists the largest city in each county.

**Figure 1.1**
**Region Location Map**

**Figure 1.2**
**Water Planning Area Location Map**

**Table 1.1 County Comparison North East Texas Region**

| County | Area (Square Miles) | 2000 County Census Population | Largest City |
|---|---|---|---|
| Bowie | 923 | 89,306 | Texarkana° |
| Camp | 203 | 11,549 | Pittsburg |
| Cass | 960 | 30,438 | Atlanta |
| Delta | 278 | 5,327 | Cooper |
| Franklin | 295 | 9,458 | Mount Vernon |
| Gregg | 276 | 111,379 | Longview° |
| Harrison | 915 | 62,110 | Marshall° |
| Hopkins | 793 | 31,960 | Sulphur Springs |
| Hunt | 882 | 76,596 | Greenville° |
| Lamar | 932 | 48,499 | Paris° |
| Marion | 420 | 10,941 | Jefferson |
| Morris | 259 | 13,048 | Daingerfield |
| Rains | 259 | 9,139 | Emory |
| Red River | 1,058 | 14,314 | Clarksville |
| Smith | 433* | 31,806* | Lindale* |
| Titus | 426 | 28,118 | Mount Pleasant |
| Upshur | 593 | 35,291 | Gilmer |
| Van Zandt | 860 | 48,140 | Wills Point |
| Wood | 696 | 36,752 | Mineola |

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

### 1.1 (b) Physiography

The North East Texas Region is located in the physiographic region known as the Gulf Coastal Plains. The Gulf Coastal Plains region 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. Topography in this region is primarily hilly in the east, with pine and hardwood vegetation. Moving westward, the region becomes more arid with a post oak dominated fauna, until the vegetation becomes prairie. The Gulf Coastal Plains are located in "lowland Texas" as opposed to upland Texas west of the Balcones fault.

The Gulf Coastal Plains has been divided into several area designations. Within the North East Texas Region, the Blackland Prairies Belt, the Post Oak Belt and the Piney Woods Belt are represented. These belts are distinguished by surface topography and vegetation.

The eastern half of the region has rolling hills and large amounts of timber. This area is defined as the Piney Woods Belt. Timber is predominately pine, with hardwood timbers interspersed near valleys of rivers and creeks. Soils are well adapted for some crops. Geology includes clays, oil, lignite and other minerals.

Moving westward and entering the Post Oak Belt, the terrain flattens slightly and native timber changes from predominately pine to oak. Soils have characteristics of both the Blackland Prairies and Piney Woods Belts. Varied cattle and farming activities are an important part of this area's economic base. This belt also has clays, lignite, and other minerals.

The western portion of the North East Texas Region is designated as the Blackland Prairies. The terrain can be described as rolling prairie. Vegetation is largely prairie with dense timber along streams. Soils are very good for row crops such as cotton. Minerals include chalk, lignites, gas, oil, sand, and gravel.

Elevations within the North East Texas 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 North East Texas Region has 24 surface water bodies with capacity of 5000 ac-ft or more, scattered throughout the region. 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.

### 1.1 (c) <u>Climate</u>

Climate in the North East Texas Region 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 last freeze in the spring normally occurs around March 20 and the first freeze in the fall occurs around November 14. The growing season in northeast Texas lasts approximately 239 days.

Average annual precipitation in the region is 43.7 inches, and ranges from an annual high of 46.8 inches in Franklin County to a low of 40.4 inches in Hunt County. The average number of days with precipitation of 0.10 inches and higher over a 30-year period is 63. The 25-year 2-day precipitation ranges from 11 inches to 12 inches across the Northeast Texas region, and the 25-year 2-hour precipitation is around 4 inches. Over 90% of the North East Texas Region is located in the TWDB's quadrangle 412, 413, 512 and 513. In these quadrangles, the average annual lake surface evaporation over a five-year period, from 1998 to 2002, was 50.81 inches. Over the same period, the January average evaporation rate was 1.80 inches, and in August the rate was 6.69 inches. See Figure 1.3 for average annual precipitation and Figure 1.4 for evaporation rates. Droughts do occur within the Northeast Texas Region, and the region has experienced ten recorded droughts of more than 58 days in duration over the past 100 years. Winter precipitation, such as snow, sleet and ice, occurs in northeast Texas, but is by no means an annual occurrence. When snow and ice conditions do transpire, they are normally short-lived.

Winds in northeast Texas are predominately from a southerly direction during summer months, although winds from the north do occur. In winter, northern winds are common. Velocities range from an annual average of 8.3 mph on the eastern edge of the region, to 10.7 mph on the west.

Destructive weather is a factor in the North East Texas Region. While hurricanes in the Gulf of Mexico do not normally cause destructive damage so far north, they can bring thunderstorms with high winds. In April of 1966, 20 to 26 inches of rain fell in Wood, Marion, Harrison, Smith, Morris and Upshur counties in a one week period, drowning 19 people. Tornadoes are frequent and are frequently destructive. Between 1951 and 1989, there was an average of 122 tornadoes per year in Texas, with most tornadoes occurring in May. The North East Texas Region has an average frequency of 1-2 tornadoes per 2,500 square miles per year. The Red River Valley, in the northern part of the North East Texas Region, has the highest frequency of tornadoes in the state. Among the state's worst natural disasters, a tornado in Paris in 1982 claimed 10 lives and caused $50 million in damage.

### 1.1 (d) Geology

Surface outcroppings in the North East Texas 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 North East Texas 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. North East 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 erosion and 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, lead 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 North East Texas 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 had the eighth highest number of barrels of oil produced in the state in 1998. Lignite, a low grade form of coal, was formed in North East 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.

Earthquakes are not generally a concern in the North East Texas Region, although one or two smaller quakes are on record in Lamar County.

**Figure 1.3**
**Average Annual Precipitation**

**Figure 1.4**
**Average Net Evaporation**

## 1.1 (e) 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 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 regionwide. The following table lists the counties in the North East Texas Region and their principal agricultural products:

**Table 1.2 Principal Agricultural Products**

| County | Principal Crops | Principal Livestock |
|---|---|---|
| Bowie | Wheat, soybean, rice, milo, timber | Beef and dairy cattle, poultry, horses |
| Camp | Hay, peaches, blueberries,timber | Broilers, eggs, beef and dairy cattle |
| Cass | Forages, timber, fruit, vegetables, timber | Beef, broilers |
| Delta | Hay, wheat, soybean, cotton | Beef and dairy cattle |
| Franklin | Hay, blueberries, peaches, timber | Beef and dairy cattle, broilers |
| Gregg | Hay, Christmas trees, timber | Beef, race horses |
| Harrison | Nursery plants, hay, timber | Cattle, hogs, horses |
| Hopkins | Hay, wheat, silage, corn, rice, soybean | Beef and dairy cattle, horses |
| Hunt | Hay, cotton, wheat | Beef and dairy cattle, race horses |
| Lamar | Hay, wheat, soybean, cotton, peanuts | Beef and dairy cattle |
| Marion | Hay, timber | Beef, horses, hogs |
| Morris | Peanuts, hay, watermelons, peaches, timber | Beef, poultry |
| Rains | Vegetables, watermelons, wheat, hay | Beef and dairy cattle |
| Red River | Soybeans, corn, cotton, alfalfa, wheat, timber | Stocker, cow-calf operations, dairy cattle |
| Smith | Rose bushes, hay, watermelons, timber | Beef and dairy cattle, poultry, broilers |
| Titus | Corn, watermelons, grain sorghums, hay, peanuts, timber | Cattle, dairy products, horses, hogs |
| Upshur | Vegetables, hay, peaches, timber | Beef and dairy cattle, poultry |
| Van Zandt | Hay, sweet potatoes, nursery stock, grains | Cattle, hogs, dairy products |
| Wood | Truck crops, hay, corn, grains, Christmas trees, timber | Beef and dairy cattle, hogs, horses, broilers |

Vegetation in the North East Texas Region is varied due to local differences in rainfall, temperature, and terrain. Figure 1.5 delineates the vegetative 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 Post Oak 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.

The North East Texas Region supports numerous species of abundant 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 four TPW wildlife management areas in the North East Texas Region. These include Cooper (14,480 acres), Pat Mayse (8,925 acres), Tawakoni (1,562 acres), and White Oak Creek (25,700 acres). These areas are used for hunting, research, fishing, wildlife viewing, hiking, camping, bicycling, and horseback riding. A map of the biotic provinces of Texas is included in Appendix A.

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. Both the Dallas-Ft. Worth area and the Tyler-Longview-Marshall area violate the national standard for ozone levels, but fall within the national levels for all other pollutants. This does not suggest that the entire region violates the ozone standard, only those areas within the monitoring location. The majority of the North East Texas Region is expected to have air quality that is low in air pollutants and will not hinder the quality of life.

There are major oil fields located throughout the region, as noted on Figure 1.6. At one time, the largest oil field in Texas was located partly in Gregg County, however overproduction and low prices have somewhat diminished the importance of the oil and gas industry in northeast Texas. Counties in the North East Texas Region with the largest oil production in 2000 included Wood, Gregg, Van Zandt, and Smith. Table 1.3, taken from the 2002-2003 Texas Almanac, lists the amount of crude oil produced in the North East Texas Region in 1999 and 2000.

**Table 1.3 Crude Oil Production**

| County | Crude Production 1999 (barrels) | Crude Production 2000 (barrels) | Total Production from discovery to January 1, 2001 |
|---|---|---|---|
| Bowie | 242,868 | 221,549 | 5,821,773 |
| Camp | 636,697 | 511,604 | 27,592,815 |
| Cass | 463,995 | 510,152 | 112,600,392 |
| Delta | 0 | 0 | 64,058 |
| Franklin | 507,938 | 469,772 | 174,987,573 |
| Gregg | 9,081,737 | 6,052,056 | 3,271,196,452 |
| Harrison | 890,361 | 862,913 | 85,447,749 |
| Hopkins | 352,643 | 333,880 | 88,030,850 |
| Hunt | 412 | 0 | 2,024,645 |
| Lamar | 0 | 0 | 0 |
| Marion | 249,831 | 224,315 | 54,834,338 |
| Morris | 0 | 0 | 0 |
| Rains | 0 | 0 | 148,886 |
| Red River | 443,794 | 356,115 | 6,691,617 |
| Smith | 1,348,511 | 1,222,834 | 258,838,383 |
| Titus | 513,654 | 573,305 | 209,191,776 |
| Upshur | 678,126 | 695,902 | 284,526,450 |
| Van Zandt | 2,133,403 | 2,206,193 | 545,362,562 |
| Wood | 6,218,320 | 7,050,783 | 1,177,613,875 |

Lignite resources are also found in portions of northeast Texas (See Figure 1.7), and there are near-surface operating mines in Harrison, Titus, and Hopkins counties. Once an important energy resource before oil and gas were readily available, lignite, a low-grade coal, is again being sought by energy suppliers. Finally, both ceramic and nonceramic 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 1.8 shows locations of agricultural land in the North East Texas 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 and Wood (See Figure 1.8). Of these counties, only Cass, Franklin, Red River and Titus produce more cubic feet of hardwoods than pine. Non-industrial parties own approximately 60 percent of timber production areas in the North East Texas Region, with industrial interests owning the remaining 40 percent.

The following table, taken from the 2002-2003 Texas Almanac, lists counties within the region that are important timber producers.

**Table 1.4 Total Timber Production and Value by County in Texas, 1999**

| County | Pine – Cu-Ft. | Hardwood – Cu-Ft. | Total | Stumpage Value ($1000) | Delivered Value ($1000) |
|---|---|---|---|---|---|
| Bowie | 7,113,646 | 6,293,117 | 13,406,763 | 10,505 | 19,127 |
| Camp | 2,001,981 | 337,829 | 2,339,810 | 2,441 | 4,052 |
| Cass | 17,323,088 | 18,392,206 | 35,715,294 | 21,026 | 42,506 |
| Franklin | 81,887 | 546,685 | 628,572 | 235 | 590 |
| Gregg | 3,914,586 | 1,575,703 | 5,490,289 | 4,771 | 8,264 |
| Harrison | 17,774,935 | 5,769,423 | 23,544,358 | 18,363 | 33,095 |
| Marion | 15,232,894 | 5,056,515 | 20,289,409 | 13,533 | 25,544 |
| Morris | 1,397,206 | 1,189,403 | 2,586,609 | 2,111 | 3,775 |
| Red River | 2,513,465 | 7,302,888 | 9,816,353 | 3,997 | 9,687 |
| Smith | 9,235,675 | 6,977,814 | 16,213,489 | 12,104 | 22,277 |
| Titus | 495,831 | 1,274,733 | 1,770,564 | 985 | 2,046 |
| Upshur | 6,153,492 | 4,163,543 | 10,317,035 | 7,492 | 13,926 |
| Wood | 2,466,110 | 1,597,710 | 4,063,820 | 3,691 | 6,417 |

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. Rains, Titus, 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.

**Figure 1.5**
**Vegetation Map**

**Figure 1.6**
**Oil & Gas Wells**

**Figure 1.7**
**Lignite resources**

**Figure 1.8**
**Landuse Map**

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 1.5 State Parks by County**

| County | State Park(s) |
|---|---|
| Cass | Atlanta State Park |
| Delta and Hopkins | Cooper Lake State Park |
| Harrison | Caddo Lake State Park |
| Lamar | Pat Mayse State Park<br>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 North East Texas Region has at least one fair or festival throughout the year. Some of these festivals are listed below.

**Table 1.6 Fairs and Festivals by County**

| County | Event |
|---|---|
| Bowie | Four-States Fair, Red Neck Day |
| Camp | Chick Fest |
| Cass | Wildfire Trails, Market Fest |
| Delta | Mayfest, Chiggerfest |
| Franklin | Countryfest |
| Gregg | Glory Days, Loblolly Festival, Alley Fest, The Great East Texas Balloon Race |
| Harrison | Fire Ant Festival, Stagecoach Days |
| Hopkins | Dairy Festival, Stew Contest |
| Hunt | Cotton Jubilee, Bois d'Arc Bash |
| Lamar | Paris Art Fair, Christmas in Fair Park |
| Marion | Mardi Gras, Founder's Day |
| Morris | Captain Daingerfield Day, Watermelon Festival |
| Rains | Eagle Fest |
| Red River | Fall Stew Cookoff |
| Smith | Country Fest, Rose Festival |
| Titus | Wrangler Fest |
| Upshur | East Texas Yamboree, Pecan Festival |
| Van Zandt | Canton's First Monday Craft Show |
| Wood | Mineola May Days, Autumn Trails |

## 1.2 Socioeconomic Characteristics of the Region

### 1.2 (a) 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. Because much of the economy in North East Texas has historically been based on agriculture, 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, ceased production. 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 1.7 presents the historical population of each county and the region as a whole. 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 1.7 Historic Population by County**

| County | | | | | | | | 30 Yr. Growth |
|---|---|---|---|---|---|---|---|---|
| | 1970 | 1980 | %Growth | 1990 | %Growth | 2000 | %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% |

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

## 1.2 (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 1.8

**Table 1.8 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 1.9 illustrates ethnic percentages in the North East Texas Region compared to the state.

Incomes in the North East Texas Region are earned through a variety of occupations, with many fields 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. Table 1.9 lists the median family income by county. The average per capita income for the region is $16,651, compared to the state average of $19,617. Red River County reported the lowest per capita income of $15,058, and Smith County reported the highest, at $19,072.

Opportunities for obtaining a good education are available in the North East Texas Region. There are numerous school districts within the region teaching students from kindergarten through 12th grade. In addition, there are multiple junior colleges and community colleges including North East Texas Community College, Kilgore Junior College, Panola Junior College, Paris Junior College and Texarkana College. Finally, there are four-year undergraduate universities, including East Texas Baptist University, Texas State Technical College and Wylie College in Marshall, Le Tourneau in Longview, and Texas A&M University in Commerce. A majority of residents within the North East Texas Region have graduated from high school or have a high school equivalent. Some have taken college courses, but most do not have a college education, according to the 2000 census.

**Table 1.9 1999 Regional Incomes**

| County | Median Income | Per Capita Income |
|---|---|---|
| Bowie | $33,001 | $17,357 |
| Camp | $31,164 | $16,500 |
| Cass | $28,441 | $15,777 |
| Delta | $29,094 | $15,080 |
| Franklin | $31,955 | $17,563 |
| Gregg` | $35,066 | $18,449 |
| Harrison | $33,520 | $16,702 |
| Hopkins | $32,136 | $17,182 |
| Hunt | $36,752 | $17,554 |
| Lamar | $31,609 | $17,000 |
| Marion | $25,347 | $14,535 |
| Morris | $29,011 | $15,612 |
| Rains | $33,712 | $16,442 |
| Red River | $27,558 | $15,058 |
| Smith | $37,148 | $19,072 |
| Titus | $32,452 | $15,501 |
| Upshur | $33,347 | $16,358 |
| Van Zandt | $35,029 | $16,930 |
| Wood | $32,855 | $17,702 |
| North East Texas Region | $32,063 | $16,651 |
| Texas | $39,927 | $19,617 |

### 1.2 (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 with tourists visiting the region from all over the country. The North East Texas Region boasts many museums, parks, lakes and other places of interest, as well as many annual fairs and festivals. In the eastern half of the region, the timber, oil and gas industries are important, as is mining. Closer to the Dallas-Ft. Worth Metroplex, many residents of the region are employed there. Major corporate employers in the region include Campbell Soup, International Paper, L3 Communications, Kimberly Clark, Pilgrim’s Pride and Rubbermaid. Other large employers include the Lowe's Distribution Center, Target Distribution Center, Neiman Marcus Headquarters, and Wal-Mart Distribution Center. Military bases in the region include Camp Maxey, the Lone Star Army Ammunition Plant, and the Red River Army Depot.

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. A new interstate route is under consideration from Texarkana south through the region, to accommodate traffic generated by the North American Free Trade Agreement.

**Figure 1.9**
**Race Ethnicity**

Water travel is not significant in the North East Texas Region. However, there are numerous county and municipal airports including the Atlanta Municipal Airport, Caddo Municipal Airport in Hunt County, Clarksville-Red River County Airport, Commerce Municipal Airport, Cox Field in Lamar County, Cypress Airport in Marion County, Franklin County Airport, Gilmer-Upshur County Airport, Gladewater Municipal Airport, Greater Morris County Airport, Gregg County Airport, Harrison County Airport, Majors Field in Hunt County, Manning Field in Marion County, Mineola-Quitman Airport, Mineola-Wisener Field, Mount Pleasant Municipal Airport, Sulphur Springs Municipal Airport, Taylor Airport in Hunt County, Texarkana Regional Airport, Wills Point Municipal Airport in Van Zandt County, and Winnsboro Municipal Airport in Wood County.

## 1.3 Descriptions of Water Supplies and Water Providers in the Region

### 1.3 (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

Figure 1.10 and Figure 1.11 shows the aerial extent of major and minor aquifers in northeast Texas. In addition, there are other aquifers in the region that have not been designated as either a major or minor aquifer by the TWDB. For planning purposes, these aquifers have been grouped together into an “other aquifer” category. The following generalized descriptions of the major and minor aquifers are based largely on the work of the TWDB. A more thorough discussion of these aquifers, especially in relation to water supply availability, can be found in Chapter 3.

The total groundwater usage in the North East Texas Region was 50,809 ac-ft during 1999. Seventy–one percent of that groundwater was used for municipal purposes. About seventeen percent of the groundwater was used for livestock purposes and the rest of the groundwater was used for manufacturing, mining, irrigation, and power generation.

(1) Major Aquifers

a) Carrizo-Wilcox Aquifer

The Carrizo-Wilcox Aquifer is the most heavily utilized aquifer in the region, producing approximately 76 percent of the total groundwater used in the region. 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 all or parts of 60 counties in Texas. Figure 1.11 which shows the extent of the Carrizo-Wilcox Aquifer in the region, illustrates that the Carrizo-Wilcox Aquifer occurs as a major trough caused by the Sabine Uplift near the Texas-Louisiana border. 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.

Total groundwater pumpage from the Carrizo-Wilcox Aquifer in the North East Texas Region was 38,704 ac-ft during 1999. Seventy-two percent of the groundwater was utilized for municipal purposes. Approximately 13 and 12 percent of the groundwater was utilized for livestock and mining, respectively, and the remainder was used for power, manufacturing, and irrigation purposes.

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 Region D, are two large public supply users of the Trinity Aquifer. The groundwater use from the Trinity Aquifer during 1999 in the North East Texas Region was 582 ac-ft. Of this total, 78 percent was used for municipal purposes and remainder was used for livestock. These values are 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 mg/l TDS limits established by TCEQ for municipal supply.

**Figure 1.10**
**Major Aquifers**

**Figure 1.11**
**Minor Aquifers**

(2) Minor Aquifers

a) Queen City Aquifer

The Queen City Aquifer extends in a band across most of Texas from the Frio River in south Texas northeast into Louisiana. The extent and distribution of the Queen City Aquifer in the North East Texas Region is shown as Figure 1.11. 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 gal/min. 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 during 1999 in the region was 5,523 ac-ft. Of this total, 58 percent was used for municipal purposes and 36 percent was used for livestock purposes.

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 (see Figure 1.11). 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 completed in the Woodbine Aquifer in the North East Texas 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 North East Texas Region during 1999 was 618 ac-ft.

c) Nacatoch Aquifer

The Nacatoch Aquifer occurs in a narrow band in northeast Texas and extends eastward into Arkansas and Louisiana (see Figure 1.11). 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 1999, pumpage from the aquifer totaled 3,059 ac-ft, 77 percent of which was used for municipal purposes. Other uses include rural domestic, livestock, irrigation and mining.

d) <u>Blossom Aquifer</u>

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 (see Figure 1.11). 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 1999, municipal pumpage accounted for 82 percent of the total pumpage of 1,170 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.

(3) <u>Other Aquifers</u>

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 1999 was 1,154 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 Region D. 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 Region D (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 Region D 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, waste water 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 waste water discharges should reduce threats to groundwater from these sources.

### 1.3 (b) Surface Water Supplies

The North East Texas Region contains portions of the Red, Sulphur, Cypress Creek and the Sabine River Basins. A small corner of Van Zandt County lies in the Neches River Basin, but the entire county has been considered part of the region for planning purposes. 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.

Within the region, a number of surface water reservoirs greater than 500 surface acres exist as shown in Table 1.10. The larger of these reservoirs are illustrated on Figure 1.12.

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, 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, and Welsh Reservoir provide cooling water for power generation as well as recreation.

**Table 1.10 Existing Reservoirs**

| | | | Conservation Pool | | |
|---|---|---|---|---|---|
| **Lake/Reservoir** | **County** | **Built** | **Area (acres)** | **Capacity (ac-ft)** | **Supply (ac-ft)** |
| **Red River Basin** | | | | | |
| Crook | Lamar | 1923 | 1,226 | 9,664 | 1,000 |
| Pat Mayse Lake | Lamar | 1967 | 5,993 | 124,500 | 59,750 |
| **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 | 8,635 |
| 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 | 1954 | 33,750 | 145,300 | 180,000 |
| **Cypress Creek Basin** | | | | | |
| Lake Bob Sandlin | Wood/Titus/Franklin | 1975 | 9,460 | 213,350 | 60,430 |
| Caddo Lake | Marion/Harrison | 1971 | 26,800 | 129,000 | 10,000 |
| Cypress Springs | Franklin | 1971 | 3,400 | 72,800 | 10,737 |
| 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 | 6,688 |
| Lake O' the Pines | Marion/Upshur | 1958 | 19,780 | 254,900 | 175,892 |
| Monticello Lake | Titus | 1973 | 2,000 | 40,100 | 5,103 |
| Tankersley Lake | Titus | | na | na | 2,230 |
| Welsh Reservoir | Titus | na | 1365 | 23,587 | 3,429 |
| **Sabine River Basin** | | | | | |
| Lake Cherokee | Gregg | 1948 | 3,987 | 46,700 | 29,120 |
| Lake Gladewater | Upshur | 1952 | 800 | 6,950 | 2,125 |
| Greenville Lakes | Hunt | na | na | 6,864 | 3,486 |
| Lake Fork | Wood/Rains | 1980 | 27,960 | 675,819 | 173,035 |
| 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 | 36,153 | 936,200 | 229,807 |

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

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 below in Table 1.11, 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 1.11 Capacity of Major Reservoirs**

| | Previously Reported Capacity at Conservation Pool – (ac-ft) | Date | Current Capacity at Conservation Pool – (ac-ft) | Study Date | Percent Reduction |
|---|---|---|---|---|---|
| **Lake Bob Sandlin** | 213,350 | 1975 | 200,579 | 1998 | 6.0 |
| **Lake Cherokee** | 46,700 | 1948 | 41,506 | 1996 | 11.1 |
| **Lake Cypress Springs** | 72,800 | 1971 | 67,690 | 1999 | 7.0 |
| **Lake Monticello** | 40,100 | 1973 | 34,740 | 1998 | 13.4 |
| **Lake O' The Pines** | 254,900 | 1958 | 238,933 | 1998 | 6.3 |
| **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 | 4,637 | 2000 | 33.3 |
| **Lake Fork** | 675,819 | 1980 | 604,927 | 2001 | 10.5 |
| **Welsh Reservoir** | 23,587 | 1975 | 18,431 | 2001 | 21.9 |
| **Lake Crook** | 9,964 | 1923 | 9,195 | 2003 | 7.7 |

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 1.12.

**Figure 1.12**
**Reservoirs**

**Table 1.12 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 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 WSC | 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 |
| 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) | — |

### 1.3 (c) <u>Surface Water Quality</u>

The Texas Commission on Environmental Quality (TCEQ) is the state agency responsible for monitoring water quality in Texas. In the Texas Nonpoint Pollution and Assessment Report and Management Program, developed by TCEQ and the State Soil and Water Conservation Board, Texas is divided into 5 basin groups for watershed quality management. Water quality in three basin groups is studied individually on 5-year cycles. Each year, TCEQ makes determinations on water quality within one basin group. These determinations are compiled into the "303d list," which identifies specific causes of water body impairment and prioritizes listed bodies for subsequent Total Maximum Daily Load development. The year 2000 303d list focused on basin group A, which includes the Canadian River Basin, Red River Basin, Sulphur River Basin, Cypress Creek Basin, Sabine River Basin, Sabine Pass and the Neches River Basin. Basin group A includes 97 percent of the North East Texas Region. Table 1.13 presents a summary of water quality improvements within the North East Texas Region area from TCEQ's 2000 Draft 303d list:

**Table 1.13**
**Surface Water Segments on 303d List**
**North East Texas Region**

| *Segment Number* | Water Body Name | Priority | Basin Group | PS | NPS | Summary of Impairment |
|---|---|---|---|---|---|---|
| 0302 | Wright Patman Lake | M | A | Y | Y | In the upper 6,693 acres of the reservoir, dissolved oxygen concentrations are sometimes lower than the standard established to assure optimum conditions for aquatic life (M/NS).<br>In a 400 acre area near the dam, a 123 acre area in the northwestern-most tip of the reservoir, and in a 3,381 acre area in the upper middle, dissolved oxygen concentrations are occasionally lower than the standard established to assure optimum conditions for aquatic life (M/PS).<br>In a 123 acre area in the northwestern-most tip of the reservoir, pH levels are higher than the standard established to safeguard general water quality uses (L/CN).<br>In the 2,350 acre arm northwest of the dam, a 3,726 acre area in the middle, and a 3,381acre area in the upper middle of the reservoir, pH levels are occasionally higher than the standard established to safeguard general water quality uses (L/CP). |
| 0303A | Big Creek Lake (unclassified water body north of Cooper in Delta County) | T-h | A | | Y | All water quality measurements currently support use as a public water supply; however, atrazine concentrations in finished drinking water indicate contamination of source water and represent a threat to future use (T-h). |
| 0303B | White Oak Creek (unclassified water body north of Omaha in Morris County) | M | A | Y | Y | In the lower 50 miles, dissolved oxygen concentrations are occasionally lower than the standard established to assure optimum conditions for aquatic life (M/PS). |
| 0304A | Swampoodle Creek (unclassified water body central Texarkana in Bowie County) | M | A | | Y | The average concentration of malathion in water exceeds the chronic criterion established to assure optimum conditions for aquatic life (M/NS).<br>The average mercury concentration in water exceeds the human health criterion for freshwater fish (M/NS). This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. |

| *Segment* Number | Water Body Name | Priority | Basin Group | PS | NPS | Summary of Impairment |
|---|---|---|---|---|---|---|
| 0306 | Upper South Sulphur River | M | A | Y | Y | In the upper 25 miles, pH levels are sometimes higher than the criterion established to safeguard general water quality uses (L/CN).<br>In the lower 6 miles, dissolved oxygen concentrations are occasionally lower than the standard established to assure optimum conditions for aquatic life (M/PS).<br>In the same 6 miles, bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation (L/NS). |
| 0307 | Cooper Lake | M | A | Y | Y | In the lower 8,000 acres of the reservoir, dissolved oxygen concentrations are occasionally lower than the standard established to assure optimum conditions for aquatic life (M/PS).<br>In the 3,000-acre lower arm of the reservoir, pH levels are sometimes higher than the criterion established to safeguard general water quality uses (L/CN).<br>In the 10,000 acres of the middle and lower portions of the reservoir, pH level are occasionally higher than the criterion established to safeguard general water quality uses (L/CP). |

| ***Segment* Number** | **Water Body Name** | **Priority** | **Basin Group** | **PS** | **NPS** | **Summary of Impairment** |
|---|---|---|---|---|---|---|
| 0401 | Caddo Lake | M | A | Y | Y | The fish consumption use is partially supported, based on a restricted-consumption advisory issued by the Texas Department of Health in November 1995 for Caddo Lake due to elevated concentrations of mercury in fish tissue (M/PS).<br>In approximately 650 acres in the Harrison Bayou Arm, approximately 1,000 acres near Hells Half Acre in Carter Lake, and in approximately 2,000 acres near Devils Elbow in Clinton Lake, dissolved oxygen concentrations are sometimes lower than the standard established to assure optimum conditions for aquatic life (L/NS).<br>In approximately 1,000 acres near Hells Half Acres in Carter Lake, pH levels are occasionally lower than the minimum criterion established to safeguard general water quality uses (L/CP).<br>In approximately 2,000 acres near Devils Elbow in Clinton Lake, pH levels are sometimes lower than the minimum criterion established to safeguard general water quality uses (L/CN).<br>The average concentration of total dissolved solids exceeds the criterion established to safeguard general water quality uses (L/CN). |
| 0402 | Big Cypress Creek Below Lake O' the Pines | M | A | Y | Y | The fish consumption use if partially supported, based on a restricted-consumption advisory issued by the Texas Department of Health in November 1995 due to elevated levels of mercury in fish tissue (M/PS).<br>In the lower 25 miles, dissolved oxygen concentrations are sometimes lower than the standard established to assure optimum conditions for aquatic life (L/NS).<br>In the same 25 miles, pH levels are occasionally below the minimum criterion established to safeguard general water quality uses (L/CP). |

| *Segment* Number | Water Body Name | Priority | Basin Group | PS | NPS | Summary of Impairment |
|---|---|---|---|---|---|---|
| 0402A | Black Cypress Bayou (unclassified water body between Avinger and Linden in Cass County) | M | A | Y | Y | In a one-mile portion around SH155 (Pruitt Lake), dissolved oxygen concentrations are sometimes lower than the standard established to assure optimum conditions for aquatic life (L/NS).<br>In the same area, the fish consumption use is only partially supported based on a consumption advisory issued by the Texas Department of Health in April 1999 due to elevated levels of mercury in fish tissue (M/PS). |
| 0403 | Lake O' the Pines | H | A | Y | Y | In approximately 2,000 acres in the upper end of the lake, dissolved oxygen concentrations are occasionally lower than the standard established to assure optimum conditions for aquatic life (L/PS). |
| 0404B | Tankersley Creek (unclassified water body near Mt. Pleasant in Titus County) | L | A | Y | Y | Bacteria levels sometimes exceed the criterion established to assure the safety of contact recreation (L/NS). |
| 0404D | Welsh Reservoir (unclassified water body between Mt. Pleasant and Daingerfield in Titus County) | M | A | Y | Y | The fish consumption use is partially supported based on a restricted-consumption advisory issued by the Department of Health due to elevated levels of selenium in fish tissue (M/PS). |
| 0407 | James' Bayou | M | A | Y | Y | In the lower 32 miles, dissolved oxygen concentrations are occasionally lower than the standard established to assure optimum conditions for aquatic life (L/PS).<br>In the lower 32 miles, the average mercury concentration in water exceeds the human health criterion for freshwater fish (M/NS). This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. |

| ***Segment* Number** | **Water Body Name** | **Priority** | **Basin Group** | **PS** | **NPS** | **Summary of Impairment** |
|---|---|---|---|---|---|---|
| 0409 | Little Cypress Bayou (Creek) | M | A | Y | Y | Dissolved oxygen concentrations are sometimes lower than the standard established to assure optimum conditions for aquatic life (L/NS).<br>In the lower 50 miles, the average mercury concentration in water exceeds the human health criterion for freshwater fish (M/NS). This criterion was established to protect consumers from bioaccumulation of toxicants in fish tissue. Risk of exposure to mercury from fish consumption has not been assessed. |

**Priority –** The overall priority rank of the water body for TMDL development is shown in this column. If there are multiple impairments, the highest rank assigned for an individual pollutant becomes the overall rank. However, in the case of international/interstate waters, the overall rank usually will be low (because of the uncertainty associated with obtaining interstate/international collaboration in TMDL development), regardless of the rank of individual pollutants.

*Impaired waters:* H=high; M=medium; L=low; U=a project to address a listed pollutant is underway. Projects include total maximum daily load (TMDL) development, targeted monitoring to assess the extent and severity of a problem, or assessment of the appropriateness of the water quality standard. Where the project underway does not address all listed pollutants, the overall priority will show the highest priority single pollutant not addressed by the TMDL, but will also show a "U" to indicate that one or more pollutants of concern are being addressed. There are 92 water bodies listed for bacteria. These waters are being addressed indirectly through a statewide study to assess the appropriateness of the indicator, but are not designated as underway.

*Threatened waters:* T-h=threatened high; T-m=threatened medium.

**PS/NPS –** a "Y" indicates whether the impairment is from point source (PS) or nonpoint sources (NPS). This includes unknown and/or potential point or nonpoint sources.

**1.3 (d) 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 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 WSC | |

Table 1.14 shows the wholesale activities of each of these entities:

**Table 1.14 Wholesale Providers of Municipal and Manufacturing Water Supply**

| Wholesale Water Provider | Wholesale Customers | |
|---|---|---|
| Cherokee Water Company | SWEPCO<br>City of Longview | |
| Cash WSC | Combined Consumers WSC<br>City of Lone Oak, | Aqua Source Utility, Inc.<br>City of Quinlan |
| Commerce Water District | North Hunt WSC<br>Maloy WSC<br>Texas A&M University | West Delta WSC<br>Gafford Chapel WSC |
| City of Emory | Cedar Cove Landing<br>Community Water Company<br>City of East Tawakoni | City of Point<br>South Rains WSC |
| City of Greenville | Caddo Mills<br>Jacobia WSC | Shady Grove WSC |
| City of Longview | Elderville WSC<br>Gum Springs WSC<br>Hallsville | Tryon Road SUD<br>White Oak (raw water)<br>C&C Mobile Home Park |
| City of Marshall | Cypress Valley WSC<br>Gill WSC | Leigh WSC<br>Talley WSC |
| City of Mt. Pleasant | Tri Water SUD<br>Winfield | Lake Bob Sandlin State Park |
| City of Paris | Lamar County WSD<br>MJC WSC | |
| City of Sulphur Springs | Brashear WSC<br>Brinker WSC<br>Gafford Chapel WSC<br>Martin Springs WSC | North Hopkins WSC<br>Pleasant Hill WSC<br>Shady Grove WSC 2 |
| City of Texarkana | Annona<br>Atlanta<br>Avery<br>Central Bowie WSC<br>DeKalb<br>Domino<br>Federal Correctional<br>Institution<br>Hooks<br>Macedonia Eylau MUD | Maud<br>Nash<br>New Boston<br>Oak Grove WSC<br>Queen City<br>Red Lick<br>Red River County WSC<br>Redwater<br>Wake Village<br>Park Terrace MHP |
| Franklin County Water District | Cypress Springs SUD<br>Mt. Vernon | Winnsboro<br>M&W Recreation |
| Lamar County Water Supply District | 410 WSC<br>Blossom<br>Deport<br>Detroit | Pattonville WSC<br>Red River WSC<br>Roxton<br>Reno |

**Table 1.14 Wholesale Providers of Municipal and Manufacturing Water Supply (cont.)**

| Wholesale Water Supplier | Wholesale Customers | |
|---|---|---|
| Northeast Texas Municipal Water District | Avinger<br>Daingerfield<br>Diana SUD<br>Glenwood WSC<br>Linden<br>Harleton WSC<br>Hughes Springs<br>Jefferson | Lone Star<br>Tryon Road SUD<br>Longview<br>Mims WSC<br>Ore City<br>Pittsburg<br>SWEPCO<br>Texas Utilities<br>Marshall |
| Sabine River Authority | Ables Springs WSC<br>Bright Star-Salem WSC<br>Caddo Mills<br>Cash SUD<br>Combined Consumers WSC<br>Commerce<br>Community Water Co.<br>Dallas<br>Eastman Chemical<br>Edgewood<br>Emory<br>Greenville | Kilgore<br>Longview<br>MacBee WSC<br>Point<br>Quitman<br>South Tawakoni WSC<br>Texas Utilities<br>West Tawakoni<br>Wills Point |
| Sulphur River MWD | Commerce Cooper | Sulphur Springs |
| Titus County FWD #1 | Mt. Pleasant<br>Texas Utilities | |

## 1.4 Description of Water Demand in the Region

### 1.4 (a) <u>Historical and Current Water Use</u>

Historical and current uses in the North East Texas Region include municipal, manufacturing, recreation, irrigation, mining, power generation and livestock. According to Figure 1.13, manufacturing is the predominant use category, exceeding all others combined. Mining and irrigation are relatively insignificant water uses in the North East Texas Region, and in fact, Table 1.15 indicates that mining use has declined by about 21 percent since 1980. While still a relatively small category, livestock watering use has increased by 52 percent since 1980. In the North East Texas Region, livestock includes poultry, and some estimates indicate further substantial increases in the poultry industry usage within the next 5 years.

The North East Texas Region utilizes both ground and surface water supplies. Table 1.16 shows a total percent water usage in 2000 and a projected usage in 2030.

**Table 1.16 Total % Water Usage in 2000 and Projected Usage in 2030**
**North East Texas Region**

| Category | 2000 Usage (Ac-ft) | Percent of Total | 2030 Projected Usage (Ac-ft) | Percent of Total | Percent Increase from 2000 |
|---|---|---|---|---|---|
| Municipal | 111,537 | 23 | 143,413 | 22 | 29 |
| Manufacturing | 253,206 | 52 | 351,427 | 53 | 39 |
| Power | 73,477 | 15 | 112,809 | 17 | 54 |
| Mining | 7,532 | 2 | 10,108 | 2 | 34 |
| Irrigation | 15,486 | 3 | 15,329 | 2 | -1 |
| Livestock | 26,577 | 5 | 26,785 | 4 | 1 |
| **Total** | **487,815** | **100** | **659,871** | **100** | **35** |

Source: TWDB - DB07.

In 2000, total reported usage in the North East Texas Region – both ground and surface – was 487,815 acre-feet, distributed as shown in Table 1.16. By 2030, projections developed in this plan indicate usage will reach 659,871 ac-ft, a 35 percent increase from 2000.

### 1.4 (b) Major Demand Centers

Major water demand centers include:

| City | 2001 Population | 2001 Use* |
|---|---|---|
| Longview | 73,739 | 6,438 MG/YR |
| Texarkana, Texas | 35,287 | 1,558 MG/YR |
| Paris | 26,074 | 2,722 MG/YR |
| Greenville | 24,336 | 1,600 MG/YR |
| Marshall | 23,922 | 1,154 MG/YR |

*From TWDB 2001 Water Use Survey Summary Estimates by Cities in Texas (Municipal water use).

**Figure 1.13**
**Water Use by Year and Category**

**Table 1.15**
**Water Use by County and Category**
North East Texas Region

### 1.4 (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 thousands of visitors each year. For example:

| Lake | 2003 Visitors (Corps of Engineers + Other facilities) |
|---|---|
| Wright Patman | 925,557 |
| Pat Mayse | 271,527 |
| Lake O' the Pines | 928,168 |
| Cooper Lake | 293,365 |

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.

### 1.4 (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. The expected completion of the study was 2005.

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.

### 1.4 (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 waste water 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.

## 1.5 Existing Water Planning in the Region

### 1.5 (a) Initial Assessment for Drought Preparedness

The survey of individual systems conducted as a part of this planning effort provided considerable insight into current preparations for drought conditions. For a number of years loans in excess of $500,000 from the TWDB have been accompanied by a requirement that the water supply entity develop a water conservation and drought contingency plan. All water supply systems that serve over 3,300 meters were to develop drought contingency plans by September 1, 1999, and smaller systems by 2000. The RWPG survey of 268 individual systems indicated that 83 of these have water conservation plans and 77 have adopted drought contingency plans. Some of the remainder may have plans, but did not respond to the NETRWPG survey. Recent droughts in the mid to late 90's resulted in emergency construction by several systems around Lake Tawakoni to lower intake structures to accommodate the critically low level of the lake. Similarly, a number of groundwater systems found that their rated well capacities were not valid for sustained use over periods of several weeks. Recent droughts have been relatively modest in relation to historically significant droughts of the 1950's and 1960's. In summary, the region as a whole is poorly prepared for a drought of major historical proportions.

### 1.5 (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 “crisis” mode to correct the deficiencies encountered by the regulators.

### 1.5 (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 recently completed two studies entitled “Comprehensive Sabine Watershed Management Plan” and “Upper Sabine Basin Water Supply Study,” dealing with water resources in the Sabine River Basin. The Sulphur River Basin Authority has completed regional plans dealing with water quality in the basin, as well as potential aspects of reservoir supply around the City of Clarksville in Red River County. Longview prepared a water supply study in 1982, and Paris completed a water system study in 1991. 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 North East Texas Region. As of 2004, a Comprehensive Water Study was being prepared for the City of Greenville. In 2003, the Texas Water Development Board completed the development of a Groundwater Availability Model of the northern part of the Carrizo-Wilcox aquifer.

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.

**1.5 (d) Summary of Recommendations from the 2002 State Water Plan**

The 2002 Texas Water Plan "Water for Texas" gave a summary of North East Texas Region based on the 2001 Water Plan prepared for the North East Texas Regional Water Planning Group –Region D.

The State Plan noted that the North East Texas Planning Group recommended that the Marvin Nichols I Reservoir site be developed to provide future water supply for water users within both the North East Texas Region and Region C (Impacts of Marvin Nichols I Reservoir were evaluated and are discussed in Chapter 7 of this plan. Based on the results of the evaluation, it is the conclusion of the North East Texas Regional Water Planning Group that due to the significant negative impacts upon environmental factors, agricultural resources/rural areas, other natural resources, and third parties, Marvin Nichols I Reservoir should not be included as a water management strategy in any 2006 regional water plan or the 2007 State Water Plan). The Planning Group also recommended Prairie Creek Reservoir as a water management strategy, consistent with a recommendation, contained in the *Comprehensive Sabine Watershed Management Plan*, that the Sabine River Authority develop the reservoir. Prairie Creek Reservoir, as recommended, would yield an estimated 17,215 AFY. However, plans call for increasing the project yield by diversions from the Sabine River and/or a pipeline from Toledo Bend Reservoir.

The 2002 State Water Plan informed that the estimated capital costs of recommended water management strategies to meet needs over the 50-year planning horizon are $55.0 million. Selected projects and costs include Prairie Creek Reservoir ($29,032,200), West Gregg Water Supply Corporation wells ($1,337,993), Harleton Water Supply Corporation surface water supply ($2,890,805), Star Mountain Water Supply Corporation wells ($2,192,735), and Lake Fork Water Supply Corporation wells ($1,504,665). To address many of the needs identified in the plan, no additional capital improvements will be required. Renewal of water supply contracts will be sufficient to ensure an adequate supply during the planning period.

The state plan stated that the North East Texas Planning Group examined needs of smaller communities in detail because much of the regional population is rural. Within the region there are eight cities with populations of more than 10,000, whereas total regional population is about 687,000. The regional water plan addresses water supply needs of many districts, water supply corporations, and other communities that were too small to be defined as water user groups. One challenge now faced by the region is how to finance the improvements necessary to meet the needs of the rural population.

## 1.6 Threats to Agricultural and Natural Resources

### 1.6 (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. Currently, prime farmland is plentiful in North East Texas, but it can be destroyed in several ways. Developments, such as subdivisions, schools, industrial parks, and others, can wipe out hundreds of acres of prime farmland. Building new reservoirs on prime farmland is another way to reduce the amount of this valuable resource. Finally, when rivers and streams reroute themselves over time, they may encroach upon prime farmlands.

### 1.6 (b) Surface Water

The North East Texas Region has many lakes and reservoirs as well as ponds and streams. Currently, most of the region uses surface water as a primary source for drinking water. Surface water resources must be carefully protected to ensure sufficient quality and quantity of this resource. Surface water quality is threatened by point and nonpoint source pollution from waste water treatment facilities, industry, farms and ranches, recreational vehicles, etc. Surface water quantity is threatened by both short term and long term overuse. 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.

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 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.

### 1.6 (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, 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 WSC 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, recently completed an expansion of its surface water facility and 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.

### 1.6 (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 28 of those species can be found in the planning region. See Table 1.17 for a regionally specified listing of endangered species as supplied by the Texas Parks and Wildlife Department in 2004. 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.

### 1.6 (e) Petroleum Resources

The oil industry is economically important in northeast Texas, but remaining supplies become increasingly expensive to extract. Oil is a renewable resource, but one that takes millions of years to produce, and exhausting this resource is a possibility. Careful monitoring of petroleum resources is important to ensure that they will be available in the future.

### 1.6 (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. Problems must be addressed and resolved in order to protect this nonrenewable resource.

### 1.6 (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 1.17 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, 2004.

**Birds**

| | |
|---|---|
| American Peregrine Falcon | *Falco Peregrinus Anatum* |
| Arctic Peregrine Falcon | *Falco Peregrinus Tundrius* |
| Bachman's Sparrow | *Aimophila Aestivalis* |
| Bald Eagle | *Haliaeetus Leucocephalus* |
| Brown Pelican | *Pelecanus Occidentalis* |
| Eskimo Curlew | *Numenius Borealis* |
| Interior Least Tern | *Sterna Antillarum Athalassos* |
| 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* |

**Mammals**

| | |
|---|---|
| Black Bear | *Ursus Americanus* |
| Louisiana Black Bear | *Ursus Americanus Luteolus* |
| Rafinesque's Big-Eared Bat | *Corynorhinus Rafinesquii* |

**Mollusks**

| | |
|---|---|
| Ouachita Rock-Pocketbook Mussel | *Arkansia Wheeleri* |

**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* |

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# 2.0 Population and Water Demand Projections

For the second round of regional water planning, draft population and water demand projections were prepared in coordination with the Regional Water Planning Group, staff from the Texas Parks and Wildlife Department (TPWD), Texas Commission on Environmental Quality (TCEQ) and Texas Department of Agriculture (TDA). 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.

The following sections of this chapter describe the methodology used 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 revised population and water demand projections that received final approval from the Region D – Regional Water Planning Group for inclusion in the 2006 Regional Water Plan and approval from the Texas Water Development Board (TWDB) for inclusion in the 2007 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 demand 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.

**2.0 (a) Methodology**

**(1) Population Projections**

New 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). (See Appendix to Chapter 2, page 90 for additional detailed information on the cohort-component procedure). Population projections were then released for the Planning Groups to have the opportunity to review the projections and request revisions. Any entity wishing to have their respective population or water demand projections revised was required to address their request through the Planning Group. If the Planning Group agreed with the request, the request was submitted to the Executive Administrator of the TWDB along with data showing how the entity met the criteria for eligibility for revisions (See Appendix to Chapter 2, page 97 for details regarding requirements for revision). The proposed revised projections were required to include documentation of how the revisions or alternative projections were derived.

**(2) Water Demand Projections**

Development of new municipal water use estimates (gallons per capita daily) are 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.

The Region D – Regional Water Planning Group 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. Additional details regarding the methodology required by the TWDB and used by the Regional Water Planning Group to estimate future water demand can be found in the following sections and the Appendix to Chapter 2, beginning on page 100.

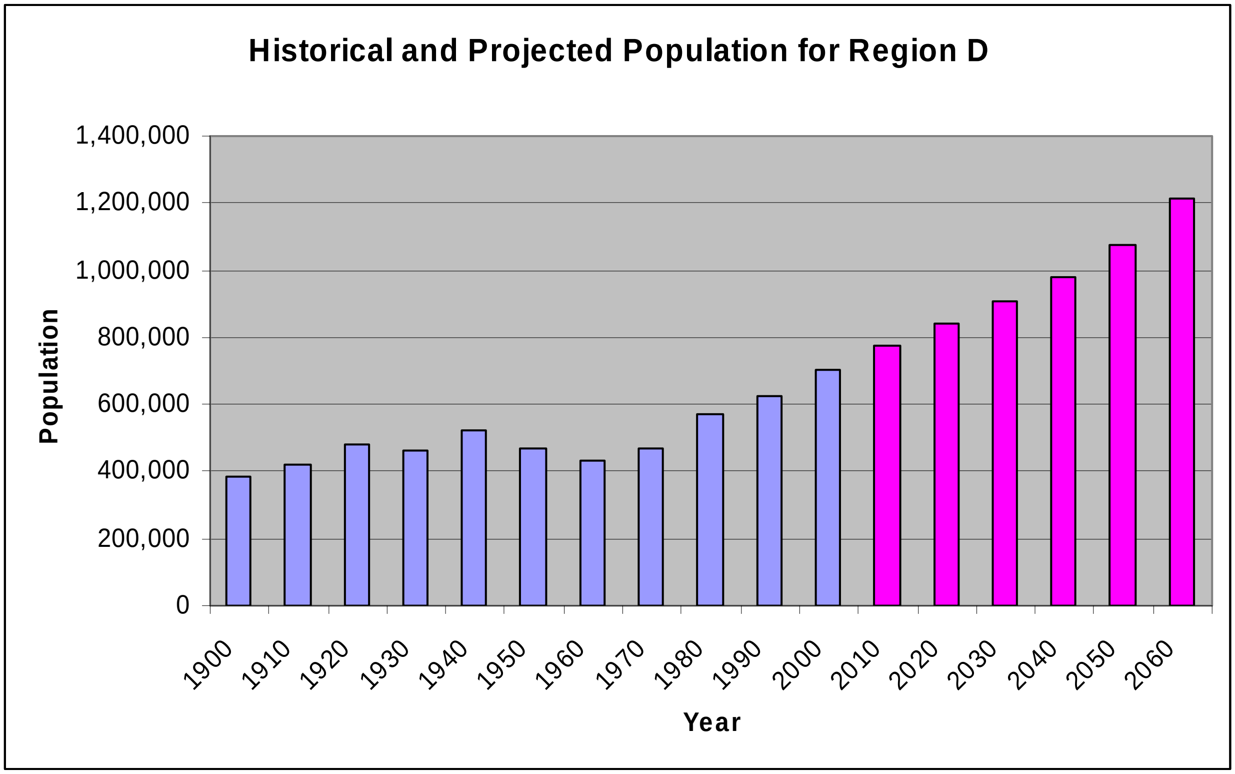
**(3) Regional Water Planning Group Approval**

Using the projections estimated by the TWDB, the population and water demand projections presented in the previous round of water planning and other locally available information, the Regional Water Planning Board reviewed and approved revisions to the TWDB projections. After approval by the Regional Water planning Board, the revised projections were forwarded for approval by the TWDB.

## 2.1 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**

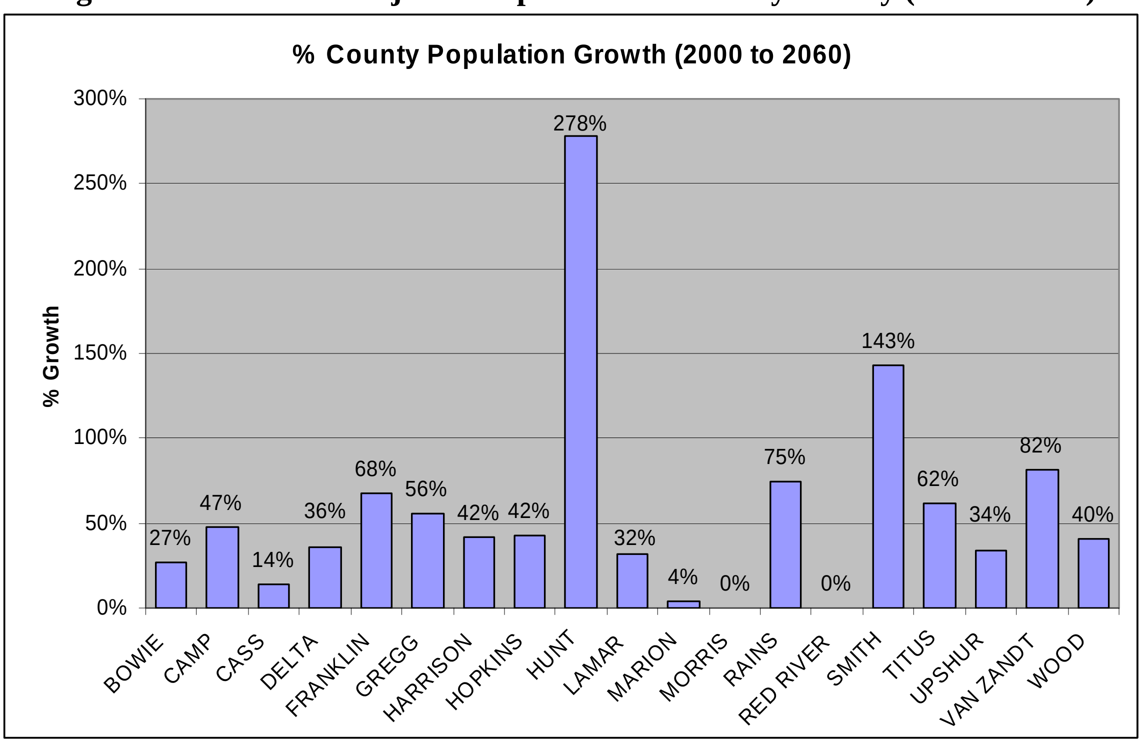



The Region's population is anticipated to grow by 72% overall (from 2000 to 2060) with the largest percentage growth occurring in Hunt and Smith Counties. In the year 2000, the counties with the largest population were Gregg and Bowie Counties. These counties include the Cities of Longview and Texarkana 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 amount of population growth in Hunt County can be attributed to the anticipated to 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)**

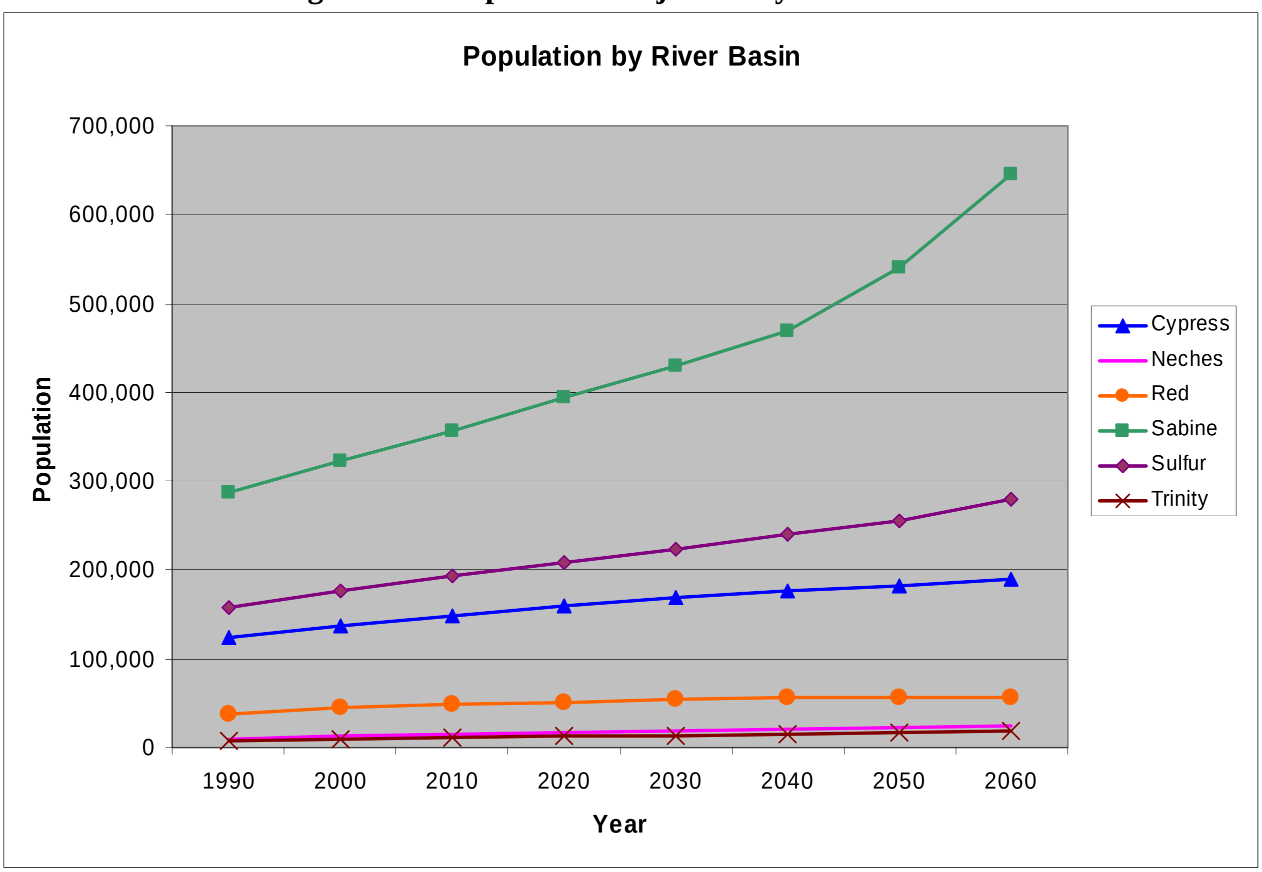


As depicted in Table 2.3 and Figure 2.3 below, the largest portion of the Region's population is within the Sabine River Basin. The Cities of Greenville, Longview, Kilgore and portions of Marshall are within the Sabine River basin as well as a large geographic area comprised of many smaller water user groups. Growth in the Sabine River Basin is anticipated to grow more quickly than in other areas of the region because the large amount of population growth expected in the eastern portion of Hunt County, as mentioned previously. A detailed breakdown of estimated population growth for each water user group in Region D can be found on Table 2.19 in the Appendix to Chapter 2, on page 74.

**Table 2.3 – Population Projection by River Basin**

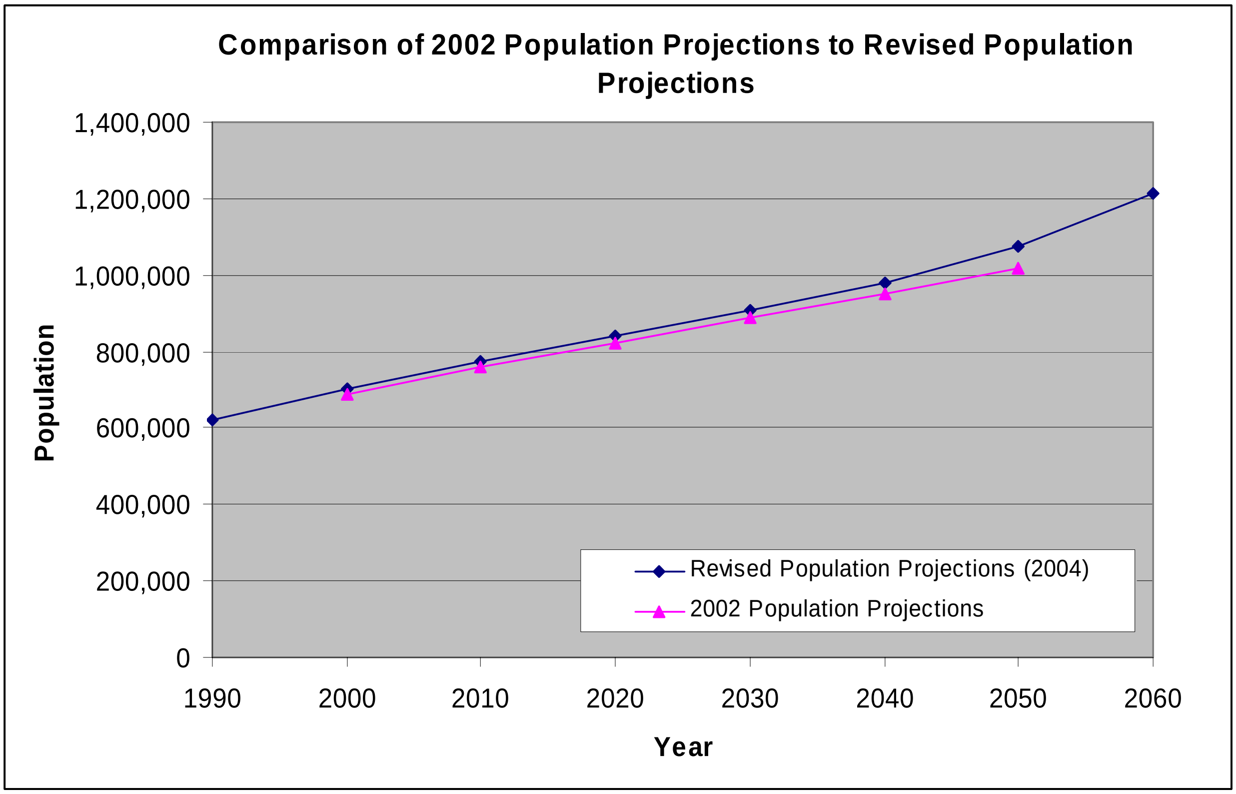
| River Basin | 1990 | 2000 | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|---|---|
| Cypress | 124,140 | 136,240 | 147,521 | 159,188 | 168,469 | 176,308 | 182,112 | 189,254 |
| Neches | 9,748 | 13,245 | 15,305 | 17,469 | 19,294 | 20,667 | 22,408 | 24,348 |
| Red | 36,722 | 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**



The 2006 Regional Water Plan is an update of the previously prepared 2002 regional water plan. Population projections for the 2006 Plan use the year 2000 Census as a baseline. Although the previous water plan was completed in 2002, population projections were set before the year 2000 Census data were available. Current population projections reflect a higher actual population in the year 2000 than was previously estimated. Thus future population growth tracks slightly higher than predicted in the 2002 Regional Water Plan.

**Figure 2.4 – Comparison of 2002 Population Projections to Revised Population Projections**

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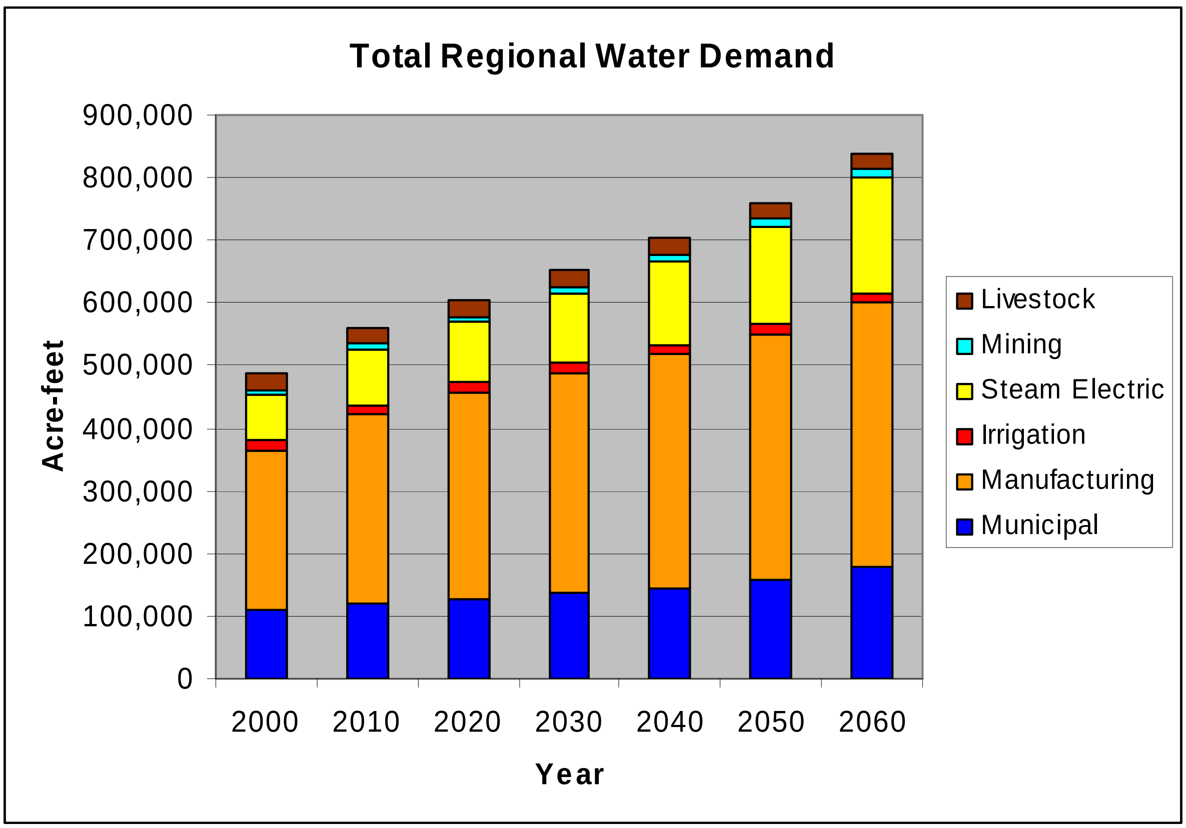
## 2.2 Water Demand Projections

Total annual water demand 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 to increases in steam electric, manufacturing and municipal water demand. Table 2.4 and Figure 2.5 summarize and illustrate the projected water demand by category for Region D.

**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** |
| 2002 Plan Estimate | 579,094 | 648,781 | 659,667 | 676,002 | 696,862 | 717,874 | |
| % Change | -15.8% | -13.5% | -8.2% | -3.4% | 1.0% | 5.9% | |

**Figure 2.5 – Regional Water Demand Projections by Category of Use (acre-feet)**



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. 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 annually in the portion of the Sabine River Basin that is in Region D.

**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 2.6 – Water Demand Projections by River Basin**

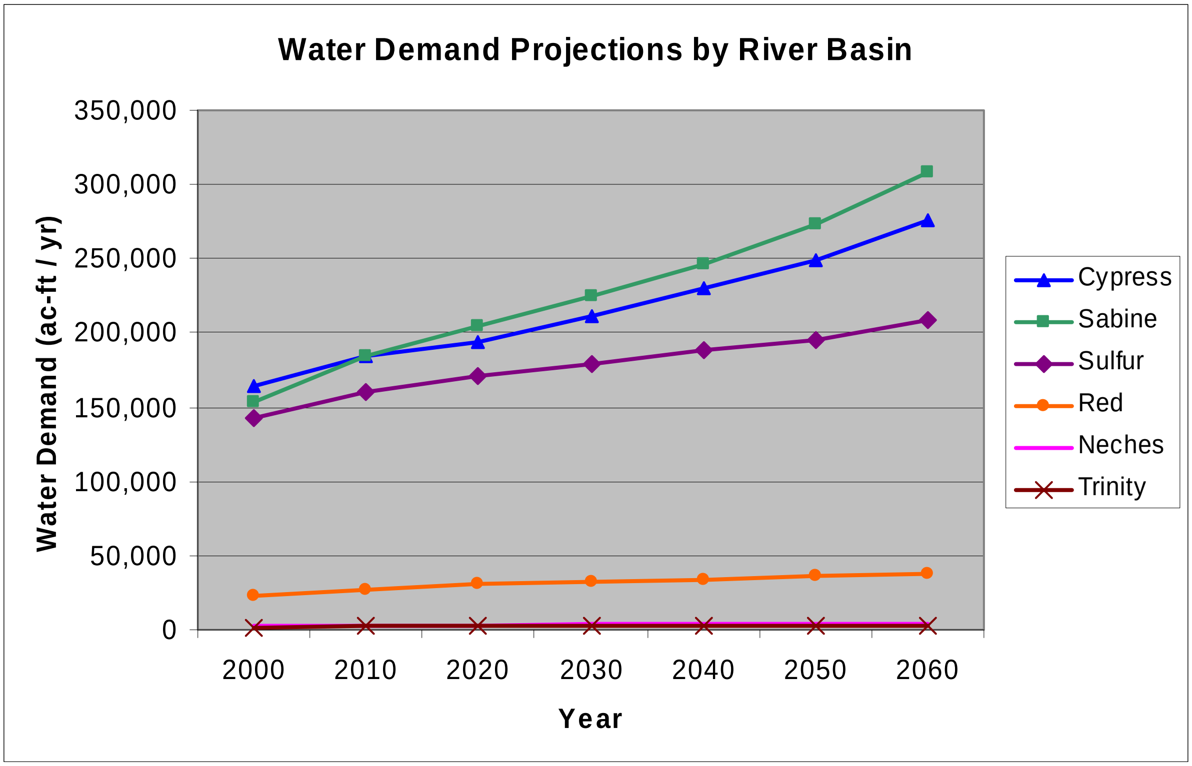
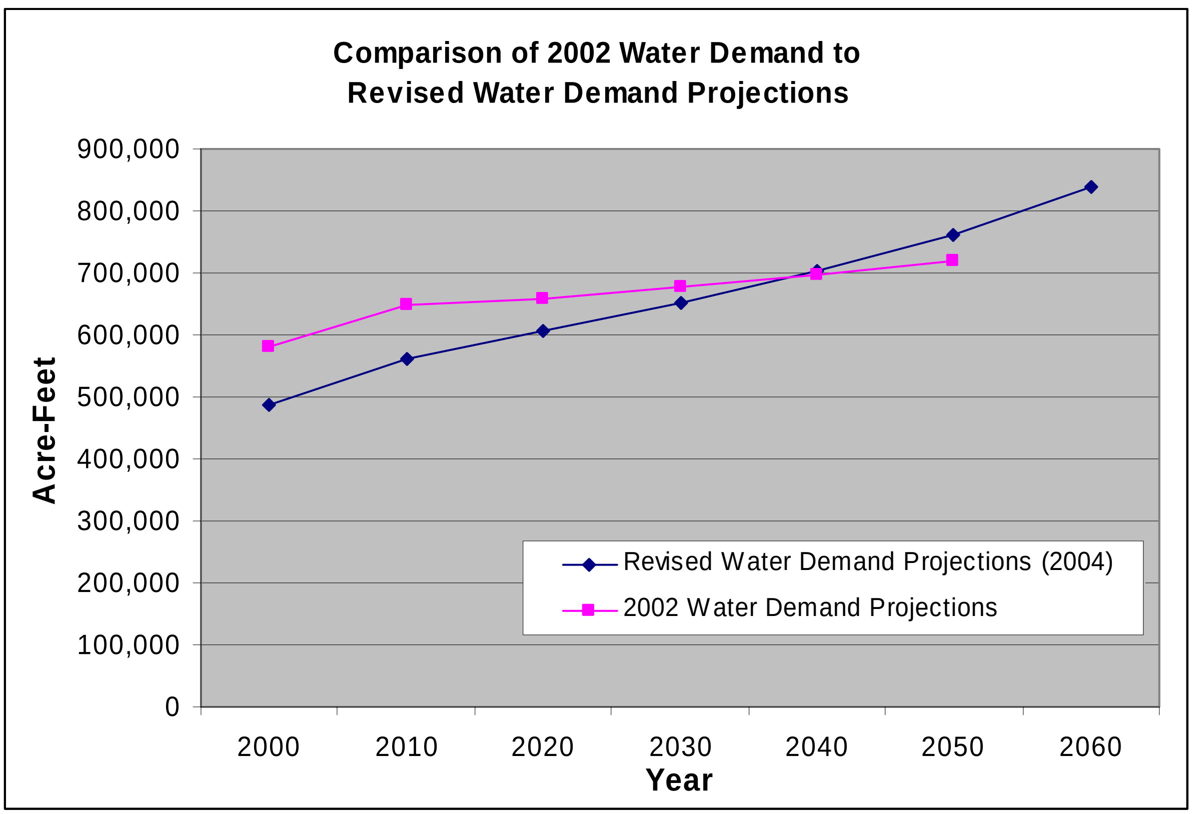



**Figure 2.7 – Comparison of 2002 Water Demand to Revised Water Demand Projections**



### 2.2 (a) 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.

**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 would, the year 2000 was the driest year in the last decade for a majority of the regions and for the State of Texas as a whole, and the water use data for the year 2000 takes into account the dry year water usage as well as incorporates water savings resulting from the 1991 State Water Efficient Plumbing Act and conservations 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 levels below that level. Although each community desires to achieve maximum conservation, 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 projection for that year to obtain a projected water demand.

Additional details regarding municipal water demand projection methodology can be found in the Appendix to Chapter 2, page 100.

### Regional Municipal Water Demand Projections

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). 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 GPCD. The statewide average water use was 17% higher, at 160 GPCD, for the same baseline year. Further breakdown of water demand and estimated plumbing code savings per specific water user group (WUG) can be found on Table 2-20 in the Appendix to Chapter 2 on page 83.

**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** |

## 2.2 (b) 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 all included in the Industrial Water Use Category. Water demands have been broken down into these three sub-categories for greater clarity of water usage.

**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 Texas Water Development Board 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 updating water demand information and adding known water users not previously included. This updated information was obtained largely through surveys of water providers who supplied water to manufacturing facilities. The recommended demands were revised as necessary and approved for presentation to the TWDB by the Planning Group.
- The TWDB contracted with representatives of investor-owned utility companies of Texas at 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 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. In general, the TWDB recommended demand projections were used unless more reliable or up to date information was available to warrant a revision.

**(1) Regional Manufacturing Demand Projections:**

Over the fifty year period from 2010 to 2060, 50% to 52% of the total water demand in Region D – North East Texas is projected to be manufacturing demand. Overall manufacturing water demand for Region D 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.

Several of the largest manufacturing water users in the northeast Texas region include:

| | |
|---|---|
| International Paper | Cass County |
| Eastman Chemical Company | Harrison County |
| Snider Industries | Harrison County |
| Campbell Soup Supply Company | Lamar County |
| Pilgrim Pride | Titus 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) Regional Steam Electric Demand Projections:**
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 Region D, 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** |

### (3) 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** |

### 2.2 (c) Livestock Demand:

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

**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.. Additional detail regarding the specifics of livestock water demand calculations can be found in the Appendix to Chapter 2 on page 105.

**Regional Livestock Water Demand Projections:**

Livestock water demand represented approximately 5.4% of water demanded 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 in percentage of total water demanded 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 of water demanded annually. Tables 2.16 & 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** |

## 2.2 (d) Irrigation Demand:

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

### 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 Evaporation (PET).

The acreage planted for each crop under irrigation is estimated for each county. The crop water application for each crop are estimated by the NRCS and multiplied by the acreage to estimate the total irrigation for a county or region. Additional details regarding estimation of irrigation water demand can be found in the Appendix to Chapter 2 on page 102.

**Regional Irrigation Water Demand Projections:**

Irrigation water demand represented approximately 3.2% of water demanded 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 of total water demanded 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** |

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# 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 water planning group was charged with updating the water availability numbers from the 2001 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.

According to Texas Water Development Board requirements, the analysis of currently available water supply is to be presented in three parts:

- 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.

**Table 3.1 Overall Water Supply by Source**

| **Overall Water Availability for Region D (ac-ft/yr)** | | | | | | |
|---|---|---|---|---|---|---|
| | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Reservoirs in Region D | 1,391,234 | 1,385,998 | 1,380,413 | 1,374,828 | 1,369,242 | 1,353,659 |
| Groundwater in Region D | 302,720 | 303,523 | 304,488 | 305,838 | 307,680 | 309,520 |
| Irrigation Local Supply | 14,732 | 14,717 | 14,704 | 14,572 | 14,262 | 14,249 |
| Livestock Local Supply | 19,476 | 19,343 | 19,006 | 18,928 | 18,531 | 18,498 |
| Other Local Supply | 3,253 | 3,512 | 3,653 | 3,816 | 3,983 | 4,144 |
| Reuse (Direct & Indirect) | 86,411 | 81,292 | 75,756 | 70,230 | 71,394 | 80,131 |
| **Total** | **1,817,826** | **1,808,385** | **1,798,020** | **1,788,212** | **1,785,092** | **1,780,201** |

## 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. A list of water rights per river basin can be found in the Appendix A, Chapter 3 Appendix.

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 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 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.

**Water Availability Models**

As required by TWDB rules, for the 2006 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.

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 water supply storage volume. The following surface water supply descriptions include the most current available firm yield estimates and are based on Water Availability Models provided by TCEQ.

### 3.1 (a) 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.

**Table 3.2 – Sabine Basin Surface Water Supplies**

| Sabine River Basin Surface Water Availability (ac-ft/yr) | | | | | | |
|---|---|---|---|---|---|---|
| **Source Name** | **2,010** | **2,020** | **2,030** | **2,040** | **2,050** | **2,060** |
| Big Sandy Creek Lake / Reservoir | 3,361 | 3,361 | 3,361 | 3,361 | 3,361 | 3,361 |
| BrandyBranch Lake / Reservoir | 11,000 | 11,000 | 11,000 | 11,000 | 11,000 | 11,000 |
| Edgewood City Lake / Reservoir | 110 | 110 | 110 | 110 | 110 | 110 |
| Fork Lake / 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** | **598,716** | **596,663** | **593,625** | **590,487** | **587,466** | **584,401** |

### 3.1 (b) 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 for 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.

**Table 3.3 – Red River Basin Surface Water Supplies**

| Red River Basin Surface Water Availability (ac-ft/yr) | | | | | | |
|---|---|---|---|---|---|---|
| **Source Name** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Crook Lake / Reservoir | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| Pat Mayse Lake / Reservoir | 59,750 | 59,200 | 58,900 | 58,600 | 58,300 | 58,000 |
| **Total** | **60,750** | **60,200** | **59,900** | **59,600** | **59,300** | **59,000** |

### 3.1 (c) 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 36,000 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 as calculated in the water availability model for drought of record conditions.

**Table 3.4 – Sulphur River Basin Surface Water Supplies**

| **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 |
| 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 |
| Langford Lake / Reservoir | 488 | 488 | 488 | 488 | 488 | 488 |
| River Crest Lake / Reservoir | 8,635 | 8,635 | 8,635 | 8,635 | 8,635 | 8,635 |
| Sulphur Springs Lake / River | 9,800 | 9,800 | 9,800 | 9,800 | 9,800 | 9,800 |
| Wright Patman Lake / Reservoir | 180,000 | 180,000 | 180,000 | 180,000 | 180,000 | 180,000 |
| Sulphur River Combined Run of River | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | - |
| **Total** | **338,424** | **336,307** | **334,190** | **332,073** | **329,956** | **317,841** |

### 3.1 (d) 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 Water Supplies**

| 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 | 1,785 | 1,785 | 1,785 | 1,785 | 1,785 | 1,785 |
| Monticello Lake/Reservoir | 6,098 | 6,098 | 6,098 | 6,098 | 6,098 | 6,098 |
| O' The Pines Lake / Reservoir | 181,869 | 181,869 | 181,869 | 181,869 | 181,869 | 181,869 |
| Tankersley Lake / Reservoir | 6,672 | 6,672 | 6,672 | 6,672 | 6,672 | 6,672 |
| Welsh Lake / Reservoir | 3,739 | 3,739 | 3,739 | 3,739 | 3,739 | 3,739 |
| Blundell Creek Run-of-River | 16,300 | 16,300 | 16,300 | 16,300 | 16,300 | 16,300 |
| 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 |
| **Total** | **402,274** | **402,034** | **401,794** | **401,554** | **401,314** | **401,074** |

### 3.1 (e) <u>Neches River Basin</u>

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.

There are no major surface water supplies within the portion of the Neches Basin in the North East Texas Region. However, some supply from Lake Tyler may be available for future use in Region D.

### 3.1 (f) 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 may be available for future 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 (a) 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 B) 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.

TWDB Exhibit B 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. A GAM has not been completed for the Nacatoch or Blossom aquifers. Therefore, the ground-water 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 RWPG, but rather provide a tool to evaluate aquifer water level impacts under different pumping scenarios.

### 3.2 (b) 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 than the estimated supply) could be pumped if there is not a groundwater conservation district in place to prevent such withdrawals.

The steps involved in determining the water supply by county and aquifer using the Queen City/Sparta/Carrizo Wilcox GAM[1] is summarized below. Because the GAM does not "output" a value for groundwater availability or supply, the model was used to determine the impact of different pumping scenarios so that those impacts could be compared to the criteria set by the planning group. In other words, an iterative approach was used to determine what groundwater demand in each county would result in no more than 50 feet of water level decline or 10% decline in saturated thickness in the outcrop areas. Future pumping locations are not known with certainty. Therefore, the total "estimated" supply was distributed equally across each county and implemented into the predictive GAM model (2000-2050). The pumping was assumed to be constant starting in 2001, and was held at the projected level for 50 years.

The drawdown across the model area was then assessed to determine if the drawdown criteria were met (i.e., if the average drawdown across the county was less about 50 feet). Depending on the drawdown results, projected supplies were adjusted and another simulation completed. This approach was used until the average drawdown in each county met the criteria at the end of the 50-year simulation period. The supply for the county and aquifer was then set equal to the total county pumping that was necessary to meet the drawdown criteria.

Simulations with Queen City/Sparta/Carrizo-Wilcox GAM indicate that drawdown from proposed groundwater strategies will reduce total streamflow in Region D by less than 1 cfs in 2060. Most of the groundwater from the Carrizo-Wilcox aquifer is produced from aquifer storage in the deeper confined sections and therefore has little impact on streams and springs.

Some of the groundwater in the region is brackish (i.e., above 1000 mg/L of total dissolved solids). In order to be used for municipal supply, the brackish groundwater may require treatment. The portion of groundwater that is brackish can been estimated by looking at the overall water quality in each county on an aquifer-by-aquifer basis.

### 3.2 (c) Groundwater Availability by Aquifer

Groundwater availability was calculated using the GAM for the Queen City/Sparta/Carrizo Wilcox and Trinity/Woodbine aquifers. The total available water for each of the aquifers present in North East Texas, assuming reasonable levels of pumping and drawdown are summarized in Table 3.6 and further divided by availability per county in Table 3.7.

1 Kelley, V.A. and others, 2004. Groundwater Availability Models for the Queen City and Sparta Aquifers.

**Table 3.6 Groundwater Availability by Aquifer**

| | Groundwater Availability (ac-ft/yr) | | | | | |
|---|---|---|---|---|---|---|
| **Aquifer** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Blossom Aquifer | 2,270 | 2,270 | 2,270 | 2,270 | 2,270 | 591 |
| Carrizo-Wilcox Aquifer | 108,311 | 109,114 | 110,079 | 111,429 | 113,271 | 115,111 |
| Nacatoch Aquifer | 9,895 | 9,895 | 9,895 | 9,895 | 9,895 | 9,895 |
| Queen City Aquifer | 169,509 | 169,509 | 169,509 | 169,509 | 169,509 | 169,509 |
| Trinity Aquifer | 2,763 | 2,763 | 2,763 | 2,763 | 2,763 | 2,763 |
| Woodbine Aquifer | 6,680 | 6,680 | 6,680 | 6,680 | 6,680 | 6,680 |
| Other Aquifer | 3,292 | 3,292 | 3,292 | 3,292 | 3,292 | 3,292 |
| **Total** | **302,720** | **303,523** | **304,488** | **305,838** | **307,680** | **307,841** |

**Table 3.7 Groundwater Supply in Region D**

| | | Groundwater Supply in Region D (ac-ft/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| **Aquifer** | **County** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Blossom Aquifer | Bowie | 200 | 200 | 200 | 200 | 200 | 200 |
| | Lamar | 391 | 391 | 391 | 391 | 391 | 391 |
| | Red River | 1,679 | 1,679 | 1,679 | 1,679 | 1,679 | - |
| | **Total** | **2,270** | **2,270** | **2,270** | **2,270** | **2,270** | **591** |
| Carrizo-Wilcox Aquifer | Bowie | 15,673 | 15,673 | 15,673 | 15,673 | 15,673 | 15,673 |
| | Camp | 3,920 | 3,920 | 3,920 | 3,920 | 3,920 | 3,920 |
| | Cass | 3,015 | 3,051 | 3,132 | 3,214 | 3,284 | 3,284 |
| | Franklin | 11,670 | 11,670 | 11,670 | 11,670 | 11,670 | 11,670 |
| | Gregg | 6,048 | 6,207 | 6,422 | 6,728 | 6,984 | 7,432 |
| | Harrison | 8,660 | 8,660 | 8,660 | 8,660 | 8,660 | 8,660 |
| | Hopkins | 4,760 | 4,760 | 4,760 | 4,760 | 4,760 | 4,760 |
| | Marion | 2,030 | 2,030 | 2,030 | 2,030 | 2,030 | 2,030 |
| | Morris | 2,660 | 2,660 | 2,660 | 2,660 | 2,660 | 2,660 |
| | Rains | 1,770 | 1,770 | 1,770 | 1,770 | 1,770 | 1,770 |
| | Red River | 239 | 239 | 239 | 239 | 239 | 239 |
| | Smith | 9,319 | 9,729 | 10,275 | 11,157 | 12,625 | 13,981 |
| | Titus | 11,134 | 11,134 | 11,134 | 11,134 | 11,134 | 11,134 |
| | Upshur | 6,641 | 6,750 | 6,822 | 6,892 | 6,935 | 6,959 |
| | Van Zandt | 11,087 | 11,087 | 11,087 | 11,087 | 11,087 | 11,087 |
| | Wood | 9,685 | 9,774 | 9,825 | 9,835 | 9,840 | 9,852 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Total** | **108,311** | **109,114** | **110,079** | **111,429** | **113,271** | **115,111** |
| Nacatoch Aquifer | Bowie | 3,936 | 3,936 | 3,936 | 3,936 | 3,936 | 3,936 |
| | Delta | 282 | 282 | 282 | 282 | 282 | 282 |
| | Franklin | 10 | 10 | 10 | 10 | 10 | 10 |
| | Hopkins | 915 | 915 | 915 | 915 | 915 | 915 |
| | Hunt | 2,956 | 2,956 | 2,956 | 2,956 | 2,956 | 2,956 |
| | Lamar | 45 | 45 | 45 | 45 | 45 | 45 |
| | Rains | 10 | 10 | 10 | 10 | 10 | 10 |
| | Red River | 700 | 700 | 700 | 700 | 700 | 700 |
| | Titus | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 | 1,041 |
| | **Total** | **9,895** | **9,895** | **9,895** | **9,895** | **9,895** | **9,895** |
| Queen City Aquifer | Camp | 3,610 | 3,610 | 3,610 | 3,610 | 3,610 | 3,610 |
| | Cass | 38,189 | 38,189 | 38,189 | 38,189 | 38,189 | 38,189 |
| | Gregg | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 | 7,500 |
| | Harrison | 10,020 | 10,020 | 10,020 | 10,020 | 10,020 | 10,020 |
| | Marion | 15,150 | 15,150 | 15,150 | 15,150 | 15,150 | 15,150 |
| | Morris | 9,540 | 9,540 | 9,540 | 9,540 | 9,540 | 9,540 |
| | Smith | 35,520 | 35,520 | 35,520 | 35,520 | 35,520 | 35,520 |
| | Upshur | 25000 | 25000 | 25000 | 25000 | 25000 | 25000 |
| | Van Zandt | 3,750 | 3,750 | 3,750 | 3,750 | 3,750 | 3,750 |
| | Wood | 21,230 | 21,230 | 21,230 | 21,230 | 21,230 | 21,230 |
| | **Total** | **169,509** | **169,509** | **169,509** | **169,509** | **169,509** | **169,509** |
| Trinity Aquifer | Delta | 364 | 364 | 364 | 364 | 364 | 364 |
| | Hunt | 551 | 551 | 551 | 551 | 551 | 551 |
| | Lamar | 1,320 | 1,320 | 1,320 | 1,320 | 1,320 | 1,320 |
| | Red River | 528 | 528 | 528 | 528 | 528 | 528 |
| | **Total** | **2,763** | **2,763** | **2,763** | **2,763** | **2,763** | **2,763** |
| Woodbine Aquifer | Delta | 12 | 12 | 12 | 12 | 12 | 12 |
| | Hunt | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 | 2,840 |
| | Lamar | 3,658 | 3,658 | 3,658 | 3,658 | 3,658 | 3,658 |
| | Red River | 170 | 170 | 170 | 170 | 170 | 170 |
| | **Total** | **6,680** | **6,680** | **6,680** | **6,680** | **6,680** | **6,680** |
| Other Aquifer | Bowie | 2,994 | 2,994 | 2,994 | 2,994 | 2,994 | 2,994 |
| | Hopkins | 298 | 298 | 298 | 298 | 298 | 298 |
| | **Total** | **3,292** | **3,292** | **3,292** | **3,292** | **3,292** | **3,292** |
| **Regional Total Groundwater** | | **302,720** | **303,523** | **304,488** | **305,838** | **307,680** | **307,841** |

### 3.2 (d) Description of Aquifers

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.

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 3.7. Total estimated groundwater availability from the Carrizo-Wilcox Aquifer in the North East Texas Region is over 110,985 ac-ft/yr.

Nacatoch Aquifer

The Nacatoch Aquifer is classified as a minor aquifer by the TWDB. Table 3.7 shows the detailed groundwater availability by county for the Nacatoch Aquifer.

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.

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.

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 (a) 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.

TWDB water supply volumes were used if more current supply estimates were not available for the manufacturing, mining, livestock, irrigation and steam electric users. It was further assumed that, unless a specific source of supply was identified during the survey or in the field investigation, livestock and irrigation were from private 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 changes in livestock and irrigation water demand.

### 3.3 (b) Regional Municipal Water Supply

**Table 3.8 Regional Municipal Water Supply by County**

| | | Supply Available (ac-ft/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| **COUNTY** | **Basin** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Bowie | Red | 3,202 | 3,294 | 3,347 | 3,397 | 3,367 | 3,353 |
| | Sulphur | 11,267 | 11,650 | 11,886 | 12,105 | 12,016 | 11,992 |
| | **Total** | **14,469** | **14,944** | **15,233** | **15,502** | **15,383** | **15,345** |
| Camp | Cypress | 3,631 | 3,634 | 3,638 | 3,641 | 3,644 | 3,646 |
| | **Total** | **3,631** | **3,634** | **3,638** | **3,641** | **3,644** | **3,646** |
| Cass | Cypress | 10,193 | 10,214 | 10,258 | 10,302 | 10,343 | 10,343 |
| | Sulphur | 1,435 | 1,453 | 1,493 | 1,534 | 1,575 | 1,575 |
| | **Total** | **11,628** | **11,667** | **11,751** | **11,836** | **11,918** | **11,918** |
| Delta | Sulphur | 2,346 | 2,336 | 2,241 | 2,233 | 2,209 | 2,177 |
| | **Total** | **2,346** | **2,336** | **2,241** | **2,233** | **2,209** | **2,177** |
| Franklin | Cypress | 3,607 | 3,617 | 3,625 | 3,632 | 3,632 | 3,632 |
| | Sulphur | 3,518 | 3,539 | 3,554 | 3,566 | 3,566 | 3,566 |
| | **Total** | **7,125** | **7,156** | **7,179** | **7,198** | **7,198** | **7,198** |
| Gregg | Cypress | 2,227 | 2,237 | 2,248 | 2,261 | 2,278 | 2,302 |
| | Sabine | 61,649 | 61,456 | 61,523 | 61,601 | 61,706 | 61,858 |
| | **Total** | **63,876** | **63,693** | **63,771** | **63,862** | **63,984** | **64,160** |
| Harrison | Cypress | 6,210 | 6,345 | 6,440 | 6,505 | 6,581 | 6,692 |
| | Sabine | 36,953 | 37,044 | 37,107 | 37,121 | 37,138 | 37,161 |
| | **Total** | **43,163** | **43,389** | **43,547** | **43,626** | **43,719** | **43,853** |
| Hopkins | Cypress | 631 | 632 | 632 | 631 | 631 | 631 |
| | Sabine | 945 | 980 | 995 | 1,005 | 979 | 955 |
| | Sulphur | 21,037 | 20,741 | 20,420 | 20,024 | 19,798 | 19,299 |
| | **Total** | **22,613** | **22,353** | **22,047** | **21,660** | **21,408** | **20,885** |
| Hunt | Sabine | 34,755 | 34,306 | 34,089 | 34,068 | 34,835 | 36,356 |
| | Sulphur | 9,072 | 9,044 | 9,009 | 9,017 | 9,125 | 9,296 |
| | Trinity | 104 | 108 | 117 | 132 | 167 | 218 |
| | **Total** | **43,931** | **43,458** | **43,215** | **43,217** | **44,127** | **45,870** |
| Lamar | Red | 12,714 | 12,376 | 12,152 | 11,945 | 11,739 | 11,444 |
| | Sulphur | 24,217 | 23,702 | 23,385 | 23,067 | 22,766 | 22,331 |
| | **Total** | **36,931** | **36,078** | **35,537** | **35,012** | **34,505** | **33,775** |
| Marion | Cypress | 13,481 | 13,489 | 13,489 | 13,489 | 13,489 | 13,454 |
| | **Total** | **13,481** | **13,489** | **13,489** | **13,489** | **13,489** | **13,454** |
| Morris | Cypress | 17,235 | 17,232 | 17,229 | 17,226 | 17,226 | 17,226 |
| | Sulphur | 506 | 506 | 506 | 506 | 506 | 506 |
| | **Total** | **17,741** | **17,738** | **17,735** | **17,732** | **17,732** | **17,732** |
| Rains | Sabine | 2,869 | 2,904 | 2,918 | 2,909 | 2,888 | 2,865 |
| | **Total** | **2,869** | **2,904** | **2,918** | **2,909** | **2,888** | **2,865** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Red River | Red | 449 | 448 | 448 | 448 | 448 | 448 |
| | Sulphur | 1,977 | 1,973 | 1,969 | 1,965 | 1,965 | 1,965 |
| | **Total** | **2,426** | **2,421** | **2,417** | **2,413** | **2,413** | **2,413** |
| Smith | Sabine | 9,694 | 10,025 | 10,465 | 10,913 | 11,711 | 12,710 |
| | **Total** | **9,694** | **10,025** | **10,465** | **10,913** | **11,711** | **12,710** |
| 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 | 13,420 | 13,483 | 13,523 | 13,545 | 13,563 | 13,588 |
| | Sabine | 2,540 | 2,540 | 2,540 | 2,540 | 2,540 | 2,540 |
| | **Total** | **15,960** | **16,023** | **16,063** | **16,085** | **16,103** | **16,128** |
| Van Zandt | Neches | 2,659 | 2,774 | 2,862 | 2,927 | 3,009 | 3,101 |
| | Sabine | 6,933 | 7,021 | 7,102 | 7,157 | 7,168 | 7,153 |
| | Trinity | 3,175 | 3,205 | 3,224 | 3,231 | 3,248 | 3,271 |
| | **Total** | **12,767** | **13,000** | **13,188** | **13,315** | **13,425** | **13,525** |
| Wood | Cypress | 541 | 544 | 546 | 546 | 546 | 546 |
| | Sabine | 9,600 | 9,673 | 9,710 | 9,705 | 9,697 | 9,690 |
| | **Total** | **10,141** | **10,217** | **10,256** | **10,251** | **10,243** | **10,236** |
| **REGION TOTAL** | | **346,058** | **345,433** | **345,284** | **345,157** | **346,966** | **347,083** |

**Table 3.9 Regional Municipal Water Supply by Basin**

| **Supply Available (ac-ft/yr)** | | | | | | |
|---|---|---|---|---|---|---|
| **BASIN** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Cypress | 81,005 | 80,810 | 80,604 | 80,368 | 81,071 | 79,463 |
| Neches | 2,659 | 2,774 | 2,862 | 2,927 | 3,009 | 3,101 |
| Red River | 16,365 | 16,118 | 15,947 | 15,790 | 15,554 | 15,245 |
| Sabine | 165,938 | 165,949 | 166,449 | 167,019 | 168,662 | 171,288 |
| Sulphur | 76,812 | 76,469 | 76,081 | 75,690 | 75,255 | 74,497 |
| Trinity | 3,279 | 3,313 | 3,341 | 3,363 | 3,415 | 3,489 |
| **TOTAL** | **346,058** | **345,433** | **345,284** | **345,157** | **346,966** | **347,083** |

### 3.3 (c) Regional Manufacturing Supply

**Table 3.10 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 | 2,423 | 2,753 | 3,052 | 3,345 | 3,597 | 3,904 |
| | **Total** | **2,423** | **2,753** | **3,052** | **3,345** | **3,597** | **3,904** |
| Harrison | Cypress | 11 | 12 | 13 | 14 | 15 | 17 |
| | Sabine | 140,024 | 140,024 | 140,024 | 140,024 | 140,024 | 140,024 |
| | **Total** | **140,035** | **140,036** | **140,037** | **140,038** | **140,039** | **140,041** |
| 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** |
| 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** | | **395,408** | **399,479** | **401,656** | **403,643** | **411,223** | **431,026** |

**Table 3.11 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 | 143,902 | 144,460 | 144,983 | 145,510 | 145,979 | 146,480 |
| Sulphur | 115,793 | 124,261 | 131,002 | 137,456 | 143,041 | 152,798 |
| Trinity | 0 | 0 | 0 | 0 | 0 | 0 |
| **TOTAL** | **395,408** | **399,479** | **401,656** | **403,643** | **411,223** | **431,026** |

### 3.3 (d) Regional Irrigation Supply

**Table 3.12 Regional Irrigation Water Supply by County**

| | | Supply Available (ac-ft/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| **COUNTY** | **Basin** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Bowie | Red | 2,314 | 2,314 | 2,314 | 2,254 | 2,104 | 1,964 |
| | Sulphur | - | - | - | - | - | - |
| | **Total** | **2,314** | **2,314** | **2,314** | **2,254** | **2,104** | **1,964** |
| Camp | Cypress | - | - | - | - | - | - |
| | **Total** | - | - | - | - | - | - |
| Cass | Cypress | 6 | 6 | 6 | 6 | 6 | 6 |
| | Sulphur | - | - | - | - | - | - |
| | **Total** | **6** | **6** | **6** | **6** | **6** | **6** |
| Delta | Sulphur | 578 | 572 | 566 | 559 | 553 | 547 |
| | **Total** | **578** | **572** | **566** | **559** | **553** | **547** |
| Franklin | Cypress | - | - | - | - | - | - |
| | Sulphur | - | - | - | - | - | - |
| | **Total** | - | - | - | - | - | - |
| Gregg | Cypress | - | - | - | - | - | - |
| | Sabine | - | - | - | - | - | - |
| | **Total** | - | - | - | - | - | - |
| Harrison | Cypress | 53 | 53 | 53 | 53 | 53 | 53 |
| | Sabine | 53 | 53 | 53 | 53 | 53 | 53 |
| | **Total** | **106** | **106** | **106** | **106** | **106** | **106** |
| Hopkins | Cypress | - | - | - | - | - | - |
| | Sabine | - | - | - | - | - | - |
| | Sulphur | 50 | 50 | 50 | 50 | 50 | 50 |
| | **Total** | **50** | **50** | **50** | **50** | **50** | **50** |
| Hunt | Sabine | 1,492 | 1,492 | 1,492 | 1,492 | 1,492 | 1,492 |
| | Sulphur | 446 | 446 | 446 | 446 | 446 | 446 |
| | Trinity | - | - | - | - | - | - |
| | **Total** | **1,938** | **1,938** | **1,938** | **1,938** | **1,938** | **1,938** |
| Lamar | Red | 5,703 | 5,640 | 5,577 | 5,514 | 5,452 | 5,391 |
| | Sulphur | - | - | - | - | - | - |
| | **Total** | **5,703** | **5,640** | **5,577** | **5,514** | **5,452** | **5,391** |
| Marion | Cypress | 68 | 68 | 68 | 68 | 68 | 68 |
| | **Total** | **68** | **68** | **68** | **68** | **68** | **68** |
| 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 | 382 | 400 | 421 | 442 | 464 | 488 |
| | **Total** | **382** | **400** | **421** | **442** | **464** | **488** |
| Titus | Cypress | - | - | - | - | - | - |
| | Sulphur | - | - | - | - | - | - |
| | **Total** | - | - | - | - | - | - |
| Upshur | Cypress | 240 | 240 | 240 | 240 | 240 | 240 |
| | Sabine | - | - | - | - | - | - |
| | **Total** | **240** | **240** | **240** | **240** | **240** | **240** |
| Van Zandt | Neches | 33 | 33 | 33 | 33 | 33 | 33 |
| | Sabine | - | - | - | - | - | - |
| | Trinity | - | - | - | - | - | - |
| | **Total** | **33** | **33** | **33** | **33** | **33** | **33** |
| Wood | Cypress | 125 | 125 | 125 | 125 | 125 | 125 |
| | Sabine | 248 | 248 | 248 | 248 | 248 | 248 |
| | **Total** | **373** | **373** | **373** | **373** | **373** | **373** |
| **REGION TOTAL** | | **15,504** | **15,415** | **15,329** | **15,182** | **14,949** | **14,728** |

**Table 3.13 Regional Irrigation Water Supply by Basin**

| **Supply Available (ac-ft/yr)** | | | | | | |
|---|---|---|---|---|---|---|
| **BASIN** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Cypress | 492 | 492 | 492 | 492 | 492 | 492 |
| Neches | 33 | 33 | 33 | 33 | 33 | 33 |
| Red River | 10,041 | 9,957 | 9,873 | 9,729 | 9,497 | 9,276 |
| Sabine | 2,175 | 2,193 | 2,214 | 2,235 | 2,257 | 2,281 |
| Sulphur | 2,763 | 2,740 | 2,717 | 2,693 | 2,670 | 2,646 |
| Trinity | 0 | 0 | 0 | 0 | 0 | 0 |
| **TOTAL** | **15,504** | **15,415** | **15,329** | **15,182** | **14,949** | **14,728** |

### 3.3 (e) Regional Steam Electric Supply

### Table 3.14 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 | 25,431 | 25,431 | 25,431 | 25,431 | 25,431 | 25,431 |
| | **Total** | **25,431** | **25,431** | **25,431** | **25,431** | **25,431** | **25,431** |
| 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 | 8,453 | 8,453 | 8,453 | 8,453 | 8,453 | 8,453 |
| | **Total** | **8,453** | **8,453** | **8,453** | **8,453** | **8,453** | **8,453** |
| Morris | Cypress | 820 | 820 | 820 | 820 | 820 | 820 |
| | Sulphur | - | - | - | - | - | - |
| | **Total** | **820** | **820** | **820** | **820** | **820** | **820** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rains | Sabine | - | - | - | - | - | - |
| | **Total** | **-** | **-** | **-** | **-** | **-** | **-** |
| Red River | Red | - | - | - | - | - | - |
| | Sulphur | 614 | 489 | 572 | 673 | 796 | 946 |
| | **Total** | **614** | **489** | **572** | **673** | **796** | **946** |
| Smith | Sabine | - | - | - | - | - | - |
| | **Total** | **-** | **-** | **-** | **-** | **-** | **-** |
| Titus | Cypress | 60,337 | 60,337 | 60,337 | 60,337 | 60,337 | 60,337 |
| | Sulphur | - | - | - | - | - | - |
| | **Total** | **60,337** | **60,337** | **60,337** | **60,337** | **60,337** | **60,337** |
| Upshur | Cypress | - | - | - | - | - | - |
| | Sabine | - | - | - | - | - | - |
| | **Total** | **-** | **-** | **-** | **-** | **-** | **-** |
| Van Zandt | Neches | - | - | - | - | - | - |
| | Sabine | - | - | - | - | - | - |
| | Trinity | - | - | - | - | - | - |
| | **Total** | **-** | **-** | **-** | **-** | **-** | **-** |
| Wood | Cypress | - | - | - | - | - | - |
| | Sabine | - | - | - | - | - | - |
| | **Total** | **-** | **-** | **-** | **-** | **-** | **-** |
| **REGION TOTAL** | | **106,616** | **106,491** | **106,574** | **106,675** | **106,798** | **106,948** |

**Table 3.15 Regional Steam Electric Water Supply by Basin**

| **Supply Available (ac-ft/yr)** | | | | | | |
|---|---|---|---|---|---|---|
| **BASIN** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Cypress | 69,610 | 69,610 | 69,610 | 69,610 | 69,610 | 69,610 |
| Neches | 0 | 0 | 0 | 0 | 0 | 0 |
| Red River | 8,961 | 8,961 | 8,961 | 8,961 | 8,961 | 8,961 |
| Sabine | 27,431 | 27,431 | 27,431 | 27,431 | 27,431 | 27,431 |
| Sulphur | 614 | 489 | 572 | 673 | 796 | 946 |
| Trinity | 0 | 0 | 0 | 0 | 0 | 0 |
| **TOTAL** | **106,616** | **106,491** | **106,574** | **106,675** | **106,798** | **106,948** |

### 3.3 (f) Regional Mining Supply

**Table 3.16 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 | - | - | - | - | - | - |
| | **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 3.17 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 (g) Regional Livestock Supply

**Table 3.18 Regional Livestock Water Supply by County**

| | | Supply Available (ac-ft/yr) | | | | | |
|---|---|---|---|---|---|---|---|
| **COUNTY** | **Basin** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Bowie | Red | 559 | 559 | 559 | 508 | 435 | 373 |
| | Sulphur | 951 | 951 | 951 | 864 | 741 | 635 |
| | **Total** | **1,510** | **1,510** | **1,510** | **1,372** | **1,176** | **1,008** |
| Camp | Cypress | 930 | 930 | 930 | 930 | 930 | 930 |
| | **Total** | **930** | **930** | **930** | **930** | **930** | **930** |
| Cass | Cypress | 584 | 584 | 584 | 584 | 584 | 584 |
| | Sulphur | 250 | 250 | 250 | 250 | 250 | 250 |
| | **Total** | **834** | **834** | **834** | **834** | **834** | **834** |
| Delta | Sulphur | 344 | 344 | 344 | 344 | 344 | 344 |
| | **Total** | **344** | **344** | **344** | **344** | **344** | **344** |
| Franklin | Cypress | 424 | 424 | 424 | 424 | 424 | 424 |
| | Sabine | 1 | 1 | 1 | 1 | 1 | 1 |
| | Sulphur | 697 | 697 | 697 | 697 | 697 | 697 |
| | **Total** | **1,122** | **1,122** | **1,122** | **1,122** | **1,122** | **1,122** |
| Gregg | Cypress | 31 | 31 | 31 | 31 | 31 | 31 |
| | Sabine | 208 | 208 | 208 | 208 | 208 | 208 |
| | **Total** | **239** | **239** | **239** | **239** | **239** | **239** |
| Harrison | Cypress | 532 | 559 | 588 | 617 | 647 | 679 |
| | Sabine | 386 | 405 | 425 | 447 | 469 | 492 |
| | **Total** | **918** | **964** | **1,013** | **1,064** | **1,116** | **1,171** |
| Hopkins | Cypress | 146 | 146 | 146 | 146 | 146 | 146 |
| | Sabine | 1,457 | 1,457 | 1,457 | 1,457 | 1,457 | 1,457 |
| | Sulphur | 3,254 | 3,254 | 3,254 | 3,254 | 3,254 | 3,254 |
| | **Total** | **4,857** | **4,857** | **4,857** | **4,857** | **4,857** | **4,857** |
| Hunt | Sabine | 812 | 812 | 812 | 812 | 812 | 812 |
| | Sulphur | 300 | 300 | 300 | 300 | 300 | 300 |
| | Trinity | 9 | 9 | 9 | 9 | 9 | 9 |
| | **Total** | **1,121** | **1,121** | **1,121** | **1,121** | **1,121** | **1,121** |
| Lamar | Red | 1,634 | 1,634 | 1,634 | 1,634 | 1,634 | 1,634 |
| | Sulphur | 959 | 959 | 959 | 959 | 959 | 959 |
| | **Total** | **2,593** | **2,593** | **2,593** | **2,593** | **2,593** | **2,593** |
| Marion | Cypress | 1,963 | 1,963 | 1,963 | 1,963 | 1,963 | 1,963 |
| | **Total** | **1,963** | **1,963** | **1,963** | **1,963** | **1,963** | **1,963** |
| Morris | Cypress | 330 | 330 | 330 | 330 | 330 | 330 |
| | Sulphur | 155 | 155 | 155 | 155 | 155 | 155 |
| | **Total** | **485** | **485** | **485** | **485** | **485** | **485** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Rains | Sabine | 675 | 675 | 675 | 675 | 675 | 675 |
| | **Total** | **675** | **675** | **675** | **675** | **675** | **675** |
| Red River | Red | 660 | 660 | 660 | 660 | 660 | 660 |
| | Sulphur | 949 | 949 | 949 | 949 | 949 | 949 |
| | **Total** | **1,609** | **1,609** | **1,609** | **1,609** | **1,609** | **1,609** |
| Smith | Sabine | 458 | 458 | 458 | 458 | 458 | 458 |
| | **Total** | **458** | **458** | **458** | **458** | **458** | **458** |
| Titus | Cypress | 433 | 433 | 433 | 433 | 433 | 433 |
| | Sulphur | 574 | 574 | 574 | 574 | 574 | 574 |
| | **Total** | **1,007** | **1,007** | **1,007** | **1,007** | **1,007** | **1,007** |
| Upshur | Cypress | 1,193 | 1,193 | 1,193 | 1,193 | 1,193 | 1,193 |
| | Sabine | 337 | 337 | 337 | 337 | 337 | 337 |
| | **Total** | **1,530** | **1,530** | **1,530** | **1,530** | **1,530** | **1,530** |
| Van Zandt | Neches | 672 | 672 | 672 | 672 | 672 | 672 |
| | Sabine | 1,124 | 1,124 | 1,124 | 1,124 | 1,124 | 1,124 |
| | Trinity | 637 | 637 | 637 | 637 | 637 | 637 |
| | **Total** | **2,433** | **2,433** | **2,433** | **2,433** | **2,433** | **2,433** |
| Wood | Cypress | 165 | 165 | 165 | 165 | 165 | 165 |
| | Sabine | 1,897 | 1,897 | 1,897 | 1,897 | 1,897 | 1,897 |
| | **Total** | **2,062** | **2,062** | **2,062** | **2,062** | **2,062** | **2,062** |
| **REGION TOTAL** | | **26,690** | **26,736** | **26,785** | **26,698** | **26,554** | **26,441** |

**Table 3.19 Regional Livestock Water Supply by Basin**

| Supply Available (ac-ft/yr) | | | | | | |
|---|---|---|---|---|---|---|
| **BASIN** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Cypress | 6,731 | 6,758 | 6,787 | 6,816 | 6,846 | 6,878 |
| Neches | 672 | 672 | 672 | 672 | 672 | 672 |
| Red River | 2,853 | 2,853 | 2,853 | 2,802 | 2,729 | 2,667 |
| Sabine | 7,355 | 7,374 | 7,394 | 7,416 | 7,438 | 7,461 |
| Sulphur | 8,433 | 8,433 | 8,433 | 8,346 | 8,223 | 8,117 |
| Trinity | 646 | 646 | 646 | 646 | 646 | 646 |
| **TOTAL** | **26,690** | **26,736** | **26,785** | **26,698** | **26,554** | **26,441** |

## 3.4 Wholesale Water Providers

Wholesale Water Providers (WWP) sell water to other entities for distribution. Table 3.20 Wholesale Water Providers represents WWP's with water sources within the boundaries of the North East Texas Regional Water Planning Area.

**Table 3.20 Wholesale Water Providers**

| Wholesale Water Provider | Source Region | Source Basin | Supply Available ac-ft/yr | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
| Cash WSC | D | Sabine | 5,806 | 5,806 | 5,806 | 5,806 | 5,806 | 5,806 |
| Commerce WD | D | Sabine | 8,095 | 8,034 | 7,975 | 7,914 | 7,853 | 7,794 |
| Commerce WD | D | Sulphur | 371 | - | - | - | - | - |
| City of Emory | D | Sabine | 1,900 | 1,886 | 1,872 | 1,858 | 1,844 | 1,831 |
| Franklin County WD | D | Cypress | 10,737 | 10,497 | 10,257 | 10,017 | 9,777 | 9,537 |
| City of Greenville | D | Sabine | 24,002 | 23,849 | 23,697 | 23,543 | 23,391 | 23,238 |
| Lamar County WD | D | Red | 18,797 | 18,796 | 18,797 | 18,797 | 18,797 | 18,797 |
| City of Longview | D | Cypress | 21,031 | 21,031 | 21,031 | 21,031 | 21,031 | 21,031 |
| City of Longview | D | Sabine | 42,698 | 42,698 | 42,698 | 42,698 | 42,698 | 42,698 |
| City of Marshall | D | Cypress | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 | 25,000 |
| City of Mount Pleasant | D | Cypress | 16,593 | 16,593 | 16,593 | 16,593 | 16,593 | 16,594 |
| Northeast Texas MWD | D | Cypress | 163,093 | 163,093 | 163,093 | 163,093 | 163,093 | 163,093 |
| City of Paris | D | Red | 60,749 | 60,199 | 59,900 | 59,599 | 59,299 | 58,999 |
| Sabine River Authority | D | Cypress | 229 | 266 | 297 | 321 | 351 | 384 |
| Sabine River Authority | D | Sabine | 395,772 | 392,968 | 390,154 | 387,316 | 384,468 | 381,617 |
| Sulphur River MWD | D | Sulphur | 33,255 | 32,869 | 32,468 | 32,040 | 31,556 | 30,936 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| City of Sulphur Springs | D | Sulphur | 22,536 | 22,389 | 22,236 | 22,073 | 21,887 | 21,650 |
| City of Texarkana | D | Sulphur | 108,659 | 108,659 | 108,659 | 108,659 | 108,659 | 108,659 |
| Titus County FWD #1 | D | Cypress | 48,500 | 48,500 | 48,500 | 48,500 | 48,500 | 48,500 |
| **Total WWP Availability from Sources in Region D** | | | **1,007,823** | **1,003,133** | **999,033** | **994,858** | **990,603** | **986,164** |

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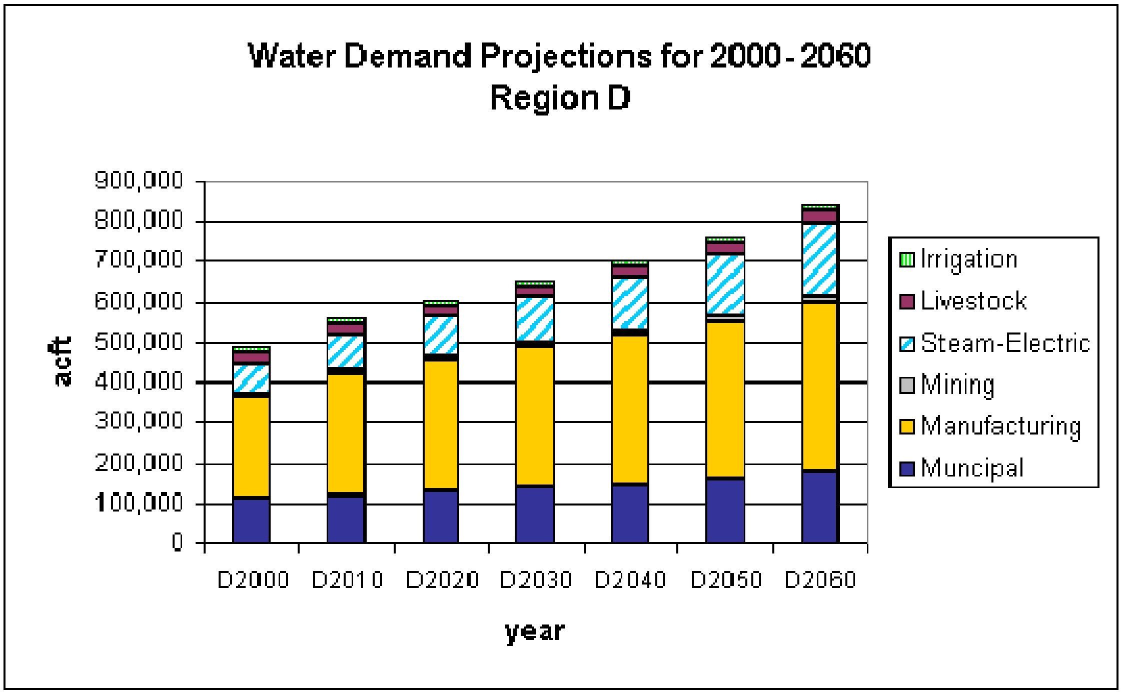
# 4.0 Comparison of Water Demands with Water Supplies to Determine Needs

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 (W.U.G.) 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. W.U.G.'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. W.U.G.'s are listed in the river basin where the demands occur, rather than the basin where the supplies are located. If a W.U.G. 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 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 W.U.G.s with shortages due to contract or permit expirations. In most cases, the recommended water supply strategy for these W.U.G.s 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.

Figure 4.1 illustrates projected demands of the six water user groups within the region.




## 4.1 County Summaries of Water Needs

The following subsections 4.1(a) – 4.1(s) 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, which are anticipated to have a surplus, have been included in Table 4.39 at the end of this chapter.

### 4.1 (a) 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. 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 | 363 | 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 | 145 | 159 | 166 | 178 | 173 | 171 | EI |
| Red River Redevelopment Authority | 1343 | 1890 | 2435 | 2981 | 3527 | 4074 | A |
| Wake Village | 356 | 414 | 472 | 529 | 587 | 645 | EI |
| Burns Redbank WSC | 91 | 100 | 106 | 110 | 106 | 103 | EI |
| Oak Grove WSC | 31 | 36 | 38 | 40 | 38 | 36 | EI |

### 4.1 (b) 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 (c) 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. The City of Linden has an actual shortage caused by inadequate groundwater supply. Manufacturing in Cass County is projected to have a shortage beginning in the year 2010. The following table, Table 4.3, is a summary of identified water supply shortages in Cass County.

**Table 4.3 – Water Supply Shortages in Cass County**

| Cass County | Total Water Shortage in ac-ft/yr | | | | | | Shortage |
|---|---|---|---|---|---|---|---|
| **Year** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** | **Type** |
| Linden | 92 | 98 | 101 | 106 | 104 | 104 | A |
| Manufacturing | 14,731 | 23,093 | 29,686 | 36,013 | 41,237 | 50,471 | A |

### 4.1 (d) 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 into the Trinity Aquifer, and currently provides water to its own customers and also has a supply contract with the Enloe-Lake Creek WSC. Enloe-Lake Creek has entered into a surface water supply contract with Delta County MUD and will stop using water from Ben Franklin WSC by 2006. In 2005 the Delta County 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 4.4, is a summary of identified water supply shortages in Delta County.

**Table 4.4 – 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 (e) 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 SUD. No water supply shortages have been identified in Franklin County in this round of planning.

### 4.1 (f) 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, White Oak and Longview. Longview also gets surface water from Lake Cherokee and Lake O' The Pines (NETMWD). The City of Gladewater is supplied by Lake Gladewater. 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 4.5.

**Table 4.5 – 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 | 133 | 209 | 287 | 378 | 502 | 678 | 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 (g) 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 municipal wastewater from the City of Longview. The following table, Table 4.6, is a summary of identified water supply shortages in Harrison County.

**Table 4.6 – 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 | | 21 | 54 | 79 | 108 | 151 | A |
| Blocker-Crossroads WSC | 78 | 91 | 100 | 107 | 116 | 128 | A |
| Caddo Lake WSC | 10 | 6 | 19 | 27 | 37 | 52 | A |
| Harleton WSC | 91 | 130 | 158 | 179 | 204 | 240 | EI |
| Leigh WSC | | | | | 7 | 36 | A |
| Scottsville | | | | | | 7 | A |
| Steam Electric | | | | 1852 | 6887 | 12914 | EI |
| Talley WSC | 59 | 81 | 97 | 109 | 122 | 142 | A |

### 4.1 (h) 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 ground water 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 4.7, is a summary of identified water supply shortages in Hopkins County.

**Table 4.7 – 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 (i) 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 WSC and Combined Consumers WSC 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 4.8, is a summary of identified water supply shortages in Hunt County.

**Table 4.8 – 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 | 762 | A |
| Cash WSC | | | | | | 4152 | EI |
| Celeste | | | | | 34 | 101 | A |
| Combined Consumers WSC | | | 75 | 621 | 1801 | 3631 | EI |
| Hickory Creek SUD | 70 | 154 | 270 | 474 | 933 | 1667 | A |
| North Hunt WSC | | 70 | 179 | 363 | 780 | 1444 | EI |
| Wolfe City | 66 | 72 | 101 | 115 | 147 | 195 | 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 | EI |
| Shady Grove WSC | | | | | | 280 | EI |
| West Leonard WSC | 2 | 3 | 5 | 9 | 16 | 28 | A |

### 4.1 (j) 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 4.9. The City of Paris is the major supplier of surface water in the county.

**Table 4.9 – 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 (k) 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 (l) 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 (m) Rains County

Sabine River Authority, Lake Tawakoni, is the main wholesale water provider for Rains County. Ground water 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 4.10, is a summary of identified water supply shortages in Rains County.

**Table 4.10 – 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 (n) Red River County

No water shortage was identified in Red River County. The county is supplied from the Blossom Sand, and by surface water from the cities of Paris, Clarksville and Texarkana.

### 4.1 (o) 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 4.11.

**Table 4.11 – 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 (p) <u>Titus County</u>**

Water supply in Titus County is predominately from Lakes Monticello, Bob Sandlin and Tankersley, and from the Carrizo-Wilcox Aquifer. Titus County 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 W.U.G. that was identified with a shortage. A summary of the identified water supply shortages in Titus County is listed below as Table 4.12.

**Table 4.12 – 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 | | | | 2137 | 15401 | 31552 | A |

**4.1 (q) <u>Upshur County</u>**

Municipal shortages in this county are due in part to insufficient water quality and yield in the Carrizo-Wilcox Aquifer. The following table, Table 4.13, is a summary of identified water supply shortages in Upshur County.

**Table 4.13 – Water Supply Shortages in Upshur County**

| **Upshur County** | **Total Water Shortage in ac-ft/yr** | | | | | | **Shortage** |
|---|---|---|---|---|---|---|---|
| **Year** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** | **Type** |
| Pritchett WSC | | | | 7 | 25 | 51 | A |

**4.1 (r) <u>Van Zandt County</u>**

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 4.14, is a summary of identified water supply shortages in Van Zandt County.

**Table 4.14 – 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** |
| Bethel Ash WSC | | | | 2 | 9 | 17 | A |
| Canton | 120 | 175 | 217 | 245 | 292 | 349 | A |
| Grand Saline | 65 | 109 | 143 | 169 | 207 | 255 | A |
| R P M WSC | | 8 | 30 | 46 | 70 | 99 | A |
| Corinth WSC | | | | | 6 | 22 | A |
| Crooked Creek WSC | | 8 | 21 | 30 | 42 | 56 | A |
| Edom WSC | 31 | 53 | 72 | 86 | 104 | 124 | A |
| Fruitvale WSC | | 64 | 119 | 160 | 211 | 269 | A |
| Little Hope-Moore WSC | 13 | 49 | 79 | 102 | 130 | 162 | A |

**4.1 (s) <u>Wood County</u>**

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 4.15, is a summary of identified water supply shortages in Wood County.

**Table 4.15 – 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 |
| Yantis | 8 | 16 | 20 | 19 | 18 | 18 | 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 (a) <u>Red River Basin</u>**

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 4.16 detail the shortages in the basin.

**Table 4.16 – 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 | 91 | 100 | 106 | 110 | 106 | 103 |
| Oak Grove WSC | 16 | 18 | 19 | 20 | 19 | 18 |
| Steam Electric | | | 980 | 2733 | 4870 | 7474 |

### 4.2 (b) 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 4.17 and 4.18 detail the shortages in the basin.

**Table 4.17 – 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 | | 70 | 179 | 363 | 780 | 1444 |
| Oak Grove WSC | 15 | 18 | 19 | 20 | 19 | 18 |

**Table 4.18 – 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 | 66 | 72 | 101 | 115 | 147 | 195 |
| Ben Franklin WSC | | | 33 | 36 | 36 | 36 |
| Hickory Creek SUD | 121 | 182 | 270 | 424 | 771 | 1326 |
| Miller Grove WSC | | | 24 | 30 | 17 | 6 |
| Petty WSC | 1 | 2 | 20 | 21 | 20 | 20 |
| Red River Redevelopment Authority | 1343 | 1890 | 2435 | 2981 | 3527 | 4074 |

**4.2 (c) <u>Cypress River Basin</u>**

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. Table 4.19 and 4.20 detail the shortages in the basin.

**Table 4.19 – Water Shortages due to Expiration and Insufficient Contract Amounts – Cypress River Basin**

| Insufficient Contract | Water Shortages in ac-ft/yr | | | | | |
|---|---|---|---|---|---|---|
| **Year** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
| Harleton WSC | 91 | 130 | 158 | 179 | 204 | 240 |

**Table 4.20 – 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 | | | | 9154 | 22328 | 38387 |
| Woodland Harbor | 61 | 60 | 60 | 60 | 60 | 60 |
| City of Linden | 92 | 98 | 101 | 106 | 104 | 104 |
| City of Scottsville | | | | | | 7 |
| City of Waskom | | 21 | 54 | 79 | 108 | 151 |
| Caddo Lake WSC | 10 | 6 | 19 | 27 | 37 | 52 |
| Leigh WSC | | | | | 7 | 36 |
| Pritchett WSC | | | | 3 | 9 | 18 |
| Talley WSC | 11 | 15 | 17 | 20 | 22 | 26 |

### 4.2 (d) 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. Table 4.21 and 4.22 detail the shortages in the basin.

**Table 4.21 – 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 WSC | | | | | | 4152 |
| Combined Consumers WSC | | | 75 | 621 | 1801 | 3631 |
| 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 4.22 – 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 | | | | | 34 | 101 |
| Hickory Creek SUD | | 6 | 27 | 62 | 141 | 267 |
| City of Canton | 120 | 175 | 217 | 245 | 292 | 349 |
| City of Grand Saline | 65 | 109 | 143 | 169 | 207 | 255 |
| 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 |
| City of Yantis | 8 | 16 | 20 | 19 | 18 | 18 |
| 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 | 133 | 209 | 287 | 378 | 502 | 678 |
| Lindale Rural WSC | | | | | 77 | 189 |
| Pritchett WSC | | | | 4 | 16 | 33 |
| Star Mountain WSC | | | | 1 | 36 | 83 |
| Starrville-Friendship WSC | | | | 19 | 54 | 101 |
| Steam Electric | 873 | 5751 | 11362 | 18203 | 26542 | 36706 |
| 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 (a) Cash WSC

Cash WSC has changed its name to Cash SUD during the current planning period, and TWDB has requested that the system be referred to as Cash WSC in this round of planning. Cash WSC is a public water supply located primarily in Hunt County. The water supply corporation sells water to Combined Consumers WSC, 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. Current water supply is from the Sabine River Authority (SRA) and North Texas Municipal Water District (NTMWD). Cash is projected to have a water supply deficit of 799 ac-ft/yr around 2050 and increasing to 4,306 ac-ft/yr by 2060. Supplies and demands are shown in Table 4.23.

**Table 4.23 – Water Supplies and Demands for Cash WSC**

| **SUPPLIES (ac-ft/yr)** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| Lake Tawakoni | 3564 | 3564 | 3564 | 3564 | 3564 | 3564 |
| Lake Fork | 2240 | 2240 | 2240 | 2240 | 2240 | 2240 |
| Lake Lavon | 1255 | 971 | 831 | 733 | 666 | 608 |
| **TOTAL** | **7,059** | **6,775** | **6,635** | **6,537** | **6,470** | **6,412** |

| **DEMANDS (ac-ft/yr)** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| **Contractual:** | | | | | | |
| Combined Consumers WSC | 84 | 84 | 84 | 84 | 84 | 84 |
| Aqua Source Utility, 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 WSC | 1,939 | 2,400 | 3,030 | 4,037 | 6,244 | 9,693 |
| **TOTAL** | **2,964** | **3,425** | **4,055** | **5,062** | **7,269** | **10,718** |

| **SURPLUS (ac-ft/yr)** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| **TOTAL** | **4,095** | **3,350** | **2,580** | **1,475** | **-799** | **-4,306** |

### 4.3 (b) 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 North East Texas Municipal Water District. Assuming contract amounts stay constant over the planning period, Cherokee Water Company will have adequate supply, which is shown below in Table 4.24.

**Table 4.24 – 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 (c) 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 371 ac-ft/yr. 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, Gafford Chapel WSC and Texas A&M University. In addition, Commerce serves its own municipal needs. Commerce is projected to have a water surplus of 6,628 ac-ft in 2010 and 3,196 ac-ft in 2060. Available supplies and demands are shown in Table 4.25.

**Table 4.25 – Water Supplies and Demands for City of Commerce**

| **SUPPLIES (ac-ft/yr)** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| Lake Tawakoni | 8,094 | 8,033 | 7,973 | 7,913 | 7,852 | 7,792 |
| Nacatoch Aquifer | 371 | 371 | 371 | 371 | 371 | 371 |
| **TOTAL** | **8,465** | **8,404** | **8,344** | **8,284** | **8,223** | **8,163** |

| **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:** | | | | | | |
| Texas A&M University | 35 | 109 | 207 | 357 | 738 | 1,335 |
| 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** | **6,629** | **6,409** | **6,110** | **5,682** | **4,705** | **3,197** |

### 4.3 (d) <u>City of Emory</u>

This provider supplies Cedar Cove Landing, Community Water Company, 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 4.26.

**Table 4.26 – 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:** | | | | | | |
| Cedar Cove Landing | 17 | 17 | 17 | 17 | 17 | 17 |
| Community Water Company | 221 | 221 | 221 | 221 | 221 | 221 |
| South Rains WSC | 265 | 265 | 265 | 265 | 265 | 265 |
| City of East Tawakoni | 552 | 552 | 552 | 552 | 552 | 552 |
| City of Point | 0 | 0 | 0 | 0 | 0 | 0 |
| **Non-Contractual:** | | | | | | |
| Emory Municipal | 197 | 218 | 240 | 260 | 284 | 309 |
| **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 (e) 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 WSC, the City of Mount Vernon the City of Winnsboro and M&W Recreation. 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 4.27, 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.

**Table 4.27 – 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 WSC | 3,500 | 3,500 | 3,500 | 3,500 | 3,500 | 3,500 |
| 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** | **11,332** | **11,332** | **11,332** | **11,332** | **11,332** | **11,332** |

| SURPLUS (ac-ft/yr) | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| **TOTAL** | **-595** | **-835** | **-1,075** | **-1,315** | **-1,555** | **-1,795** |

### 4.3 (f) <u>Lamar County Water Supply District</u>

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, 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 4.28, LCWSD has a water supply surplus.

**Table 4.28 – 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 |
| 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** | **3,629** | **3,818** | **4,025** | **4,232** | **4,239** | **4,245** |

| **SURPLUS (ac-ft/yr)** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| **TOTAL** | **15,166** | **14,977** | **14,770** | **14,563** | **14,556** | **14,550** |

### 4.3 (g) <u>North East Texas Municipal Water District</u>

North East Texas Municipal Water District obtains water from numerous sources, listed below. This provider supplies the cities of Avinger, Daingerfield, Hughes Springs, Jefferson, Lone Star, Longview, Marshall, Ore City, Pittsburg, and Diana, Glenwood WSC, Harleton WSC, Tryon Road SUD, and Mims WSC. The North East Texas Municipal Water District is projected to maintain a supply surplus throughout the planning period, which is shown in Table 4.29.

**Table 4.29 – Water Supplies and Demands for Northeast Texas Municipal Water District**

| SUPPLIES (ac-ft/yr) | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Lake O' The Pines | 175,892 | 174,902 | 173,912 | 172,922 | 171,932 | 170,942 |
| Lake Bob Sandlin | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 | 12,000 |
| Johnson Creek Lake | 6,668 | 6,668 | 6,668 | 6,668 | 6,668 | 6,668 |
| Lake Monticello | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 | 10,000 |
| Swauno Creek | 4,500 | 4,500 | 4,500 | 4,500 | 4,500 | 4,500 |
| **TOTAL** | **209,060** | **208,070** | **207,080** | **206,090** | **205,100** | **204,110** |

| 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 | 739 | 739 | 739 | 739 | 739 | 739 |
| Glenwood WSC | 419 | 419 | 419 | 419 | 419 | 419 |
| NETMWD South Side | 775 | 775 | 775 | 775 | 775 | 775 |
| Manufacturing | 32,400 | 32,400 | 32,400 | 32,400 | 32,400 | 32,400 |
| Steam Electric | 58,900 | 58,900 | 58,900 | 58,900 | 58,900 | 58,900 |
| **TOTAL** | **161,086** | **161,086** | **161,086** | **161,086** | **161,086** | **161,086** |

| SURPLUS (ac-ft/yr) | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| **TOTAL** | **47,974** | **46,984** | **45,994** | **45,004** | **44,014** | **43,024** |

### 4.3 (h) 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 WSC, Combined Consumers WSC, Community Water Company, MacBee WSC 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 4.30.

**Table 4.30 – 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:** | | | | | | |
| 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 | 6,157 | 6,114 | 6,070 | 6,027 | 5,984 | 5,941 |
| 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 WSC | 5,804 | 5,804 | 5,804 | 5,804 | 5,804 | *5,804 |
| Combined Consumers WSC | 1,584 | 1,572 | *1,561 | 1,549 | 1,538 | 1,526 |
| Mac Bee WSC | 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 | 316,499 | 314,144 | 313,350 | 309,434 | 308,200 | 310,527 |
| 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.*
**TXU has released this water back to SRA, and is currently being redistributed to various SRA customers.

### 4.3 (i) <u>Sulphur River Municipal Water District</u>

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, which is a reduction of approximately 13% from the round one regional water planning estimates. The demands from the SRMWD were proportioned to reflect the reduction in reservoir yield. The amounts of water allocated to each city are given in Table 4.30A.

**Table 4.30A – 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 (j) Titus County Fresh Water Supply District 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 4.31.

**Table 4.31 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 |
| Texas Utilities | 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 (k) 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 4.32, 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 4.32 – 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 (l) 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. 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 4.33.

**Table 4.33 – 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 (m) City of Longview

The City of Longview purchases supply from NETMWD, Cherokee Water Co., and SRA. Shortages in this system are contractual. Table 4.34 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 4.34 – 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 |
| Tryon Road SUD | 1,031 | 1,031 | 1,031 | 1,031 | 1,031 | 1,031 |
| Gum Springs WSC | 1,105 | 1,105 | 1,105 | 1,105 | 1,105 | 1,105 |
| **Non-Contractual:** | | | | | | |
| Longview Municipal | 10,671 | 10,812 | 11,029 | 11,397 | 12,149 | 13,225 |
| C&C Mobile Home Park | 18 | 18 | 18 | 18 | 18 | 18 |
| Manufacturing | 5,300 | 6,360 | 7,420 | 8,480 | 9,540 | 10,600 |
| Steam Electric | 6,161 | 6,161 | 6,161 | 6,161 | 6,161 | 6,161 |
| **TOTAL** | **20,719** | **21,920** | **23,197** | **24,625** | **26,437** | **28,573** |

| SURPLUS (ac-ft/yr) | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| **TOTAL** | **55,738** | **54,537** | **53,260** | **51,832** | **50,020** | **47,884** |

### 4.3 (n) 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 4.35.

**Table 4.35 – 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 Water Supply Corp. | 1,468 | 1,611 | 1,766 | 1,868 | 1,961 | 2,046 |
| Winfield | 153 | 153 | 153 | 153 | 153 | 153 |
| Lake Bob Sandlin Park | 1 | 1 | 1 | 1 | 1 | 1 |
| 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 (o) City of Paris

The City of Paris, Lamar County, has water rights in Lake Crook of 1,000 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 4.36, it is expected that 72 percent of the City's supply will be in use by 2060.

**Table 4.36 – Water Supplies and Demands for the City of Paris**

| **SUPPLIES (ac-ft/yr)** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| Pat Mayse Lake | 59,750 | 59,200 | 58,900 | 58,600 | 58,300 | 58,000 |
| Lake Crook | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 | 1,000 |
| **TOTAL** | **60,750** | **60,200** | **59,900** | **59,600** | **59,300** | **59,000** |

| **DEMANDS (ac-ft/yr)** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| **Contractual:** | | | | | | |
| Lamar County WSD | 18,795 | 18,795 | 18,795 | 18,795 | 18,795 | 18,795 |
| M J C WSC | 81 | 85 | 90 | 95 | 93 | 91 |
| Steam Electric | 8,961 | 8,961 | 8,961 | 8,961 | 8,961 | 8,961 |
| **Non-Contractual:** | | | | | | |
| Manufacturing | 5,580 | 5,949 | 6,240 | 6,521 | 6,763 | 7,225 |
| Paris Municipal | 6,252 | 6,628 | 6,960 | 7,277 | 7,239 | 7,239 |
| **TOTAL** | **39,669** | **40,418** | **41,046** | **41,649** | **41,851** | **42,311** |

| **SURPLUS (ac-ft/yr)** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| **TOTAL** | **21,081** | **19,782** | **18,854** | **17,951** | **17,446** | **16,689** |

### 4.3 (p) <u>City of Sulphur Springs</u>

Sulphur Springs, located in Hopkins County, has two sources of water supply. Lake Sulphur Springs has a safe 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 4.37.

**Table 4.37 – 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 (q) 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 4.38 only consider Texarkana, Texas.

Texarkana, Texas supply comes from Lake Wright Patman through a contract with the U.S. Corps of Engineers for 108,661 ac-ft/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 Red Lick, 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, 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. Water shortages projected for the Texarkana system are contractual as noted on Table 4.38.

**Table 4.38 – Water Supplies and Demands for the City of Texarkana**

| **SUPPLIES (ac-ft/yr)** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| Lake Wright Patman | 108,661 | 108,661 | 108,661 | 108,661 | 108,661 | 108,661 |
| **TOTAL** | 108,661 | 108,661 | 108,661 | 108,661 | 108,661 | 108,661 |

| **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 |
| Dominos | 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 | *92,703 | 92,106 | 91,669 | 91,224 | 91,087 | 90,828 |
| 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** | **108,661** | **108,661** | **108,661** | **108,661** | **108,661** | **108,661** |
| | | | | | | |
| **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.*

## 4.4 Water Surpluses in the North East Texas Region

Table 4.39 lists the entities within the North East Texas Region, which have a supply surplus during the planning period. TWDB designated W.U.G.'s and County Other W.U.G.'s surpluses are listed in the table.

**Table 4.39 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 |
| 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 | 1,510 | 1,476 | 1,442 | 1,420 | 1,394 | 1,360 |
| 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 | 4085 | 4074 | 4066 | 4056 | 4058 | 4058 |
| Queen City | 402 | 397 | 397 | 394 | 396 | 396 |
| *COUNTY OTHER:* | | | | | | |
| Atlanta State Rec. Area | 87 | 87 | 87 | 87 | 87 | 87 |
| 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 | 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** | **6,995** | **6,934** | **6,884** | **6,832** | **6,843** | **6,843** |

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 | 106 | 98 | 89 | 77 | 77 | 77 |
| | | | | | | |
| Irrigation | - | - | - | - | - | - |
| Livestock | - | - | - | - | - | - |
| **Total** | **1,548** | **1,476** | **1,352** | **1,273** | **1,241** | **1,193** |

**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 WSC | 2,030 | 1914 | 1838 | 1765 | 1765 | 1765 |
| *COUNTY OTHER:* | | | | | | |
| Dear Cove POA WS | 3 | 3 | 3 | 3 | 3 | 3 |
| Pelican Bay | - | - | - | - | - | - |
| 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 | - | - | - | - | - | - |
| 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 | - | - | - | - | - | - |

| **Gregg County cont.** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| 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** | **36,247** | **35,571** | **34,318** | **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 | 331 | 254 | 184 | 131 | 70 | - |
| Hallsville | 450 | 378 | 326 | 287 | 241 | 174 |
| 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 | 10 | 10 | 10 | 10 | 10 | 10 |
| Caddo Lake WSC | 10 | - | - | - | - | - |
| Cypress Valley WSC | 67 | 53 | 42 | 34 | 25 | 11 |
| Elysian Fields WSC | 37 | 29 | 22 | 18 | 12 | 4 |
| Harleton WSC | 91 | 80 | 38 | 21 | 1 | - |
| Holiday Springs MHP | 4 | 4 | 4 | 4 | 4 | 4 |
| Karnack WSC | 48 | 39 | 33 | 28 | 22 | 14 |
| Leigh WSC | 84 | 52 | 30 | 13 | - | - |
| 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 |

| Harrison County cont. | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Self-Supplied | - | - | - | - | - | - |
| Talley WSC | - | - | - | - | - | - |
| Waskom Rural WSC #1 | 49 | 39 | 32 | 26 | 20 | 11 |
| Waskom | 6 | - | - | - | - | - |
| 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** | **100,988** | **89,009** | **76,328** | **64,804** | **56,631** | **36,647** |

**Total Water Supply Surplus in ac-ft/yr**

| Hopkins County | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Cash WSC | - | - | - | - | - | - |
| 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 WSC | 378 | 365 | 358 | 355 | 368 | 379 |
| Martin Springs WSC | 236 | 193 | 172 | 160 | 203 | 242 |
| North Hopkins WSC | - | - | - | - | - | - |
| 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 | - | - | - | - | - |
| 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 | 79 | 60 | 52 | 46 | 65 | 82 |
| | | | | | | |
| Irrigation | - | - | - | - | - | - |
| Livestock | - | - | - | - | - | - |
| Manufacturing | - | - | - | - | - | - |
| Mining | - | - | - | - | - | - |
| **Total** | **16,350** | **15,544** | **14,822** | **14,090** | **13,773** | **13,145** |

**Total Water Supply Surplus in ac-ft/yr**

| **Hunt County** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| Campbell | 11 | 5 | - | - | - | - |
| Celeste | 50 | 41 | 29 | 9 | 0 | 0 |
| 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 WSC | 4,145 | 3,434 | 2,694 | 1,572 | - | - |
| Combined Consumers WSC | 517 | 275 | - | - | - | - |
| Community WC | 110 | 95 | 97 | 99 | 100 | 100 |
| Mac Bee WSC | 57 | 44 | 27 | - | - | - |
| North Hunt WSC | 5 | - | - | - | - | - |
| Josephine | - | - | - | - | - | - |
| *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 | 22 | 15 | 7 | - | - | - |
| Self Supplied | - | - | - | - | - | - |
| Shady Grove WSC | 403 | 367 | 314 | 226 | 29 | 0 |
| West Oaks Phoenix Corp. Water System | 4 | 4 | 4 | 4 | 4 | 4 |
| 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** | **30,649** | **28,897** | **26,962** | **24,529** | **20,548** | **17,442** |

**Total Water Supply Surplus in ac-ft/yr**

| Lamar County | 2010 | 2020 | 2030 | 2040 | 2050 | 2060 |
|---|---|---|---|---|---|---|
| Blossom | - | - | - | - | - | - |
| Deport | - | - | - | - | - | - |
| Paris | 24,102 | 20,240 | 17,874 | 15,218 | 12,579 | 9,216 |
| Lamar County WSD | 15,166 | 14,977 | 14,770 | 14,563 | 14,556 | 14,549 |
| Reno | - | - | - | - | - | - |
| Roxton | - | - | - | - | - | - |
| *COUNTY OTHER:* | | | | | | |
| 410 WSC | - | - | - | - | - | - |
| MJC WSC | - | - | - | - | - | - |
| Pattonville WSC | 135 | 133 | 130 | 127 | 128 | 129 |
| Self Supplied | - | - | - | - | - | - |
| | | | | | | |
| Irrigation | - | - | - | - | - | - |
| Livestock | - | - | - | - | - | - |
| Manufacturing | - | - | - | - | - | - |
| Mining | - | - | - | - | - | - |
| **Total** | **39,403** | **35,350** | **32,774** | **29,908** | **27,263** | **23,894** |

**Total Water Supply Surplus in ac-ft/yr**

| **Marion County** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| Diana WSC | 5 | 5 | 5 | 5 | 5 | 5 |
| Jefferson | 10668 | 10671 | 10678 | 10685 | 10690 | 10690 |
| Steam Electric | 11013 | 11484 | 11171 | 10789 | 10324 | 9756 |
| *COUNTY OTHER:* | | | | | | |
| C & C Waterworks | 2 | 2 | 2 | 2 | 2 | 2 |
| Crestwood | 74 | 74 | 74 | 74 | 74 | 74 |
| Diana WSC | 26 | 26 | 26 | 26 | 26 | 26 |
| East Marion WSC | 102 | 100 | 100 | 100 | 100 | 100 |
| Harleton WSC | - | - | - | - | - | - |
| 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** | **28,981** | **29,922** | **29,303** | **28,546** | **27,621** | **26,485** |

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 | 9915 | 9924 | 9932 | 9940 | 9946 | 9946 |
| Hughes Springs | 26 | 26 | 26 | 26 | 26 | 26 |
| Lone Star | 4574 | 4580 | 4585 | 4591 | 4595 | 4595 |
| Naples | 22 | 27 | 29 | 29 | 29 | 29 |
| Omaha | 63 | 67 | 70 | 74 | 76 | 76 |
| Tri WSC | 4 | 5 | 5 | 5 | 5 | 5 |
| Manufacturing | 39096 | 25975 | 14379 | 3369 | | |
| Steam Electric | 767 | 777 | 770 | 761 | 751 | 738 |
| *COUNTY OTHER:* | | | | | | |
| Daingerfield | 235 | 235 | 235 | 236 | 236 | 236 |
| Holly Springs WSC | 35 | 33 | 31 | 29 | 30 | 30 |
| Hughes Springs | 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** | **95,573** | **69,375** | **46,186** | **24,168** | **17,423** | **17,397** |

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 | 137 | 67 | 22 | 10 | 13 | 22 |
| Cash WSC | - | - | - | - | - | - |
| *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 | 42 | 25 | 15 | 13 | 15 | 17 |
| | | | | | | |
| Livestock | - | - | - | - | - | - |
| Manufacturing | - | - | - | - | - | - |
| **Total** | **1,356** | **1,190** | **1,056** | **967** | **892** | **822** |

**Total Water Supply Surplus in ac-ft**

| **Red River County** | **2010** | **2020** | **2030** | **2040** | **2050** | **2060** |
|---|---|---|---|---|---|---|
| Bogata | 166 | 171 | 176 | 179 | 179 | 179 |
| Clarksville | 9 | 22 | 35 | 48 | 57 | 57 |
| Deport | - | - | - | - | - | - |
| Detroit | - | - | - | - | - | - |
| Red River County WSC | 124 | 123 | 123 | 123 | 123 | 123 |
| *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** | **333** | **352** | **372** | **390** | **399** | **399** |

**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 | 2 | 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** | **2,829** | **2,419** | **2,170** | **1,920** | **1,646** | **1,350** |

**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 WSC | 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 WSC | 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 | 119 | 56 | 16 | - | - | - |
| 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** | **9,477** | **9,188** | **9,002** | **8,902** | **8,825** | **8,702** |

**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 | 295 | 241 | 192 | 158 | 110 | 55 |
| 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 | 19 | 11 | 4 | 0 | 0 | 0 |
| Combined Consumers WSC | - | - | - | - | - | - |
| Mac Bee WSC | 1,076 | 896 | 742 | 620 | 406 | 142 |
| RPM WSC | 21 | 0 | 0 | 0 | 0 | 0 |
| South Tawakoni WSC | 568 | 481 | 407 | 349 | 277 | 199 |
| *COUNTY OTHER:* | | | | | | |
| Canton North Estates | 26 | 26 | 26 | 26 | 26 | 26 |
| 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 | 157 | 146 | 136 | 129 | 119 | 109 |
| 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 | 71 | 71 | 71 | 71 | 71 | 71 |
| | | | | | | |
| Irrigation | - | - | - | - | - | - |
| Livestock | - | - | - | - | - | - |
| Manufacturing | - | - | - | - | - | - |
| Mining | - | - | - | - | - | - |
| **Total** | **4,899** | **4,404** | **4,000** | **3,689** | **3,238** | **2,720** |

**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 | - | - | - | - | - | - |
| 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 | 1096 | 1058 | 1039 | 1041 | 1043 | 1043 |
| Quitman | 649 | 598 | 575 | 578 | 581 | 581 |
| Ramey WSC | 296 | 256 | 234 | 232 | 232 | 232 |
| *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 | 66 | 37 | 22 | 25 | 28 | 28 |
| Hawkins | 80 | 79 | 78 | 79 | 79 | 79 |
| 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 | - | - | - | - | - | - |
| | | | | | | |
| Irrigation | - | - | - | - | - | - |
| Livestock | - | - | - | - | - | - |
| Manufacturing | - | - | - | - | - | - |
| Mining | - | - | - | - | - | - |
| | | | | | | |
| **Total** | **3,827** | **3,318** | **3,059** | **3,094** | **3,128** | **3,128** |

## 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 Natural Resource Conservation Commission;
- 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 Ground Water Strategies to identify a specific supply source aquifer and location by county and river basin. Many W.U.G.'s 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 ground water supply" includes all available ground water aquifers in all applicable river basins in all applicable counties for a given W.U.G..

In this round of planning, the TWDB rules require that previous cost estimates be updated to second quarter 2002 price levels and trending of unit costs be performed using the Engineering News Record (ENR) Construction Cost Index. Water management strategy costs were updated from the 1997 ENR index of 5860 to the second quarter 2002 ENR index of 6532. This update resulted in 11.5% change in unit costs over the five- year period from 1997 to 2002. A description of the cost estimating procedure is included in Appendix A.

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, and Prairie Creek Reservoir, 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 (a) <u>Current and Projected Water Demands</u>

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 4.40 below summarizes current and projected regional water demands for each of the six major water use categories.

**Table 4.40 - 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 (b) <u>Currently Available Water Supply</u>

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 1.43 million ac-ft/yr. This represents more than 75 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 303,000 ac-ft./yr. of water supply, or 25 percent of the total water supply is estimated to be available from groundwater sources at present.

### 4.7 (c) <u>Water Supply Needs</u>

A user-by-user comparison of supply and demand reveals that 64 entities within the designated water user groups (W.U.G.s) 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 110,710 acre-ft/yr by the year 2060.

In Titus County, Steam Electric shows a shortage during the 50 year planning period. In Hunt County, Steam Electric is projected to have a deficit. 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 (d) 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, 2004. In general, the process allowed for an initial broad list of strategies, with 30 days allowed for comment. At a subsequent September meeting there was a presentation by the consultants on the various strategies, and the broad list was narrowed to strategies feasible for Region D. 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 6.2. 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 more of those listed in the TWDB rules.

### 4.7 (e) 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 (f) <u>Water Reuse</u>**

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 (g) <u>Groundwater</u>**

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 (h) <u>Surface Water</u>**

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 64 entities are projected to have a water shortage in either 2030 or 2060. Of these entities, 18 are contractual related shortages. The remaining 46 entities were actual projected shortages that require consideration of alternative water management strategies.

### 4.8 (a) Recommended Strategies for Entities with Contractual Shortages

Within the North East Texas Region, there are 18 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 4.41.

**Table 4.41 – 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 | 106 | 103 | | | 106 | 103 |
| Oak Grove WSC | 38 | 36 | | | 38 | 36 |
| Redwater | 166 | 171 | | | 166 | 171 |
| **Camp County** | | | | | | |
| **Cass County** | | | | | | |
| **Delta County** | | | | | | |
| **Franklin County** | | | | | | |
| **Gregg County** | | | | | | |
| Liberty-Danville FWSC 2 | 0 | 40 | | | 0 | 40 |
| **Harrison County** | | | | | | |
| Harleton WSC | 158 | 240 | | | 158 | 240 |
| **Hopkins County** | | | | | | |
| **Hunt County** | | | | | | |
| North Hunt WSC | 179 | 1444 | | | 179 | 1444 |
| Jacobia WSC | 0 | 328 | | | 0 | 328 |
| Maloy WSC | 57 | 263 | | | 57 | 263 |
| Poetry WSC | 0 | 46 | | | 0 | 46 |
| Shady Grove WSC | 0 | 280 | | | 0 | 280 |
| **Lamar County** | | | | | | |
| Panda Steam Electric | 980 | 7474 | | | 980 | 7474 |
| **Marion County** | | | | | | |
| **Morris County** | | | | | | |
| **Rains County** | | | | | | |
| South Rains WSC | 284 | 277 | | | 284 | 277 |
| **Red River County** | | | | | | |
| **Smith County** | | | | | | |
| Winona | 0 | 5 | | | 0 | 5 |
| **Titus County** | | | | | | |
| **Upshur County** | | | | | | |
| **Van Zandt County** | | | | | | |
| **Wood County** | | | | | | |

### 4.8 (b) Recommended Strategies for Entities with Actual Shortages

There are 46 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 the other 14 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 91 percent of the total supply required. Table 4.42 summarizes these entities.

**Table 4.42 – 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 | 2435 | 4074 | | | 2435 | 4074 |
| **Camp County** | | | | | | |
| BI-County WSC | 299 | 653 | | | 299 | 653 |
| Woodland Harbor | 60 | 60 | 65 | 65 | | |
| **Cass County** | | | | | | |
| Linden | 101 | 104 | 215 | 215 | | |
| **Delta County** | | | | | | |
| Ben Franklin WSC | 33 | 36 | | | 33 | 36 |
| **Franklin County** | | | | | | |
| **Gregg County** | | | | | | |
| Clarksville City | 148 | 217 | 162 | 242 | | |
| Liberty City WSC | 287 | 678 | 376 | 752 | | |
| West Gregg SUD | 56 | 333 | 70 | 350 | | |
| Starrville-Friendship WSC | 0 | 101 | 0 | 108 | | |
| **Harrison County** | | | | | | |
| Waskom | 54 | 151 | 88 | 176 | | |
| Blocker-Crossroads WSC | 100 | 128 | 129 | 129 | | |
| Caddo Lake WSC | 19 | 52 | 43 | 86 | | |
| Leigh WSC | 0 | 36 | 0 | 43 | | |
| Scottsville | 0 | 7 | 0 | 65 | | |
| Talley WSC | 97 | 142 | 118 | 177 | | |
| Steam Electric | 0 | 3184 | | | 0 | 3184 |
| **Hopkins County** | | | | | | |
| Miller Grove WSC | 24 | 6 | 35 | 35 | | |
| **Hunt County** | | | | | | |
| Able Springs WSC | 0 | 171 | | | 0 | 171 |
| Campbell WSC | 101 | 762 | 108 | 108 | 0 | 665 |

| | | | | | | |
|---|---|---|---|---|---|---|
| Cash WSC | 0 | 4152 | | | 0 | 4152 |
| Celeste | 0 | 101 | | | 0 | 108 |
| Combined Consumers WSC | 75 | 3631 | | | 75 | 3631 |
| Hickory Creek SUD | 270 | 1667 | 270 | 1882 | | |
| Wolfe City | 101 | 195 | | | 101 | 195 |
| Steam Electric | 14457 | 23902 | | | 14457 | 23902 |
| Little Creek Acres | 37 | 153 | | | 37 | 153 |
| West Leonard WSC | 5 | 28 | 81 | 81 | | |
| **Lamar County** | | | | | | |
| Petty WSC | 20 | 20 | | | 20 | 20 |
| Steam Electric | 980 | 7474 | | | 980 | 7474 |
| **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 | 0 | 83 | 0 | 108 | | |
| **Titus County** | | | | | | |
| Steam Electric | 0 | 31552 | | | 0 | 31552 |
| **Upshur County** | | | | | | |
| Pritchett WSC | 0 | 51 | 0 | 54 | | |
| **Van Zandt County** | | | | | | |
| Bethel Ash WSC | 0 | 17 | 0 | 81 | | |
| Canton | 217 | 349 | 291 | 387 | | |
| Grand Saline | 143 | 255 | 323 | 323 | | |
| R P M WSC | 30 | 99 | 37 | 102 | | |
| Corinth WSC | 0 | 22 | 0 | 27 | | |
| Crooked Creek WSC | 21 | 56 | 59 | 59 | | |
| Edom WSC | 72 | 124 | 96 | 124 | | |
| Fruitvale WSC | 119 | 269 | 129 | 301 | | |
| Little Hope-Moore WSC | 79 | 162 | 113 | 188 | | |
| **Wood County** | | | | | | |
| Mineola | 374 | 360 | 403 | 403 | | |
| Yantis | 20 | 18 | 38 | 38 | | |
| **TOTALS (all counties)** | **20,834** | **86,623** | **3,249** | **7,838** | **18,437** | **79,970** |

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 siting 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 A.

### 4.8 (c) Bowie County

- **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 alternative 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 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the 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 Central Bowie WSC's needs.

- **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 alternative strategies considered to meet City of Hooks's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater 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's needs.

- **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 alternative 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 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the 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.

- **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 alternative 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 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the city is planning on continuing to purchase surface water from the City of Texarkana.

**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.

- **Red River Redevelopment Authority**

**Description / Discussion of Needs**

The Red River Redevelopment Authority (RRRA) is an instrumentality of and political subdivision 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's plan is to acquire a surface water right permit, from TCEQ, to utilize surface water from Caney Creek Lake and Elliott Creek Lake in Bowie County. Consequently, only surface water was considered as a viable alternative to meet projected demands.

**Recommendations**

The recommended strategy for the Red River Redevelopment Authority to meet projected demands during the planning period is to obtain a water rights permit and utilize surface water from Caney Creek Lake and Elliott Creek Lake in Bowie County.

- **City of Redwater**

**Description / Discussion of Needs**

City of Red Water 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 alternative strategies considered to meet the City of Red Water's supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater 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 Red Water's needs.

- **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 alternative 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 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the city is planning on continuing to purchase surface water from the City of Texarkana.

**Recommendations**

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

- **Burns-Redbank WSC**

**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 129 ac-ft/yr. The WSC is projected to have a deficit of 91 ac-ft in 2010 and increasing to a deficit of 103 ac-ft by 2060.

**Evaluated Strategies**

Four alternative strategies were considered to meet the WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. 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.

- **Oak Grove WSC**

**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 74 ac-ft/yr. The WSC is projected to have a deficit of 31 ac-ft in 2010 and increasing to a deficit of 36 ac-ft by 2060.

**Evaluated Strategies**

There were four alternative strategies considered to meet the WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. 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 (d) <u>Camp County</u>**

- **Bi-County WSC**

**Description / Discussion of Needs**

Bi-County WSC provides water service in Camp, Morris, Titus and Upshur Counties. The W.U.G. 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 alternative 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 gpcd 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

**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 before the end of 2005, and the source of the surface water will be Lake Bob Sandlin in the Cypress Creek basin.

- **Woodland Harbor**

**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 alternative strategies considered to meet Woodland Harbor's water supply shortages are listed in the table below. 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 (e)** **<u>Cass County</u>**

- **City of Linden**

**Description / Discussion of Needs**

The City of Linden is located in central Cass County. In 2003, the City served 954 connections. The City is expected to grow from a current population of 2,297 persons in 2010 to 2,575 persons by the year 2060. The City relies on ground water from four wells. The four water wells produce a cumulative total of approximately 475 GPM, or 255 ac-ft/yr. The City does not have a water conservation plan or a drought management plan. The system is bounded on all sides by Western Cass WSC. The City of Linden is projected to have a water supply deficit of 92 ac-ft/yr in 2010 increasing to a deficit of 104 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. Although the City of Linden has a centralized wastewater collection system, water reuse was not considered because Linden does not have a non-potable water user large enough to warrant the creation of a water reuse system. Groundwater was considered, as the City of Linden has recently completed a test well which yielded 400 gpm. Surface water was considered, as the North East Texas Municipal Water District (NETMWD) has entered into an agreement with the City to provide treated water.

**Recommendations**

The recommended strategy for the City of Linden to meet their projected deficit of 92 ac-ft/yr in 2010 and 104 ac-ft/yr in 2060 would be to complete construction of one additional water well. The recommended supply source will be the Carrizo-Wilcox Aquifer in Cass County. One well with rated capacity of 400 gpm would provide approximately 215 ac-ft/yr. The Carrizo-Wilcox Aquifer in Cass County is projected to have a more than ample supply availability to meet the needs of the City of Linden for the planning period. The City of Linden will continue to maintain an agreement with the NETMWD to purchase treated water in the future should ground water become unreliable or more expensive.

**4.8 (f) <u>Delta County</u>**

- **Ben Franklin WSC**

**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 provides water to its own customers and also has a supply contract with the Enloe-Lake Creek WSC. Enloe-Lake Creek is planning on entering into surface water supply contract with Delta County MUD and will stop using water from Ben Franklin WSC by 2006. 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 alternative 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 before 2010. Since Delta County MUD already has water available, and since there would be no significant construction, environmental impact would be negligible.

**4.8 (g) <u>Franklin County</u>**

There are no entities with actual shortages in Franklin County.

## 4.8 (h) Gregg County

- **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 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.

- **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 W.U.G. for Gregg County and County Other W.U.G. for Smith County. The system relies on six wells with a total rated capacity of 925 GPM, or 492 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 133 ac-ft/yr in 2010 increasing to a deficit of 678 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**

Liberty City WSC is currently completing plans to construct an additional water well (April, 2003). The recommended strategy for LCWSC to meet their projected deficits would be to complete construction of this water well, and construct seven 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 eight additional wells with a rated capacity of 175 GPM each would provide approximately 752 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.

- **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 W.U.G.s 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.

- **Liberty-Danville FWSD 2**

**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 W.U.G. 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. LCWSC 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.

- **Starrville-Friendship WSC**

**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 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 (i) <u>Harrison County</u>

- **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 W.U.G. 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 735 GPM, or 395 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 21 ac-ft/yr in 2020 increasing to a deficit of 151 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 21 ac-ft/yr in 2020 and 151 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. Four wells with rated capacity of 82 gpm each would provide approximately 44 acre-feet each or 176 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.

- **Blocker-Crossroads WSC**

**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.

- **Caddo Lake WSC**

**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.

- **Harleton WSC**

**Description / Discussion of Needs**

Harleton WSC is located in northwestern Harrison County and southwestern Marion County and serves an area around the communities of Harleton, Smyrna, Lake Deerwood, and Jackson. The system completed an expansion in 2005 giving the system 1,130 members with 87% in Harrison County and 13% in Marion County. The population is projected to increase from 2,749 persons in 2010 to 3,902 persons in 2060. The HWSC is included in the County Other W.U.G. for Harrison and Marion Counties. The system's current water supply consists of five water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 557 gpm, or 299 ac-ft/yr. The system is bounded on the west by Diana WSC, on the north by Lake O' the Pines, on the south by Little Cypress Creek, and Karnack WSC and Caddo Lake WSC to the east. HWSC does not have a water conservation plan or a drought management plan. Harleton WSC is projected to have a water supply deficit of 91 ac-ft/yr in 2010 increasing to a deficit of 240 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 HWSC does not have a centralized sewerage collection system. One surface water alternative was completed that included extending their water purchase contract the Northeast Texas Municipal Water District near Jefferson. The groundwater alternative was eliminated because HWSC has had difficulty in the past developing acceptable wells due to poor quality groundwater. The HWSC recently completed a project to expand their service area and connect to the NETMWD near Jefferson.

**Recommendations**

The recommended strategy for the Harleton WSC to meet their projected deficit of 91 ac-ft/yr in 2010 and 240 ac-ft/yr in 2060 would be to extend and increase their surface water contract with the Northeast Texas Municipal Water District. The recommended supply source will be the

Lake O' The Pines in Marion County. NETMWD would add approximately 91 ac-ft/yr by 2010 and 204 ac-ft/yr by 2060 to the HWSC. The Lake O' The Pines in Marion County is projected to have a more than ample supply availability to meet the needs of HWSC for the planning period.

- **Leigh WSC**

**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 CLWSC 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 7 ac-ft/yr in 2050 increasing to a deficit of 36 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 7 acre-feet in the year 2050 and 36 acre-feet in the year 2060 would be to construct one additional water well similar to their existing wells just prior to 2050. 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.

- **City of Scottsville**

**Description / Discussion of Needs**

The City of Scottsville is located in southeastern Harrison County and serves the incorporated city limits and an area immediately north, east, and south of the City of Scottsville. In 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 W.U.G. 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.

- **Talley WSC**

**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.

- **Steam Electric**

**Description / Discussion of Needs**

The Steam Electric W.U.G. 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 W.U.G. in Harrison County.

**Evaluated Strategies**

Three alternative strategies were considered to meet the Harrison County Steam Electric W.U.G.'s 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 W.U.G. to meet projected demands during the planning period is to purchase additional water from the Northeast Texas Municipal Water District.

**4.8 (j) <u>Hopkins County</u>**

- **Miller Grove WSC**

**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 W.U.G. 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. Ground water was considered as the system's primary source to meet the projected deficit.

**Recommendations**

Additional ground water 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 (k) <u>Hunt County</u>**

- **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 alternative 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.

- **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 alternative 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.

- **Cash WSC**

**Description / Discussion of Needs**

Cash Water Supply Corporation is a public water supply located primarily in Hunt County. The water supply corporation sells water to Combined Consumers WSC, 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 76% of water supply to Cash WSC 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 4305 ac-ft/yr around 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 WSC needs in 2060.

Cash WSC 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 WSC. Consequently, Region C has developed tables to show current and future allocation to Cash WSC from NTMWD.

**Evaluated Strategies**

Four alternative strategies were considered to meet Cash 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 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 WSC to meet their projected deficit in 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 WSC.

- **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, each with a production capacity of 150 gpm. The City provides water to its own customers in the Sabine basin and is projected to have a water supply deficit of 34 ac-ft/yr in 2050. The deficit is projected to increase to 101 ac-ft/yr by 2060. The system does have a water conservation or drought management plan in place.

**Evaluated Strategies**

Four alternative 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 2050 and 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.

- **Combined Consumers WSC**

**Description / Discussion of Needs**

Combined Consumers Water Supply Corporation is a public water supply located primarily in Hunt County and supplies consumers in both Hunt and Van Zandt counties. Approximately 80% of the WSC's consumer demand is located in Hunt County. Current water supply is from the Sabine River Authority (SRA) and Cash WSC. Approximately 94% of water supply to the WSC is from SRA. The WSC is projected to have a supply deficit of 75 ac-ft/yr in 2030 and increasing to a deficit of 3631 in 2060. Combined Consumers 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. Water from Toledo Bend will be used to meet Combined Consumers needs beginning in 2030.

**Evaluated Strategies**

The four alternative strategies considered to meet Combined Consumers WSC's water supply shortages are listed in the table below. 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 WSC to meet their projected deficit from 2030 is to purchase raw water from the Sabine River Authority's proposed Toledo Bend Transfer.

- **Hickory Creek SUD**

**Description / Discussion of Needs**

Hickory Creek SUD is currently supplied by three wells in the Woodbine aquifer. All wells are located in Hunt County and have a total rated capacity of 690 gpm or 371 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 70 ac-ft/yr by 2010. The deficit is projected to increase to 1666 ac-ft/yr by 2060. The system does not have either a water conservation plan or a drought management plan.

**Evaluated Strategies**

Four alternative 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**

Hickory Creek SUD has a documented plan to drill a well with a rated capacity of 500 gpm (269 ac-ft/yr) by June 2005 in the Woodbine Aquifer, Hunt County. The three existing wells plus this additional well have the capacity to meet projected demand up to 2030 in all three counties. Six or more additional wells will have to be drilled during successive decades to ensure that a deficit is not encountered by the SUD.

- **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 Ladonia with a rating of 230 gpm, 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 70 ac-ft in 2020 and increasing to a deficit of 1444 ac-ft by 2060.

**Evaluated Strategies**

There were four alternative strategies considered to meet the WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. 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 City of Commerce is the recommended strategy to meet North Hunt WSC's needs.

- **Jacobia WSC**

**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 alternative strategies considered to meet the WSC's water supply shortages. Advanced conservation was not selected because the per capita use per day was less than the 140 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. 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 City of Greenville is the recommended strategy to meet Jacobia WSC's needs.

- **Little Creek Acres**

**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 WSC, and a purchased water alternative from Cash was also considered.

**Recommendations**

Purchase of treated surface water from Cash WSC 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.

- **Maloy WSC**

**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 alternative 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 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the WSC is planning on continuing to purchase surface water from the City of Commerce.

**Recommendations**

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

- **Poetry WSC**

**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, and the supplies available to portion of Poetry WSC in Hunt County are given in the table bellow. 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 alternative 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 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the WSC is planning on continuing to purchase surface water from the City of Terrell.

**Recommendations**

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

- **Shady Grove WSC**

**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 alternative 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 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the WSC is planning on continuing to purchase surface water from the City of Greenville.

**Recommendations**

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

- **Steam Electric**

**Description / Discussion of Needs**

The Steam Electric W.U.G. 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 alternative 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 W.U.G. to meet projected demands during the planning period is to purchase raw water from the Sabine River Authority's proposed Toledo Bend transfer.

- **West Leonard WSC**

**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 is a well into the Woodbine aquifer with a total rated capacity of 310 gpm, which equates to 167 ac-ft/yr on an annual average basis. 5 ac-ft/yr or 3% of the total supply is the water allocated to users in Hunt County. A water supply deficit of 2 ac-ft/yr beginning 2010 and increasing to a deficit of 28 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. Ground water was considered as the system's primary source to meet the projected deficit.

**Recommendations**

Additional ground water from the Woodbine aquifer is the recommended strategy for West Leonard WSC to meet the projected deficit by 2010. 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.

- **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 this yields, water quantity from the lakes 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 (l) <u>Lamar County</u>

- **Petty WSC**

**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.

- **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 alternative 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 is already in place.

### 4.8 (m)Marion County

There are no entities with actual shortages in Marion County.

### 4.8 (n) Morris County

There are no entities with actual shortages in Morris County.

### 4.8 (o) Rains County

- **South Rains WSC**

**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 alternative 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 gpcd threshold set by the water planning group. Reuse is not a feasible option because water supply is mainly used for public consumption. Groundwater was not selected because the WSC is planning on continuing to purchase surface water from the City of Emory.

**Recommendations**

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

**4.8 (p) Red River County**

There are no entities with actual shortages in Red River County.

**4.8 (q) Smith County**

- **Crystal Systems Inc.**

**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.

- **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.

- **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. 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 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.

- **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.

- **Star Mountain WSC**

**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 (r)** **<u>Titus County</u>**

- **Steam Electric**

**Description / Discussion of Needs**

The Steam Electric W.U.G. 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 TXU 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**.**

**Evaluated Strategies**

Three alternative strategies were considered to meet the Titus County Steam Electric W.U.G.'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 Titus County steam electric W.U.G. 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 (s) <u>Upshur County</u>**

- **Pritchett WSC**

**Description / Discussion of Needs**

Pritchett WSC is located in southwestern Upshur County and eastern Wood County and serves an area around the communities of Pritchett, Center Point, Latch, Shady Grove, and Wilkins. In 2003 the system had 2,305 members with 99% in Upshur County and 1% in Wood County. The population is projected to increase from 5,670 persons in 2010 to 6,998 persons in 2060. The PWSC is included as a W.U.G. for Upshur and Wood Counties. The system's current water supply consists of seventeen water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 1,582 gpm, or 850 ac-ft/yr. The system is bounded on the west by Fouke WSC, on the north by Sharon WSC and the City of Gilmer, on the south by the cities of Gladewater and Big Sandy, and on the east by Union Grove WSC and Glenwood WSC. PWSC has a water conservation plan and a drought management plan. Pritchett WSC is projected to have a water supply deficit of 7 ac-ft/yr in 2040 increasing to a deficit of 51 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 PWSC does not have a centralized sewerage collection system. Surface water was considered but there are not any existing surface water treatment facilities within reasonable distance from Pritchett WSC. There are alternative sources of surface water available to PWSC such as Lake Gilmer, but the cost of purchasing raw water and building a surface water treatment plant is not realistic when compared to existing groundwater.

**Recommendations**

The recommended strategy for the Pritchett WSC to meet their projected deficit of 7 ac-ft/yr in 2010 and 51 ac-ft/yr in 2060 would be to construct one additional well with a minimum capacity of 100 gpm which yields 54 ac-ft/yr. The recommended supply source will be the Carrizo-Wilcox Aquifer in Upshur County. The Carrizo-Wilcox Aquifer in Upshur County is projected to have a more than ample supply availability to meet the needs of Pritchett WSC for the planning period.

### 4.8 (t) <u>Van Zandt County</u>

- **Bethel Ash WSC**

**Description / Discussion of Needs:**

Bethel Ash WSC provides water services in Van Zandt County (Region D) and Henderson County (Region C and I). The water management strategy listed here is meant to satisfy the portion of the W.U.G. in Van Zandt County. The system is projected to serve 475 people in 2010 and 797 people by the year 2060 in Van Zandt County. The current sources of supply are seven wells into the Carrizo Wilcox with a total production capacity of 1257 gpm. This total supply was distributed to Region C, D and I based on demand in the respective regions. In Region D, Bethel Ash is projected to have a water supply deficit of 2 ac-ft/yr in 2040. The deficit is projected to increase to 17 ac-ft/yr by 2060. The system does not have a water conservation plan but has a drought management plan in place.

**Evaluated Strategies**

Four alternative strategies were considered to meet Bethel Ash's water supply shortages. Advanced conservation was not selected since per capita use is less than 140 gpcpd. There are no current water needs in Bethel Ash that could be met by water reuse. Surface water was not selected because Bethel Ash stated in their survey response that they would continue to drill wells to meet future demands. Also, surface water treatment is not economically feasible for a system of this size. Groundwater from the Carrizo Wilcox was the alternative selected for this entity.

**Recommendations**

The recommended strategy for the portion of Bethel Ash in Van Zandt County to meet their projected deficit in 2040 to 2060 is to construct a new well with a rated capacity of 150 gpm, which would provide a total of 81 ac-ft/yr. This is in excess of the needs in Region D, and would provide additional water for use in the neighboring users of region C.

- **City of Canton**

**Description / Discussion of Needs:**

The City of Canton provides water service in Van Zandt County. The estimated population is 3,537 in the year 2010 and is projected to be 4,613 in the year 2060. The City relies on ground water from the Carrizo-Wilcox with a total pumping capacity of 180 GPM, or 97 ac-ft/yr and from Lake Canton with 706 ac-ft/yr. Canton is projected to have a water supply deficit of 120 ac-ft/yr beginning 2010 and increasing to a deficit of 349 ac-ft/yr by 2060. The system is bordered by Myrtle Springs WSC to the Northwest and Mac Bee WSC to the Southwest.

**Evaluated Strategies**

Advanced conservation was considered because the 238 gallons per capita per day use was above the 140 gpcd 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 ground water. Water reuse was omitted because the City does not have a demand for non-potable water at this time. Surface water alternatives were not selected since the safe yield from the City Lake has all been allocated for City use. In addition, the City has indicated a preference to use ground water and is planning on drilling new wells.

**Recommendations**

The recommended strategy for the City of Canton to meet their projected water deficit of 120 ac-ft in the year 2010 and 175 ac-ft in the year 2020 would be to construct two additional wells, similar to their existing well, with a capacity of 180 gpm each, or a total of 194 ac-ft/yr. With these additional wells, the City will still have a water shortage of 23 ac-ft in the year 2030 and increasing to 155 ac-ft in the year 2060. These shortages can be met by constructing two additional wells similar to the other wells. The recommended wells will be in the Carrizo-Wilcox aquifer in Van Zandt County.

- **Corinth WSC**

**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 alternative strategies considered to meet Corinth WSC water supply. Advanced conservation was not selected because the per capita use per day was below 140 gpcd 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.

- **Crooked Creek WSC**

**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 alternative 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 gpcd 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 ground water 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.

- **Edom WSC**

**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 alternative strategies considered to meet Edom WSC water supply shortages. Advanced conservation was not selected because the per capita use per day was below 140 gpcd threshold set by the water planning group. Water reuse is not feasible because the WSC does not have a centralized sewerage collection system. Ground water 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.

- **Fruitvale WSC**

**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 alternative strategies considered to meet Fruitvale WSC water supply. Advanced conservation was omitted because the per capita use per day was below 140 gpcd 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.

- **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 1,045 gpm, or 562 ac-ft/yr. Grand Saline is projected to have a water supply deficit of 65 ac-ft/yr in 2010 and increasing to 255 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 gpcd was above the 140 gpcd 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 W.U.G.'s 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 65 ac-ft in the year 2010 and 255 ac-ft in the year 2060 would be to construct two wells. The first well, 500 feet deep and with a pumping capacity of 300 gpm is currently under development and will replace existing well #2, for a net increase of 180 gpm, or 97 acre feet per year. A second well will be needed after 2015.

- **Little Hope Moore WSC**

**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 ground water 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 gpcd 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.

- **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 440 gpm. RPM provides water to its own customers in the Neches river basin and is projected to have a water supply deficit of 8 ac-ft/yr in 2020. The deficit is projected to increase to 99 ac-ft/yr by 2060. The system does have a water conservation plan or drought management plan in place.

**Evaluated Strategies**

Four alternative 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 their survey response, RPM stated that they had a documented plan to construct an additional well to provide 12 MG/yr (37 ac-ft/yr). Supply from this additional source should meet demand up to 2030. In order to meet the projected deficit after 2030, a new well with a rated capacity of

120 gpm should be drilled before 2040. This well will provide an additional 65 ac-ft/yr sufficient to meet the demand up to 2060.

**4.8 (u) Wood County**

- **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 W.U.G. 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.

- **City of Yantis**

**Description / Discussion of Needs**

The City of Yantis is located in north central Wood County and serves an area north of Lake Fork within their city limits. In 2003 the system had 230 members. The population is projected to increase from 525 persons in 2010 to 637 persons in 2060. The City of Yantis is included in the County Other W.U.G. for Wood County. The system's current water supply consists of three water wells from the Carrizo-Wilcox Aquifer. The total rated capacity of these wells is 122 gpm, or 66 ac-ft/yr. The system is bounded on the north, east, south, and west by Lake Fork WSC. City of Yantis does not have a water conservation plan, but does have a drought management plan. The City of Yantis is projected to have a water supply deficit of 8 ac-ft/yr in 2010 increasing to a deficit of 18 ac-ft/yr in 2060.

**Evaluated Strategies**

Advanced conservation was considered because the per capita use per day of 150 is greater than the 140 gpcpd threshold set by the water planning group. Water reuse was not considered because the City of Yantis does not have any users of recycled water. Surface water alternatives were not considered for the near term deficits since surface water treatment is not economically feasible for a system of this size. In addition, City of Yantis is constructing one new water well with expected completion in 2005. If surface water becomes available from the Lake Fork Reservoir this study should be re-evaluated.

**Recommendations**

The recommended strategy for the City of Yantis to meet their projected deficit of 8 acre-feet in the year 2010 and 18 acre-feet in the year 2060 would be to construct one additional water well similar to their existing well. The recommended supply source will be the Carrizo-Wilcox Aquifer in Wood County. One well with rated capacity of 70 gpm would provide approximately 38 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 Yantis for the planning period. The City of Yantis has received approval from TCEQ and should complete construction of the new well in 2005.

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# 5.0 Impacts of Water Management Strategies on Key Parameters of Water Quality and Impacts of Moving Water from Rural and Agricultural Areas

## 5.1 Impacts – Water Quality

The NETRWPG has identified 63 water user groups with shortages, which will require strategies in this plan. 18 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 45, 31 shortages will be resolved with additional groundwater supplies, 1 with both groundwater and surface water, 1 will require TCEQ water right permit, and 12 will involve increasing the maximum quantity of taking under existing surface water purchase contracts. 4 of these 12 will require additional surface water provided by the Toledo Bend pipeline project of the Sabine River Authority.

Chapter 357.7 of the regional water planning guidelines provide that the plan shall include

> "a description of the major impacts of recommended water management strategies on key parameters of water quality identified by the regional water planning group as important to the use of the water resource 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 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.

Table 5.1

| Contaminant | MCL (mg/L) |
|---|---|
| Antimony | 0.005 |
| Arsenic | 0.05 |
| Asbestos | 7 million fibers/liter (longer 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 | |
|---|---|
| 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) | $3 \text{ X } 10^{-8}$ |
| 2,4,5-TP | 0.05 |
| 2,4-D | 0.07 |

| Table 5.3 | |
|---|---|
| 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

| 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 32 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 that the additional pumping does not overdraft the aquifer. Each of the region's aquifers have 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 nine 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:

| 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 | 101 | 0.0 |
| Wolfe City | Lake Tawakoni | 927,440 | 195 | 0.0 |
| Little Creek Acres | Lake Tawakoni | 927,440 | 153 | 0.0 |
| Petty WSC | Pat Mayse Lake | 124,500 | 20 | 0.0 |
| Steam Electric, Titus | Lake O' The Pines | 254,900 | 31,522 | 12.4 |

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:

| WUG | Needed From Toledo Bend (2060) (ac-ft/yr) |
|---|---|
| Able Springs WSC | 143 |
| Cash WSC | 3,121 |
| Combined Consumers WSC | 3,631 |
| Steam Electric, Hunt Co. | 23,902 |
| **TOTAL** | **30,797** |

By the end of the 50 year planning period, the NETRWPG area needs due to these strategies will total 30,797 ac-ft per year. The capacity of Toledo Bend Reservoir is 4,412,300 ac-ft. While it is anticipated that 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 5.5 compares key water quality parameters for the upper and lower basins, and shows no significant difference in water quality.

Table 5.5
Water Quality Comparison
Upper and Lower Sabine Basin
August, 2004

| Parameter [3] | Upper Basin[1] | Lower Basin[2] |
|---|---|---|
| Temperature, $^{o}C$ | 28.6 | 29.5 |
| pH | 7.79 | 7.45 |
| DO mg/l | 7.44 | 7.02 |
| Turbidity NTU | 27.4 | 5.2 |
| Nitrite mg/l | <0.02 | <0.02 |
| Nitrate mg/l | 0.14 | 0.04 |
| Orthophosphate | 0.04 | 0.04 |
| TOC mg/l | 7.4 | 8 |
| Chlorides mg/l | 23.2 | 20.2 |
| Sulfates mg/l | 21.8 | 24.5 |

(1) Upper Basin includes Lake Tawakoni and Lake Fork.
(2) Lower Basin includes Toledo Bend.
(3) 30-Day average for August, 2004.
Source: Sabine River Authority of Texas, "August, 2004, Monthly Water Quality Report", page 2 and page 18. Averages performed by consultant.

The Draft 2004 "Water Quality Inventory for Texas" indicates that all 3 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 because of low dissolved oxygen levels, and fish consumption is impacted by mercury levels in largemouth bass and freshwater drum species.

The project is still in a 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 the Toledo Bend water is piped directly to a 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 requires that the plan include an analysis of the impacts of strategies, which move water from rural and agricultural areas. As previous noted, strategies were identified for 45 entities in the NETRWPG area. 32 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.

| WUG | County of Use | Reservoir | County of Origin |
|---|---|---|---|
| Bi-County WSC | Titus/Upshur/Camp | Lake Bob Sadlin | 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 |
| Wolfe City | Hunt | Lake Tawakoni | Hunt/Rains |
| Little Creek Acres | Hunt | Lake Tawakoni | Hunt/Rains |
| Petty WSC | Lamar | Pat Mayse Lake | Lamar |
| Steam Electric, Titus | Titus | Lake O' The Pines | Marion/Morris |

The four remaining strategies move water from 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 is in excess of the needs of Region I in which Toledo Bend is located. 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 the construction of Marvin Nichols Reservoir in the NETRWPG area. Transfer of water from Marvin Nichols to the Dallas-Ft. Worth metroplex would constitute the moving of water from rural and agricultural areas. The impact of this project, particularly on the timber industry, has been the focus of at least 2 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 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 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 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."

| Table E-1: 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 | Sate 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 | $321.31 | 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 by the NETRWPG for livestock, mining, or irrigation needs, and thus there are no predicted impacts.

- By 2060, failure to meet projected water needs would result in the loss of 2130 jobs in the steam-electric industry, and 450 lost manufacturing jobs in the NETRWPG area.

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## 6.0 Introduction

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 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.

The Regional Water Plan will also consolidate in this chapter the water conservation and drought management recommendations of the planning group.

## 6.1 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.

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. Other systems have limited staff and monetary resources, and priorities other than conservation/drought planning consume all available resources. Finally, data compiled through the first round of regional planning showed that Region D already has the lowest per capita municipal use of any region in the state.

## 6.2 Water Conservation Strategies

The planning group determined that a 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 6.2) 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. 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 before 1992 should be equipped with low flow toilets and fixtures due to the implementation of the Texas Plumbing Efficiency Standards. The savings for these two categories for each WUG are identified and tabulated by entity in Chapter 2, and range from 0 to 15 gpcpd over the 50 year planning period. These savings increase from decade to decade as less efficient fixtures are continually replaced.

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 42 municipal water groups with identified actual shortages, 9 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. Currently 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 items that would allow systems to operate more efficiently, such as installation of rain sensor devices.

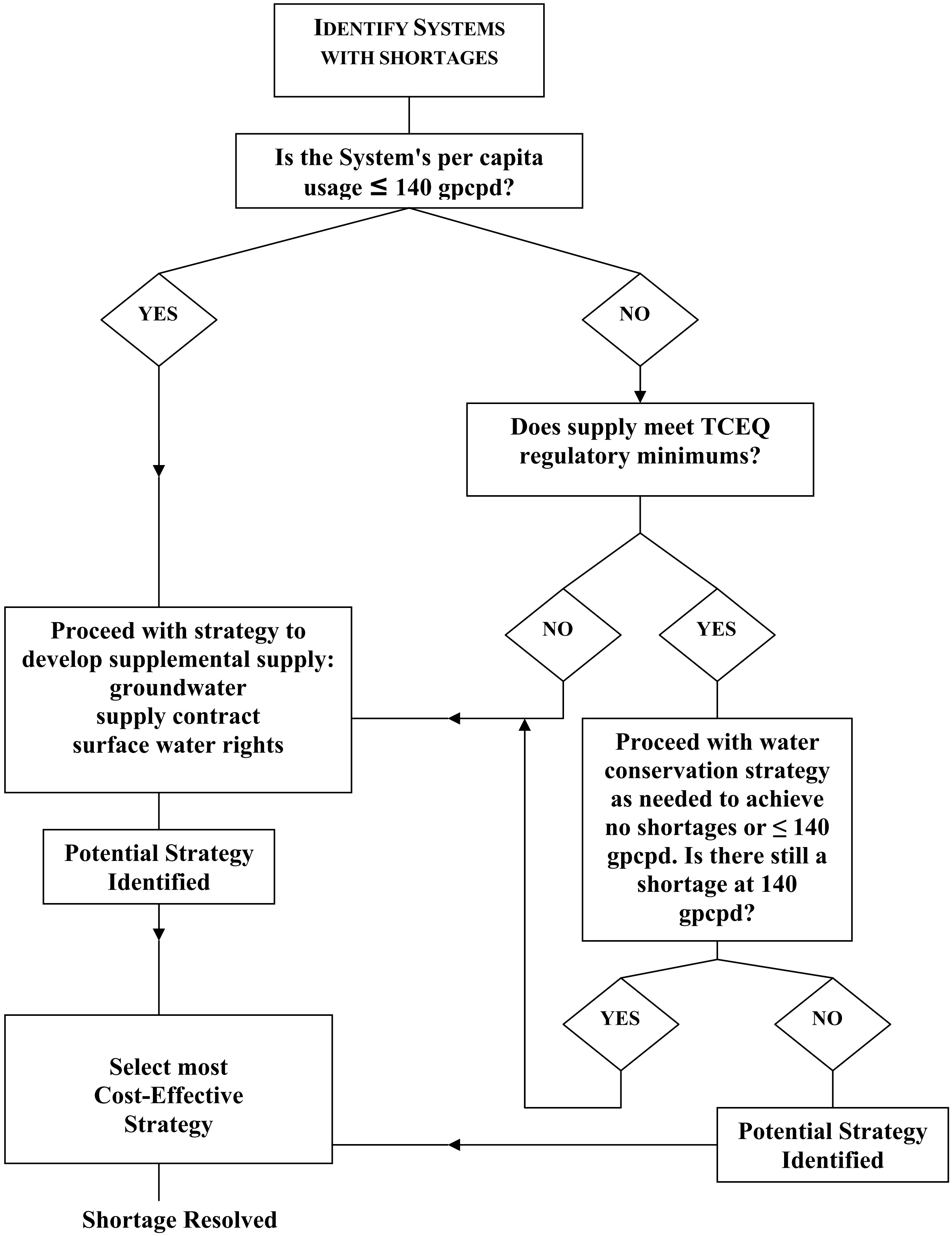
Rainwater harvesting rebates would provide a rebate to single family, multi-family, and commercial customers whom install rainwater collection tanks for potable and non-potable water uses. According to GDS Associates' Texas Water Development Board Study, a 1,000 gallon tank would be used for a single 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 at the TWDB website at: http:www.twdb.state.tx.us/assistance/conserbation/TaskForceDocs/WCITFBMPGuide.pfd

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 Chapter 4. Acre-foot savings from advanced conservation ranged from a low of 7 acre-feet/year for the City of Scottsville to a high of 193 acre-feet/year for the Hickory Creek SUD. Costs per acre-foot saved ranged from $2,412/ac-ft to $3,749/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.

**FIGURE 6.1 — REGION D -WATER CONSERVATION STRATEGY DECISION TREE**



## 6.3 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.

The planning rules also require a model drought contingency plan for irrigation districts, but no such districts were identified in Region D and so no plan was developed. These plans are provided in the Appendix to Chapter 6.

## 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 approximately 50 years since the "drought of record" for this area, and the region should not become complacent.

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 which allow the utility to readily segregate user classes.

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.

3. The planning group encourages funding and implementation of educational water conservation 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.

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# 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

## 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 Chapter 7 is to describe how the 2006 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 2006 North East Texas Regional Water Plan 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 2001 State Water Plan. The Marvin Nichols I Reservoir, if constructed, would be located in the North East Texas Regional Water Planning Group area. To demonstrate compliance with the State's requirements, a matrix table has been developed and included later in this chapter.

## 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 recognizes and honors 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 1.2, in Chapter 1. The region's groundwater resources include, primarily, the Carrizo-Wilcox Aquifer, the Trinity Aquifer, the Queen City Aquifer, the Nacotoch Aquifer, the Blossom Aquifer, and the Woodbine Aquifer. Lesser amounts of water are also available from localized shallow aquifers and springs. The extents of these aquifers within the region are depicted as major and minor aquifers on Figures 1.10 and 1.11 in Chapter 1.

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 1.10 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. 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.

Recommend 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 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.

## 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. 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. 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 1.17, in Chapter 1. Included are 11 species of birds, 3 mammals, 7 reptiles/amphibians, 6 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 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 is expected to significantly impact oil, natural gas, or coal production in the region.

## 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 the following regulations:

- 31 TAC Chapter 358.3
- 31 TAC Chapter 357.5
- 31 TAC Chapter 357.7
- 31 TAC Chapter 357.8
- 31 TAC Chapter 357.9

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. To assist with demonstrating compliance, the North East Texas Regional Water Planning Group has developed a matrix addressing the specific recommendations contained in the above referenced regulations.

The matrix is a checklist highlighting each pertinent paragraph of the regulations. The contents of the North East Texas Regional Water Plan have been evaluated against this matrix. Table 7.1 is a Summary of Evaluation of Water Management Strategies. Table 7.2 is a Summary of Environmental Assessment of Water Management Strategies.

**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: Environmental Factors | Agricultural Resources/ Rural Areas | Other Natural Resources | Key Water Quality Parameters | Political Feasibility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | # | *(1-5) | $ | **(1-5) | **(1-5) | **(1-5) | **(1-5) | **(1-5) |
| Bowie | WUG | Central Bowie WSC | Increase Existing Contract | 353 | 1 | $430 | 1 | 1 | 1 | 1 | 1 |
| Bowie | WUG | Hooks, City of | Increase Existing Contract | 151 | 1 | $430 | 1 | 1 | 1 | 1 | 1 |
| Bowie | WUG | Macedonia-Eylau MUD | Increase Existing Contract | 270 | 1 | $430 | 1 | 1 | 1 | 1 | 1 |
| Bowie | WUG | New Boston, City of | Increase Existing Contract | 169 | 1 | $430 | 1 | 1 | 1 | 1 | 1 |
| Bowie | WUG | Redwater, City of | Increase Existing Contract | 14 | 1 | $430 | 1 | 1 | 1 | 1 | 1 |
| Bowie | WUG | Wake Village | Increase Existing Contract | 645 | 1 | $430 | 1 | 1 | 1 | 1 | 1 |
| Bowie | CO | Burns - Redbank WSC | Increase Existing Contract | 103 | 1 | $430 | 1 | 1 | 1 | 1 | 1 |
| Bowie | CO | Oak Grove WSC | Increase Existing Contract | 36 | 1 | $430 | 1 | 1 | 1 | 1 | 1 |
| Bowie | CO | Redwater, City of | Increase Existing Contract | 157 | 1 | $430 | 1 | 1 | 1 | 1 | 1 |
| Bowie | CO | Red River Development Authority | Water Right Permit from TCEQ | 4074 | 1 | | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | | | | |
| Camp | WUG | Bi-County WSC | Drill 2 New Wells & New Surface Water Contract | 653 | 1 | $656 | 1 | 1 | 1 | 1 | 1 |
| Camp | CO | Woodland Harbor | Drill 2 New Wells | 65 | 1 | $572 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | | | | |
| Cass | WUG | Linden, City of | Drill New Well | 215 | 1 | $260 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | | | | |
| Delta | CO | Ben Franklin WSC | New Surface Water Contract | 36 | 1 | $1,203 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | | | | |
| Gregg | WUG | Clarksville City, City of | Drill 3 New Wells | 242 | 1 | $594 | 1 | 1 | 1 | 1 | 1 |
| Gregg | WUG | Liberty City WSC | Drill 8 New Wells | 752 | 1 | $346 | 1 | 1 | 1 | 1 | 1 |
| Gregg | WUG | West Gregg SUD | Drill 5 New Wells | 350 | 3 | $454 | 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 | $356 | 1 | 1 | 1 | 3 | 3 |
| | | | | | | | | | | | |
| Harrison | WUG | Waskom, City of | Drill 4 New Wells | 176 | 3 | $331 | 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 | $414 | 1 | 1 | 1 | 3 | 3 |
| Harrison | CO | Caddo Lake WSC | Drill 2 New Wells | 86 | 3 | $336 | 1 | 1 | 1 | 3 | 3 |
| Harrison | CO | Harleton WSC | Increase Existing Contract | 240 | 1 | $749 | 1 | 1 | 1 | 1 | 1 |
| Harrison | CO | Leigh WSC | Drill New Well | 43 | 3 | $378 | 1 | 1 | 1 | 3 | 1 |
| Harrison | CO | Scottsville, City of | Drill New Well | 65 | 1 | $332 | 1 | 1 | 1 | 1 | 1 |
| Harrison | CO | Talley WSC | Drill 3 New Wells | 177 | 3 | $453 | 1 | 1 | 1 | 3 | 1 |
| | | | | | | | | | | | |
| Hopkins | CO | Miller Grove WSC | Drill New Well | 35 | 1 | $1,969 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | | | | |
| Hunt | WUG | Able Springs WSC | New Surface Water Contract | 143 | 1 | $94 | 1 | 1 | 1 | 1 | 1 |
| Hunt | WUG | Campbell WSC | Drill 2 New Wells & New Surface Water Contract | 773 | 3 | $1,471 | 1 | 1 | 1 | 3 | 1 |
| Hunt | WUG | Cash WSC | New Surface Water Contract | 3121 | 1 | $95 | 1 | 1 | 1 | 1 | 1 |

**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: Environmental Factors | Impacts of Strategy on: Agricultural Resources/ Rural Areas | Impacts of Strategy on: Other Natural Resources | Key Water Quality Parameters | Political Feasibility |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | # | *(1-5) | $ | **(1-5) | **(1-5) | **(1-5) | **(1-5) | **(1-5) |
| Hunt | WUG | Celeste, City of | New Surface Water Contract | 101 | 1 | $3,085 | 1 | 1 | 1 | 1 | 1 |
| Hunt | WUG | Combined Consumers WSC | New Surface Water Contract | 3,477 | 1 | $110 | 1 | 1 | 1 | 1 | 1 |
| Hunt | WUG | Hickory Creek SUD | Drill 7 New Wells | 1,882 | 1 | $841 | 1 | 1 | 1 | 1 | 1 |
| Hunt | WUG | North Hunt WSC | Increase Existing Contract | 1,619 | 1 | $977 | 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 | 195 | 1 | $1,660 | 1 | 1 | 1 | 1 | 1 |
| Hunt | CO | Jacobia WSC | Increase Existing Contract | 328 | 1 | $978 | 1 | 1 | 1 | 1 | 1 |
| Hunt | CO | Little Creek Acres | New Surface Water Contract | 153 | 1 | $1,359 | 1 | 1 | 1 | 1 | 1 |
| Hunt | CO | Maloy WSC | Increase Existing Contract | 263 | 1 | $978 | 1 | 1 | 1 | 1 | 1 |
| Hunt | CO | Poetry WSC | Increase Existing Contract | 46 | 1 | $717 | 1 | 1 | 1 | 1 | 1 |
| Hunt | CO | Shady Grove WSC | Increase Existing Contract | 280 | 1 | $978 | 1 | 1 | 1 | 1 | 1 |
| Hunt | CO | West Leonard WSC | Drill a New Well | 81 | 1 | $538 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | | | | |
| Lamar | CO | Petty WSC | New Surface Water Contract | 20 | 1 | $907 | 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 | 277 | 1 | $681 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | | | | |
| Smith | WUG | Crystal Systems Inc. | Drill 2 New Wells | 538 | 1 | $278 | 1 | 1 | 1 | 1 | 1 |
| Smith | WUG | Lindale Rural WSC | Drill a New Well | 215 | 3 | $252 | 1 | 1 | 1 | 3 | 1 |
| Smith | WUG | Lindale, City of | Drill a New Well | 376 | 3 | $243 | 1 | 1 | 1 | 3 | 1 |
| Smith | WUG | Winona, City of | Increase Existing Contract | 5 | 1 | $1,124 | 1 | 1 | 1 | 1 | 1 |
| Smith | CO | Star Mountain WSC | Drill a New Well | 108 | 3 | $356 | 1 | 1 | 1 | 3 | 1 |
| | | | | | | | | | | | |
| Titus | WUG | Steam Electric | Increase Existing Contract | 40,992 | 1 | $407 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | | | | |
| Upshur | WUG | Pritchett WSC | Drill a New Well | 54 | 1 | $506 | 1 | 1 | 1 | 1 | 1 |
| | | | | | | | | | | | |
| Van Zandt | WUG | Bethel Ash WSC | Drill a New Well | 81 | 3 | $492 | 1 | 1 | 1 | 3 | 1 |
| Van Zandt | WUG | Canton, City of | Drill 4 New Wells | 387 | 3 | $346 | 1 | 1 | 1 | 3 | 1 |
| Van Zandt | WUG | Grand Saline, City of | Drill 2 New Wells | 322 | 1 | $307 | 1 | 1 | 1 | 1 | 1 |
| Van Zandt | WUG | R-P-M WSC | Drill a New Well | 102 | 3 | $473 | 1 | 1 | 1 | 3 | 1 |
| Van Zandt | CO | Corinth WSC | Drill a New Well | 27 | 3 | $1,333 | 1 | 1 | 1 | 3 | 1 |
| Van Zandt | CO | Crooked Creek WSC | Drill a New Well | 59 | 3 | $331 | 1 | 1 | 1 | 3 | 1 |
| Van Zandt | CO | Edom WSC | Drill 5 New Wells | 124 | 1 | $827 | 1 | 1 | 1 | 1 | 1 |
| Van Zandt | CO | Fruitvale WSC | Drill 7 New Wells | 301 | 3 | $755 | 1 | 1 | 1 | 3 | 1 |
| Van Zandt | CO | Little Hope-Moore WSC | Drill 5 New Wells | 161 | 3 | $503 | 1 | 1 | 1 | 3 | 1 |
| | | | | | | | | | | | |
| Wood | WUG | Mineola, City of | Drill a New Well | 403 | 1 | $190 | 1 | 1 | 1 | 1 | 1 |
| Wood | CO | Yantis, City of | Drill a New Well | 38 | 1 | $579 | 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 | Redwater, City of | 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 | Linden, City of | Drill New Well | 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 8 New Wells | 8 | 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 4 New Wells | 4 | 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 | Harleton WSC | Increase Existing Contract | 1 | 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 |
| | | | | | | | | | | | | |
| 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 |

**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) |
| 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 | CO | Petty WSC | New Surface Water 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 | Enchanted Lakes WSC | Drill a New Well | 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 |
| | | | | | | | | | | | | |
| Upshur | WUG | Pritchett WSC | Drill a New Well | 1 | 0 | 1 | 1 | 14 | 1 | N/A | 1 | 1 |
| Upshur | CO | Union Grove WSC | Drill a New Well | 1 | 0 | 1 | 1 | 14 | 1 | N/A | 1 | 1 |
| | | | | | | | | | | | | |
| Van Zandt | WUG | Bethel Ash WSC | Drill a New Well | 1 | 0 | 1 | 1 | 21 | 1 | N/A | 1 | 1 |
| Van Zandt | WUG | Canton, City of | Drill 4 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 | 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 3 New Wells | 2 | 0 | 1 | 1 | 21 | 1 | N/A | 1 | 1 |
| Van Zandt | CO | Fruitvale WSC | Drill 5 New Wells | 3 | 0 | 1 | 1 | 21 | 1 | N/A | 1 | 1 |
| Van Zandt | CO | Little Hope-Moore WSC | New Surface Water Contract | 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 |
| Wood | CO | Yantis, City of | Drill a New Well | 2 | 0 | 1 | 1 | 19 | 1 | N/A | 1 | 1 |

---1 Indicates Little or No Impact, 5 Indicates Significant Impact

## 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 2001 and was included in the 2001 State Water Plan. Marvin Nichols 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 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 2006 regional plan as a water management strategy and not be included in the 2007 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 Table 1.2 of Chapter 1 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 TPW/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, 1334 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 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. See Table 1.2 of Chapter 1. In addition, acreage currently being utilized for beef cattle, dairy cattle, poultry and hog production would be affected. See Table 1.2. 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 near the reservoir site. See Chapter 1 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 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 upon "agricultural resources/rural areas" as "high" and "possible third party impacts" are rated high.

### 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 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.

### 7.6.6 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 2006 regional water plan or the 2007 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.

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# 8.0 Unique Stream Segments/Reservoir Site/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 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 North East Texas Regional Water Planning Group (RWPG), 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.*

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.

### 8.1.1 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.

### 8.1.2 Candidate Stream Segments

To assist various regional planning groups the TPWD developed a list of candidate stream segments in each region that appear to meet the criteria for designation as ecologically unique. For the North East Texas Region, TPWD prepared a 40-page report entitled *Ecologically Significant River and Stream Segments of Region D, Regional Water Planning Area* (May 2000) that presents information on 14[(1)] stream segments within the region that meet one or more of the criteria for designation as ecologically unique. The information provided to the NETRWPG by TPWD is summarized in Table 8.1 and 8.2, and Figures 8.1 – 8.15 show the locations.

[(1)] The report covers 15 segments, but the Quail Creek segment has been determined to be in Region I.

**TABLE 8.1 – Ecologically Significant River and Stream Segments**

| River or Stream Segment | Biological Function | Hydrologic Function | Riparian Conservation Area | High Water Quality/Aesthetic Value | Endangered Species/Unique Communities |
|---|---|---|---|---|---|
| Big Cypress Creek/Bayou | X | X | X | X | X |
| Big Cypress Creek | | | | | X |
| Black Cypress Creek | X | X | | X | |
| Black Cypress Bayou | X | X | | | X |
| Frazier Creek | | | | X | |
| Glade Creek | X | | | | X |
| Little Cypress Creek/Bayou | X | X | | X | X |
| Little Sandy Creek | X | X | X | | X |
| Pine Creek | | | | | X |
| Purtis Creek | | | X | | |
| Sabine River (Rusk/Harrison) | X | X | | X | X |
| Sabine River (Wood/Smith) | X | X | X | X | X |
| Sanders Creek | | | X | | X |
| Sulphur River | X | X | | | X |

**TABLE 8.2 – 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).

Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985)
Riparian conservation area - **Caddo Lake State Park and Wildlife Management Area**
Threatened or endangered species/unique communities - **Paddlefish** (SOC/St.T) (Pitman, 1991; TPWD, 1998)

**Big Cypress Creek** - From a point 0.6 mile downstream of US 259 in Morris/Upshur County upstream to Fort Sherman Dam in Camp/Titus County (TCEQ classified stream segment 0404).

Threatened or endangered species/unique communities - Paddlefish (SOC/St.T) (Pitman, 1991; TPWD, 1998)

**Black Cypress Creek** - From the confluence with Black Cypress Bayou east of Avinger in south Cass County upstream to its headwaters located four miles northeast of Daingerfield in the eastern part of Morris County.

Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985)
High water quality/exceptional aquatic life/high aesthetic value - ecoregion stream; diverse benthic macroinvertebrate and fish communities (Bayer et al., 1992; Linam et al., 1999)
Threatened or endangered species/unique communities - paddlefish (SOC/St.T) (Pitman, 1991)

**Black Cypress Bayou** - From the confluence with Big Cypress Bayou in south central Marion County upstream to the confluence of Black Cypress Creek east of Avinger in south Cass County.

Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985)
Threatened or endangered species/unique communities - paddlefish (SOC/St.T) (Pitman, 1991)

**Frazier Creek** - From the confluence with Jim Bayou in Marion County upstream to its headwaters located three miles north of Almira in west Cass County.

High water quality/exceptional aquatic life/high aesthetic value - ecoregion stream; diverse fish community (Bayer et al., 1992; Linam et al., 1999)

**Glade Creek** - From the confluence with the Sabine River in the northwestern corner of Gregg County near Gladewater upstream to its headwaters located about five miles southwest of Gilmer in Upshur County.

Biological function - Swamp/bog habitat displays significant biodiversity and overall habitat value (Bauer et al., 1991)
Threatened or endangered species/unique communities - unique swamp/bog community (Bauer et al., 1991)

**Little Cypress Bayou** - From the confluence with Big Cypress Bayou in Harrison County to a point 0.6 mile upstream of FM 2088 in Wood County (TCEQ classified stream segment 0409).

Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985)
High water quality/exceptional aquatic life/high aesthetic value - ecoregion stream; diverse benthic macroinvertebrate community (Bayer et al., 1992)
Threatened or endangered species/unique communities - bluehead shiner (SOC/St.T), creek chubsucker (SOC/St.T) (SOC/St.T), and blackside darter (SOC/St.T) (Bauer et al., 1991)

**Little Sandy Creek** - From Lake Hawkins upstream to its headwaters in Wood County.

Biological function - priority bottomland hardwood habitat displays significant overall habitat value (Bauer et al., 1991).
Riparian conservation area - Little Sandy National Wildlife Refuge High water
Threatened or endangered species/unique communities - unique swamp/bog community (Bauer et al., 1991); rough-stemmed aster (SOC) (J. Poole, 1999, pers. comm.)

**Pine Creek** - From the confluence with the Red River in Red River County upstream to Crook Lake Dam in Lamar County.

Threatened or endangered species/unique communities - one of two sites in Texas where Ouachita rock-pocketbook freshwater mussel (Fed.E) has been collected (Howells, 1995; Howells et al., 1997)

**Purtis Creek** - From the Van Zandt/Henderson County line upstream to its headwaters in Van Zandt County.

Riparian conservation area - **Purtis Creek State Park**

**Sabine River** - From US 59 in south Harrison County upstream to Easton on the Rusk/Harrison County line (within TCEQ classified stream segment 0505).

Biological function - Texas Natural Rivers System nominee, diverse riparian assemblage including hardwood forest and wetlands, and significant natural areas (NPS, 1995); priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985)
High water quality/exceptional aquatic life/high aesthetic value - exceptional aesthetic value (NPS, 1995)
Threatened or endangered species/unique communities - Paddlefish (SOC/St.T) (Pitman, 1991; TPWD, 1998)

**Sabine River** - From FM 14 in Wood/Smith County upstream to FM 1804 in Wood/Smith County (within TCEQ classified stream segment 0506).

Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985)
Riparian conservation area - Old Sabine Bottom Wildlife Management Area; Little Sandy National Wildlife Refuge
Threatened or endangered species/unique communities - Paddlefish (SOC/St.T) (Pitman, 1991; TPWD, 1998)

**Sanders Cree**k - From the confluence with the Red River in Lamar County upstream to the confluence of Spring Branch in Lamar County, excluding Pat Mayse Reservoir.

Riparian conservation area - Pat Mayse State Wildlife Management Area
Threatened or endangered species/unique communities - one of two sites in Texas where Ouachita rock-pocketbook freshwater mussel (Fed.E) has been collected (Howells, 1995; Howells et al., 1997)

**Sulphur River** - From a point 0.9 miles downstream of Bassett Creek in Bowie/Cass County upstream to the IH 30 bridge in Bowie/Morris County.

Biological function - priority bottomland hardwood habitat displays significant overall habitat value (USFWS, 1985)
Threatened or endangered species/unique communities - Paddlefish (SOC/St.T) (Pitman, 1991; TPWD, 1998)

### 8.1.3 Conflicts with Water Management Strategies

As a part of the planning effort, the TPWD candidate streams 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. Both of these projects were not supported by the planning group in Round 1 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, Camp Counties) provided there is no interference with the operation and maintenance of Lake Bob Sandlin or Lake O' the Pines.

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.

## 8.1.4 Summary

After consideration of available information the regional planning group elected not to recommend any stream segments for ecologically unique status. Reasons for this decision include the following:

1. The Regional Water Planning Group feels 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.

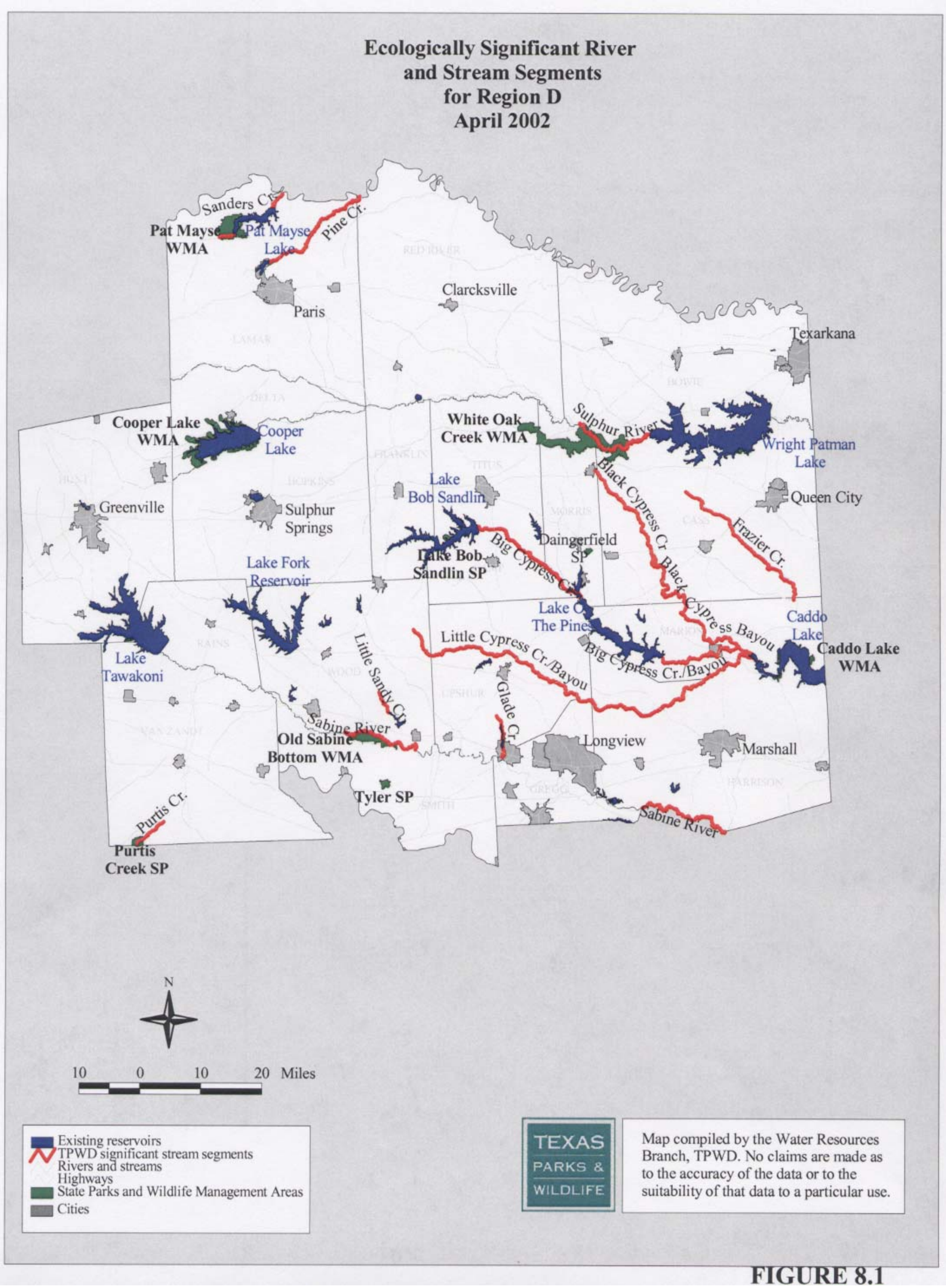
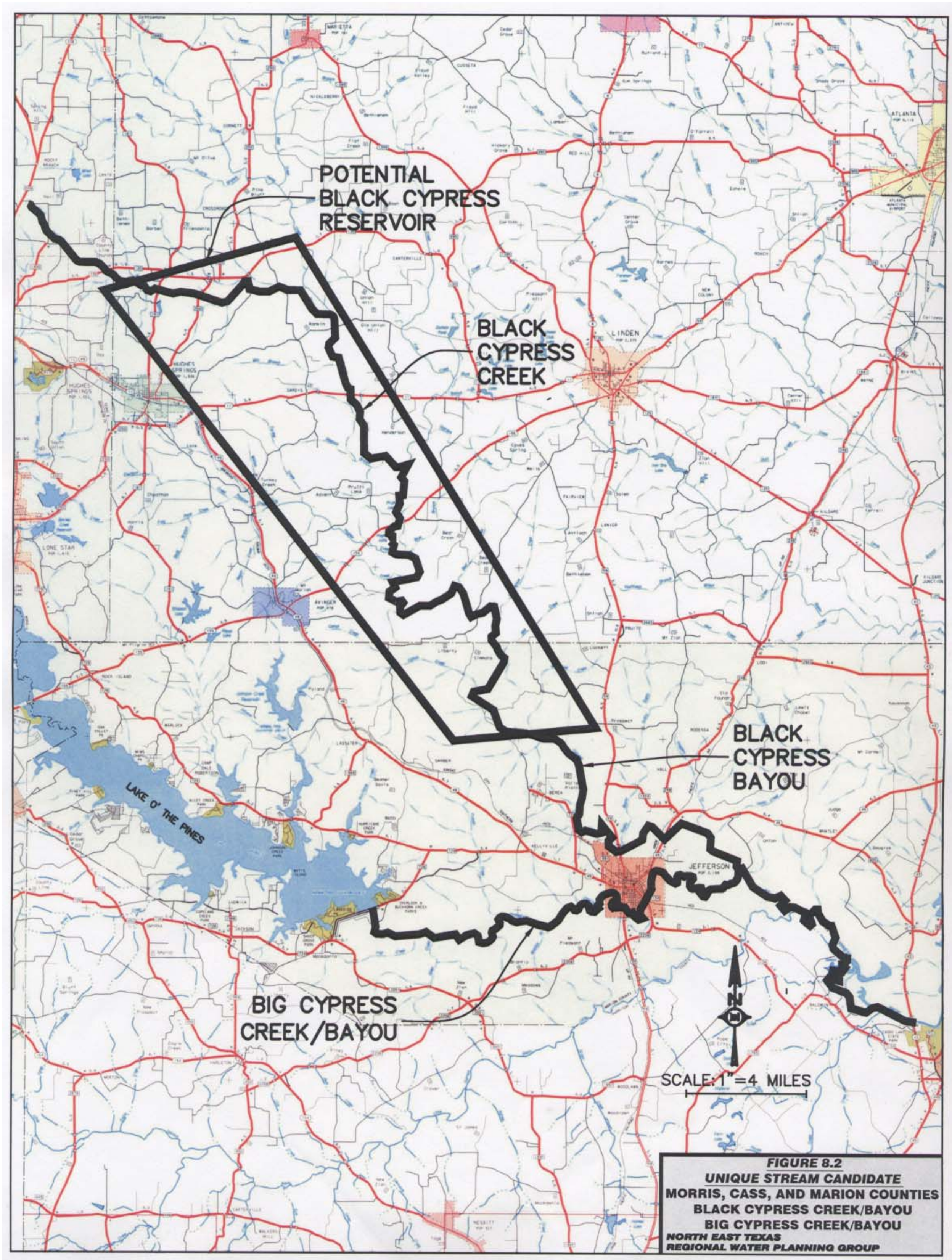

Ecologically Significant River
and Stream Segments
for Region D
April 2002
Sanders Cr.
Pat Mayse WMA
Pat Mayse Lake
Pine Cr.
Paris
Clarksville
Texarkana
Cooper Lake WMA
Cooper Lake
White Oak Creek WMA
Sulphur River
Wright Patman Lake
Greenville
Sulphur Springs
Lake Bob Sandlin
Black Cypress Cr.
Queen City
Frazier Cr.
Lake Fork Reservoir
Lake Bob Sandlin SP
Big Cypress Cr.
Daingerfield SP
Lake O' The Pines
Black Cypress Bayou
Caddo Lake
Caddo Lake WMA
Lake Tawakoni
Little Cypress Cr./Bayou
Big Cypress Cr./Bayou
Little Sandy Cr.
Glade Cr.
Sabine River
Old Sabine Bottom WMA
Longview
Marshall
Tyler SP
Sabine River
Purtis Cr.
Purtis Creek SP
N
10 0 10 20 Miles
Existing reservoirs
TPWD significant stream segments
Rivers and streams
Highways
State Parks and Wildlife Management Areas
Cities
TEXAS PARKS & WILDLIFE
Map compiled by the Water Resources Branch, TPWD. No claims are made as to the accuracy of the data or to the suitability of that data to a particular use.

**FIGURE 8.1**


POTENTIAL BLACK CYPRESS RESERVOIR
BLACK CYPRESS CREEK
BLACK CYPRESS BAYOU
BIG CYPRESS CREEK/BAYOU
LAKE O' THE PINES
LINDEN
JEFFERSON
SCALE: 1"=4 MILES
FIGURE 8.2
UNIQUE STREAM CANDIDATE
MORRIS, CASS, AND MARION COUNTIES
BLACK CYPRESS CREEK/BAYOU
BIG CYPRESS CREEK/BAYOU
NORTH EAST TEXAS
REGIONAL WATER PLANNING GROUP

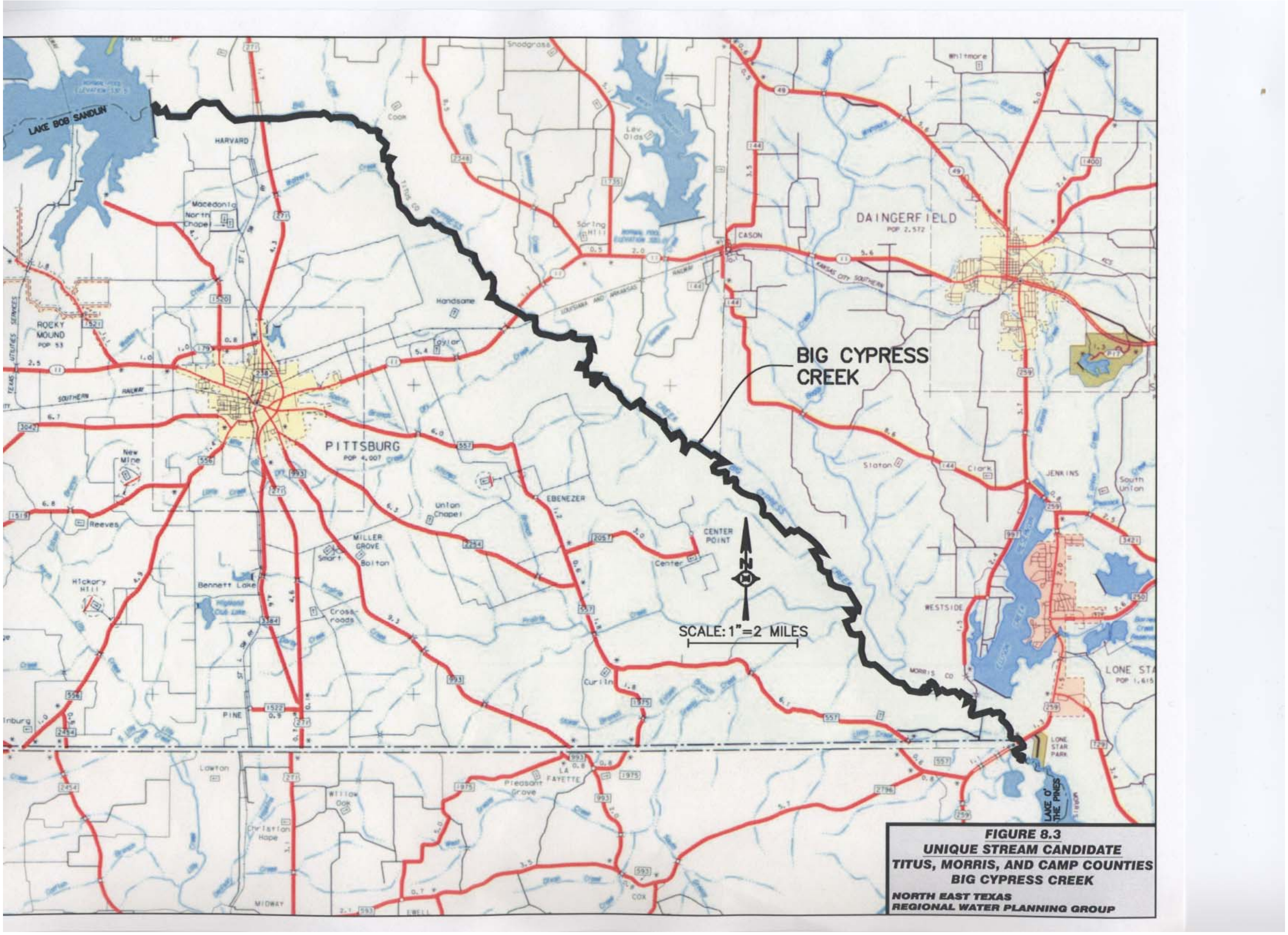
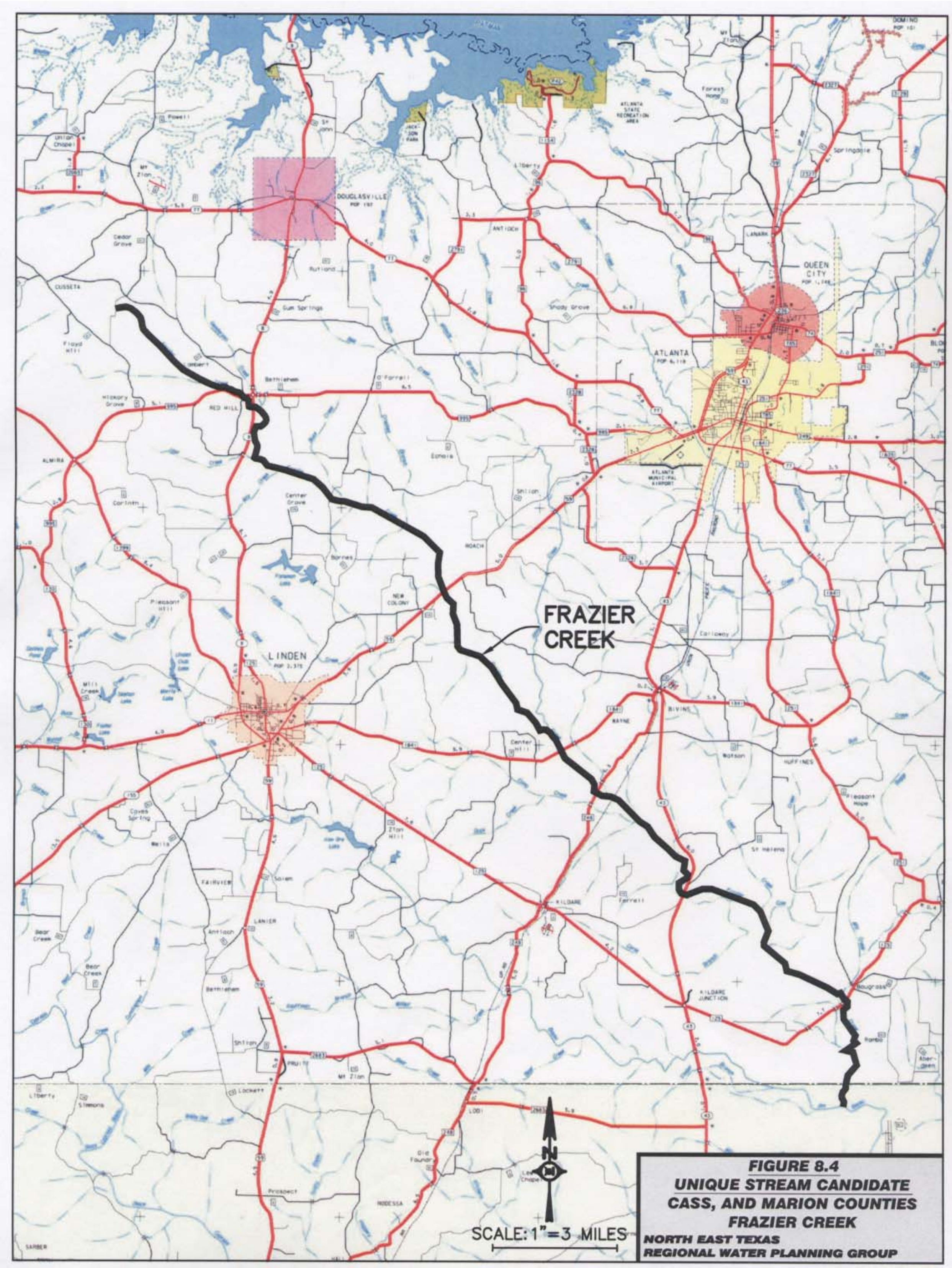
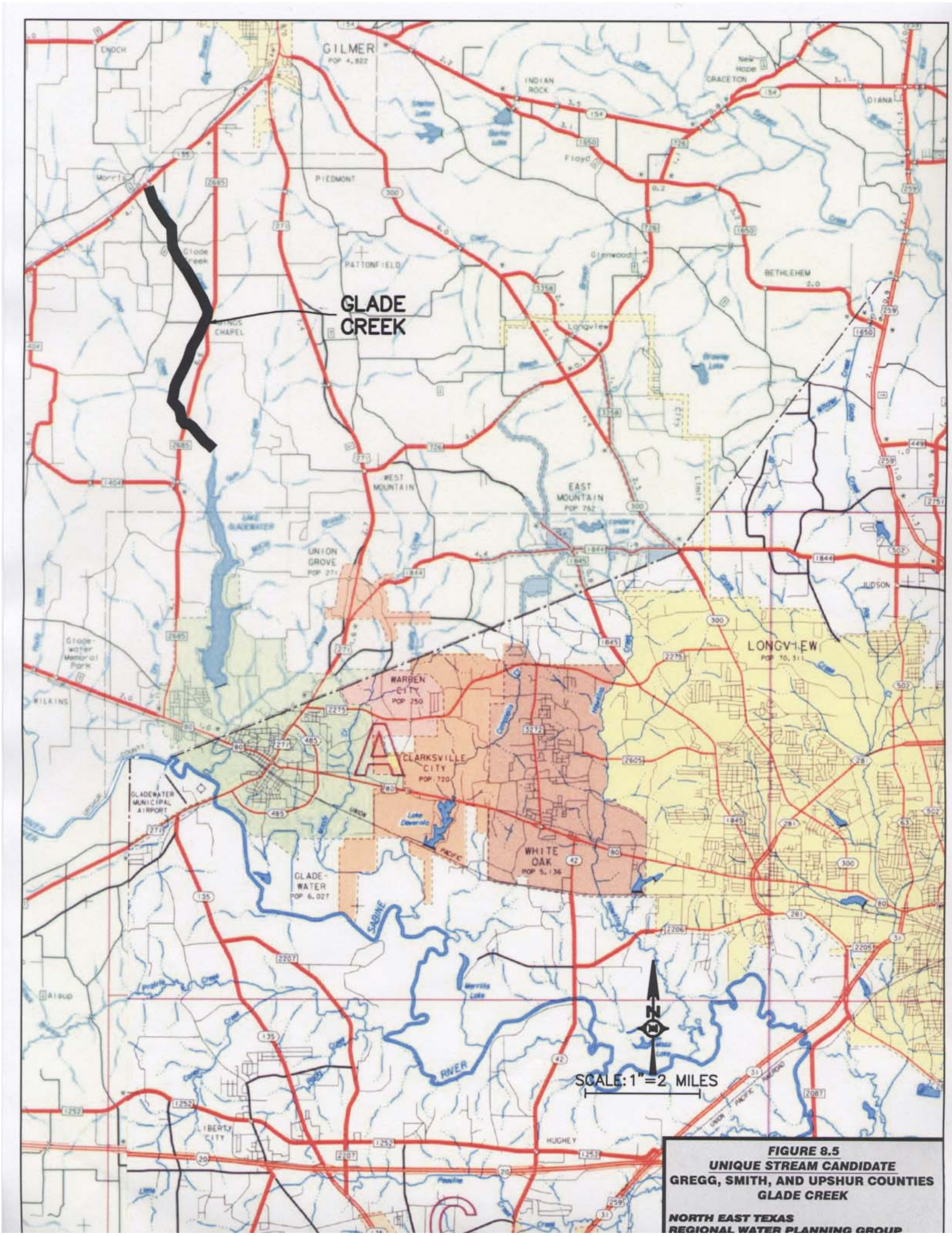
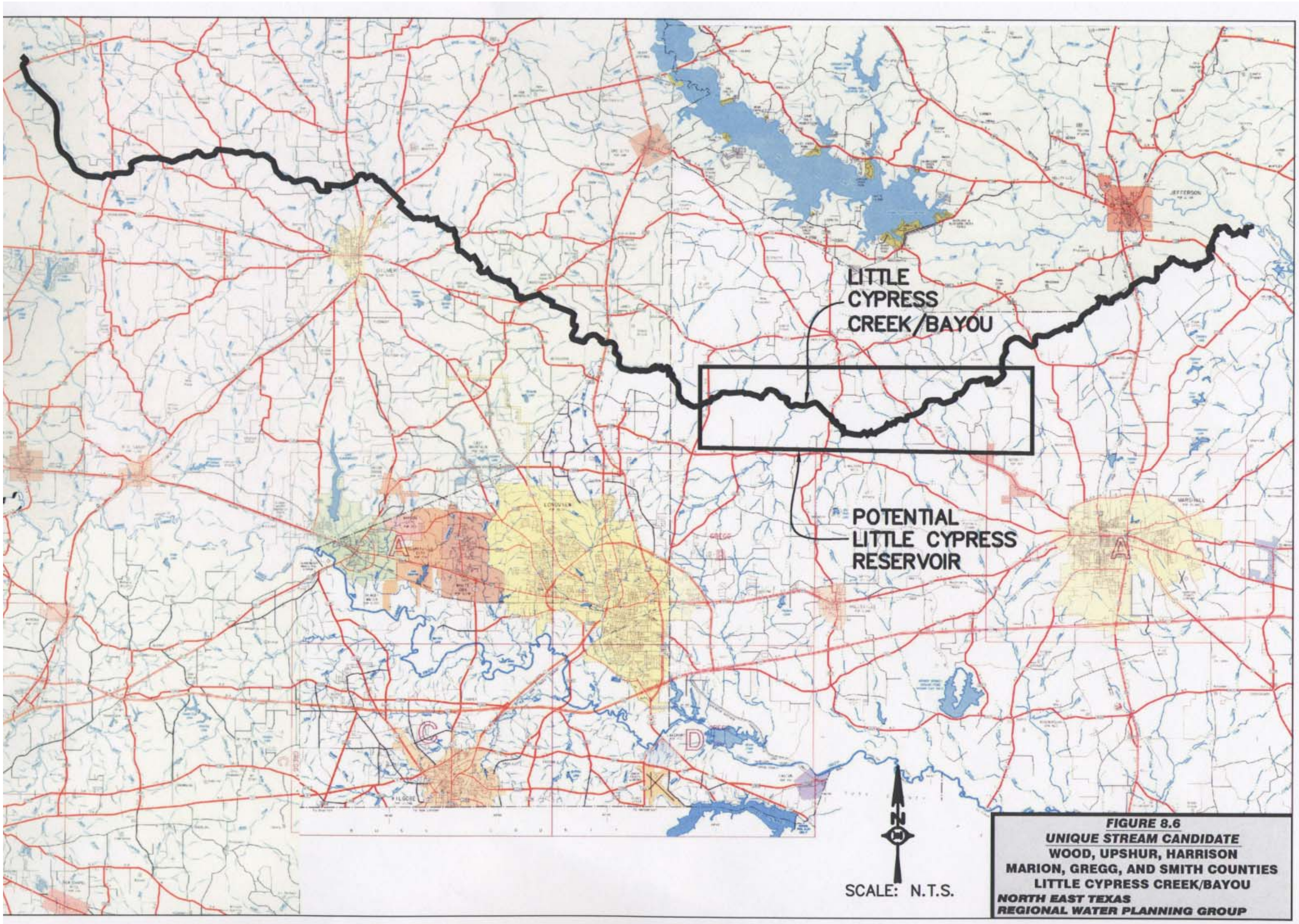



FIGURE 8.3
UNIQUE STREAM CANDIDATE
TITUS, MORRIS, AND CAMP COUNTIES
BIG CYPRESS CREEK
NORTH EAST TEXAS
REGIONAL WATER PLANNING GROUP


FRAZIER CREEK
DOUGLASVILLE
QUEEN CITY
ATLANTA
LINDEN
SCALE: 1"=3 MILES
FIGURE 8.4
UNIQUE STREAM CANDIDATE
CASS, AND MARION COUNTIES
FRAZIER CREEK
NORTH EAST TEXAS
REGIONAL WATER PLANNING GROUP


GLADE
CREEK
GILMER
LONGVIEW
WHITE
OAK
CLARKSVILLE
CITY
WARREN
CITY
GLADE-
WATER
EAST
MOUNTAIN
WEST
MOUNTAIN
UNION
GROVE
SCALE: 1"=2 MILES
FIGURE 8.5
UNIQUE STREAM CANDIDATE
GREGG, SMITH, AND UPSHUR COUNTIES
GLADE CREEK
NORTH EAST TEXAS
REGIONAL WATER PLANNING GROUP


LITTLE CYPRESS CREEK/BAYOU
POTENTIAL LITTLE CYPRESS RESERVOIR
SCALE: N.T.S.
FIGURE 8.6
UNIQUE STREAM CANDIDATE
WOOD, UPSHUR, HARRISON
MARION, GREGG, AND SMITH COUNTIES
LITTLE CYPRESS CREEK/BAYOU
NORTH EAST TEXAS
REGIONAL WATER PLANNING GROUP

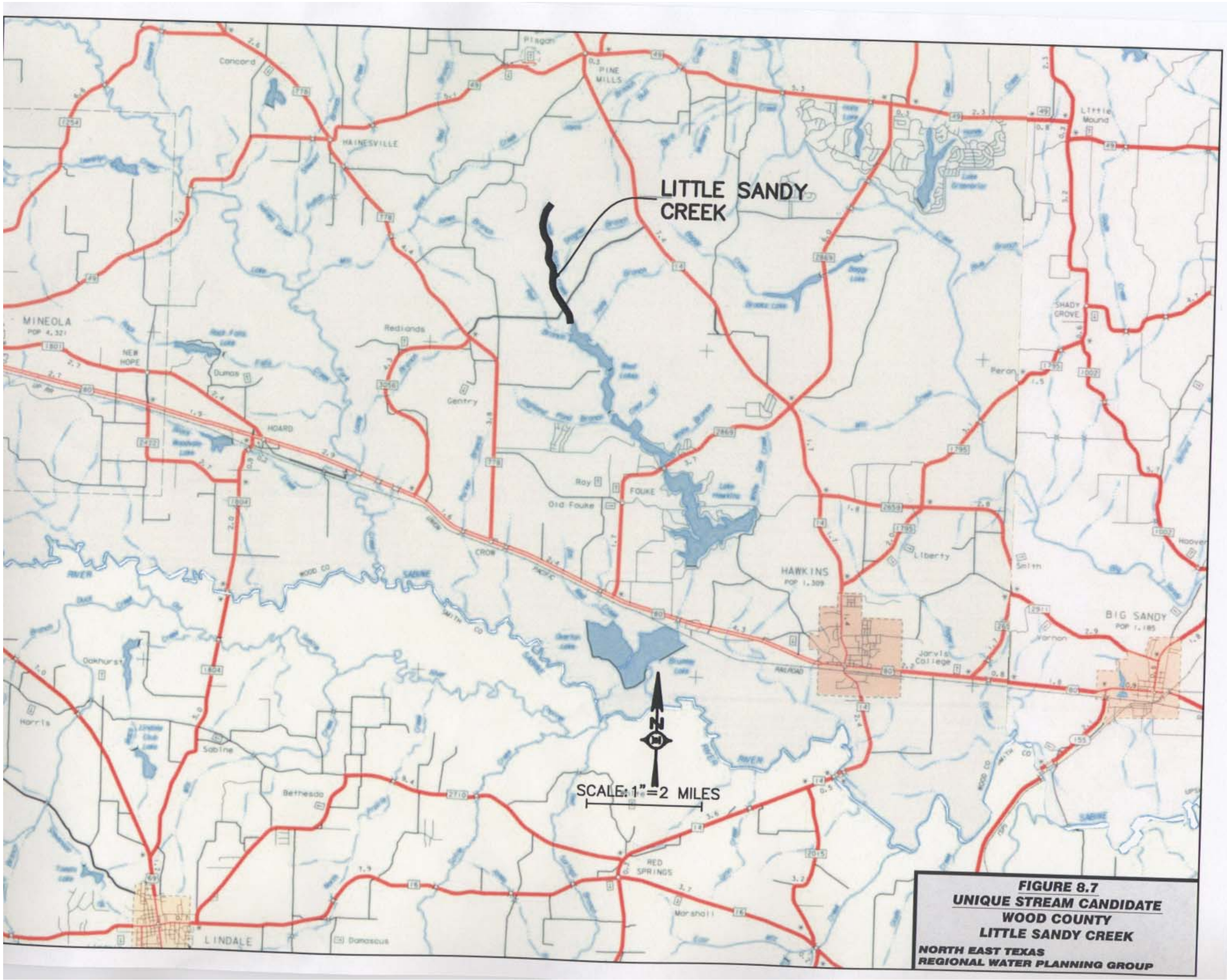



FIGURE 8.7
UNIQUE STREAM CANDIDATE
WOOD COUNTY
LITTLE SANDY CREEK
NORTH EAST TEXAS
REGIONAL WATER PLANNING GROUP

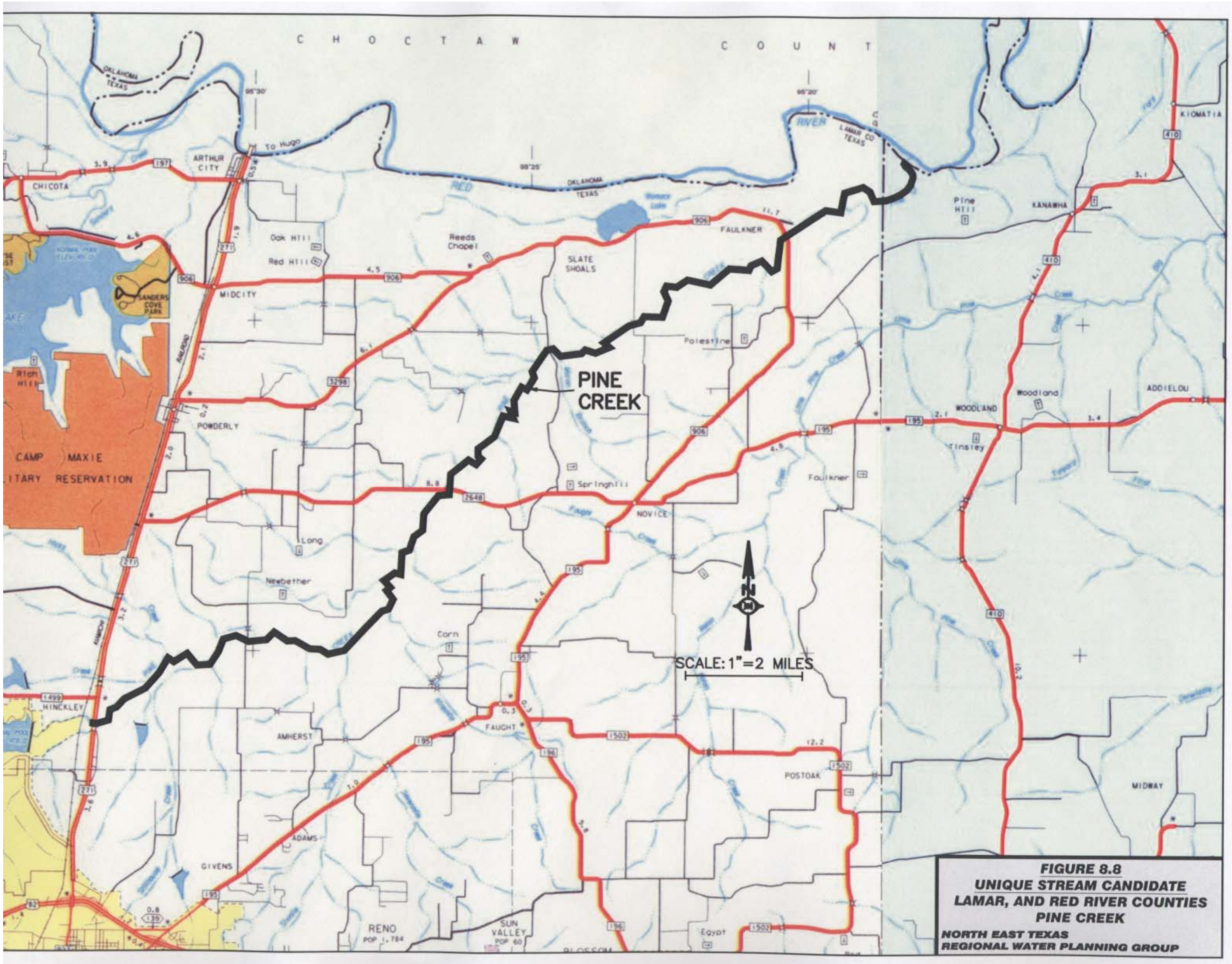
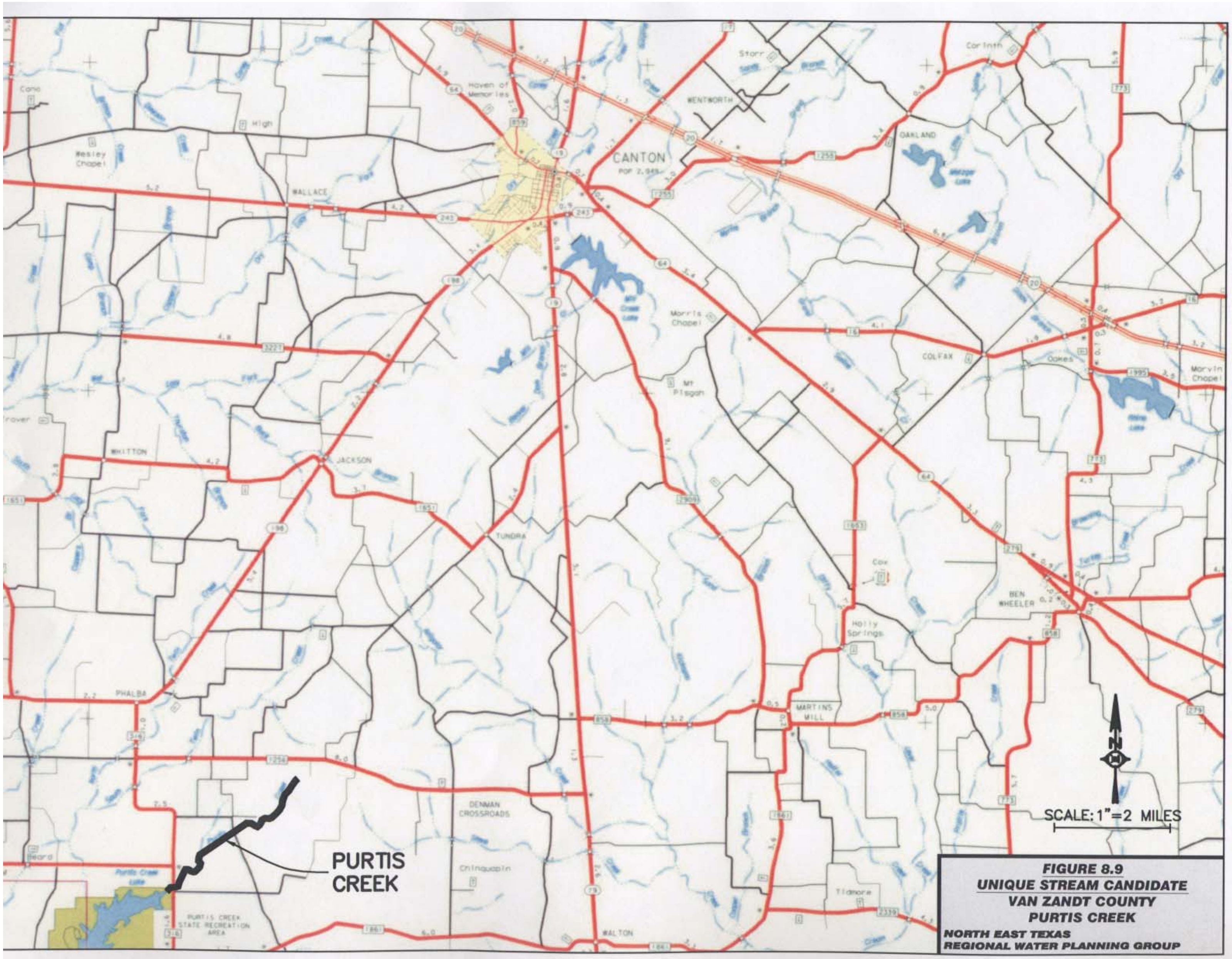
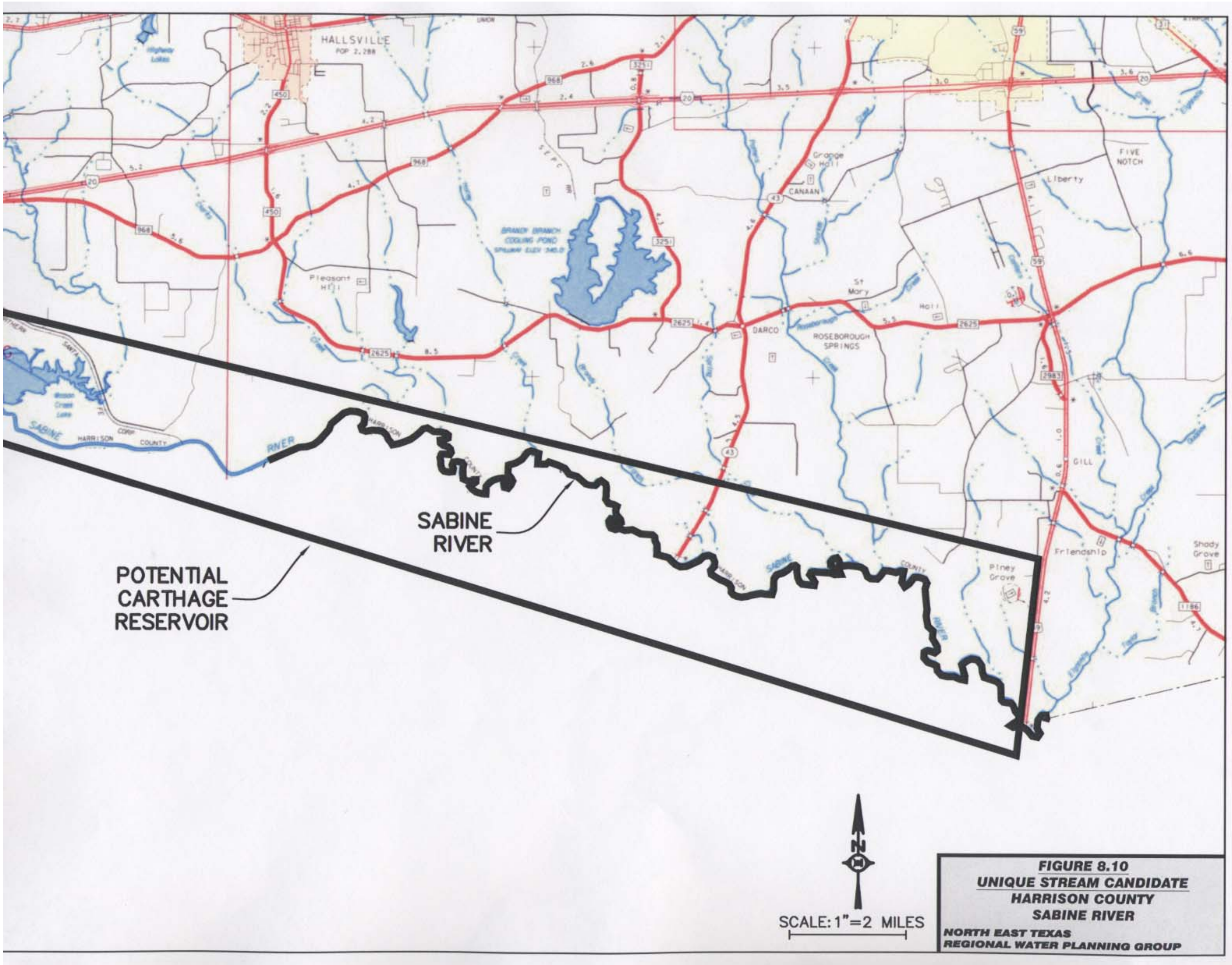
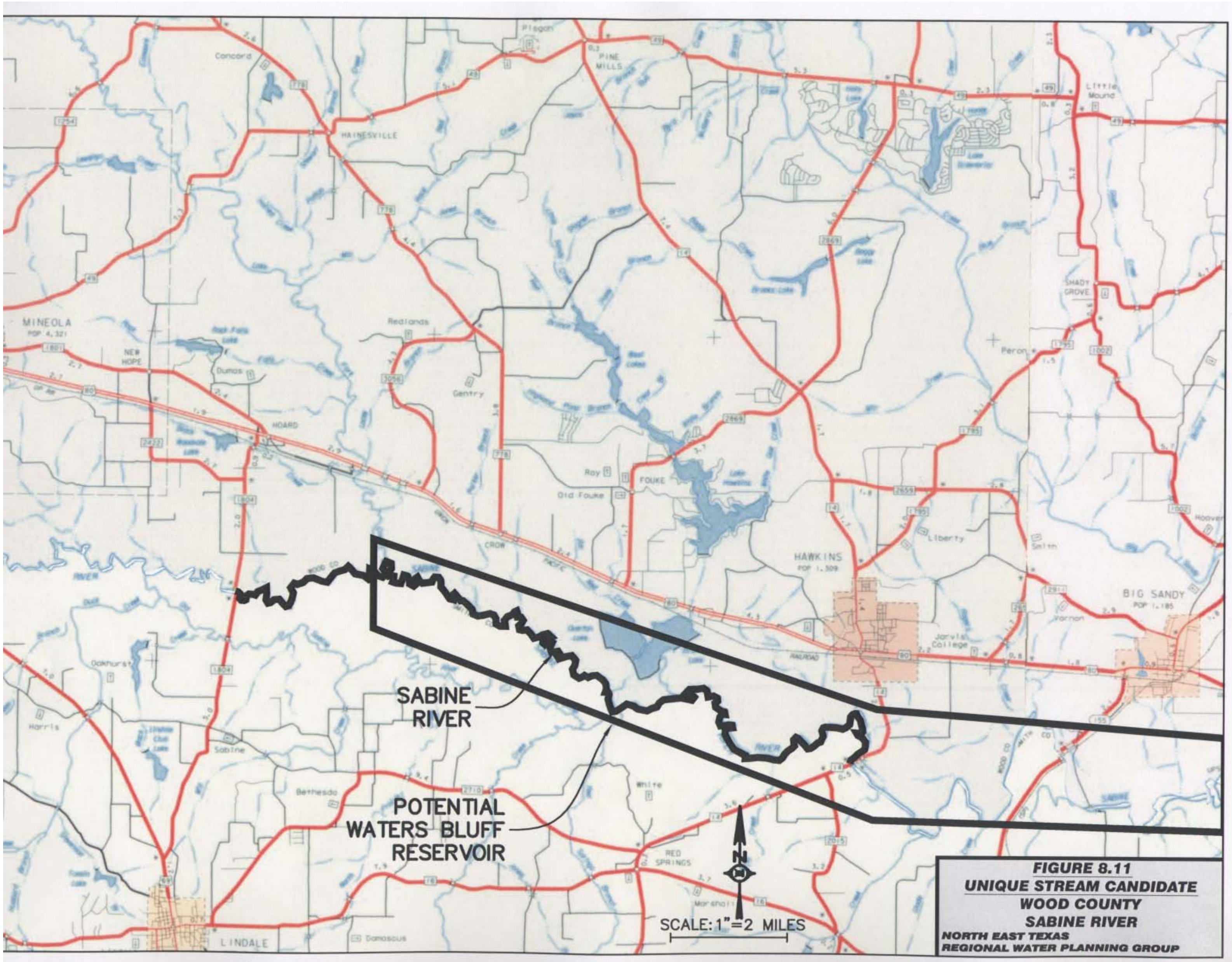



FIGURE 8.8
UNIQUE STREAM CANDIDATE
LAMAR, AND RED RIVER COUNTIES
PINE CREEK
NORTH EAST TEXAS
REGIONAL WATER PLANNING GROUP


CANTON
PURTIS
CREEK
SCALE: 1"=2 MILES
FIGURE 8.9
UNIQUE STREAM CANDIDATE
VAN ZANDT COUNTY
PURTIS CREEK
NORTH EAST TEXAS
REGIONAL WATER PLANNING GROUP


HALLSVILLE
SABINE
RIVER
POTENTIAL
CARTHAGE
RESERVOIR
SCALE: 1"=2 MILES
N
FIGURE 8.10
UNIQUE STREAM CANDIDATE
HARRISON COUNTY
SABINE RIVER
NORTH EAST TEXAS
REGIONAL WATER PLANNING GROUP


SABINE RIVER
POTENTIAL WATERS BLUFF RESERVOIR
SCALE: 1"=2 MILES
MINEOLA
HAWKINS
BIG SANDY
LINDALE
FIGURE 8.11
UNIQUE STREAM CANDIDATE
WOOD COUNTY
SABINE RIVER
NORTH EAST TEXAS
REGIONAL WATER PLANNING GROUP

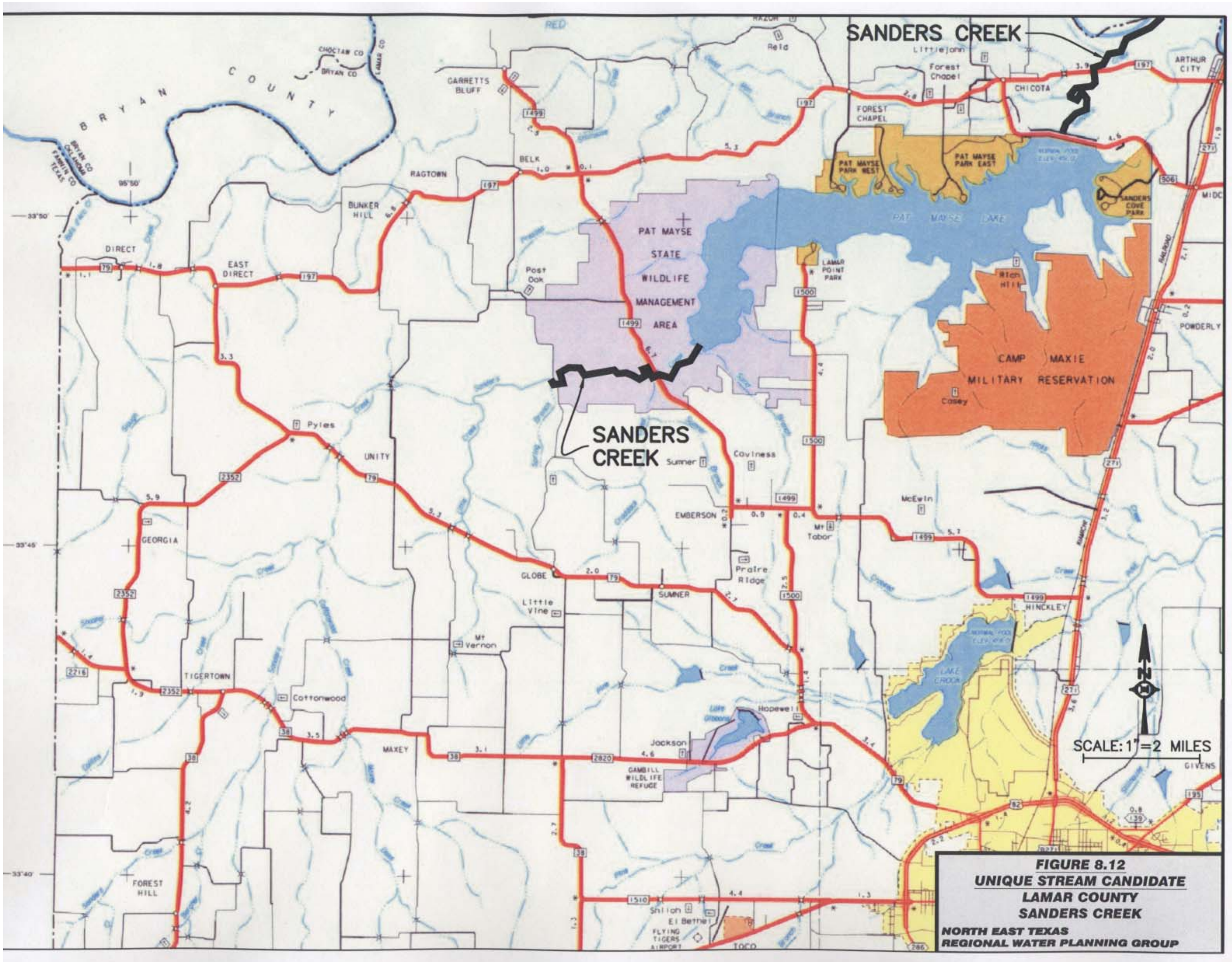
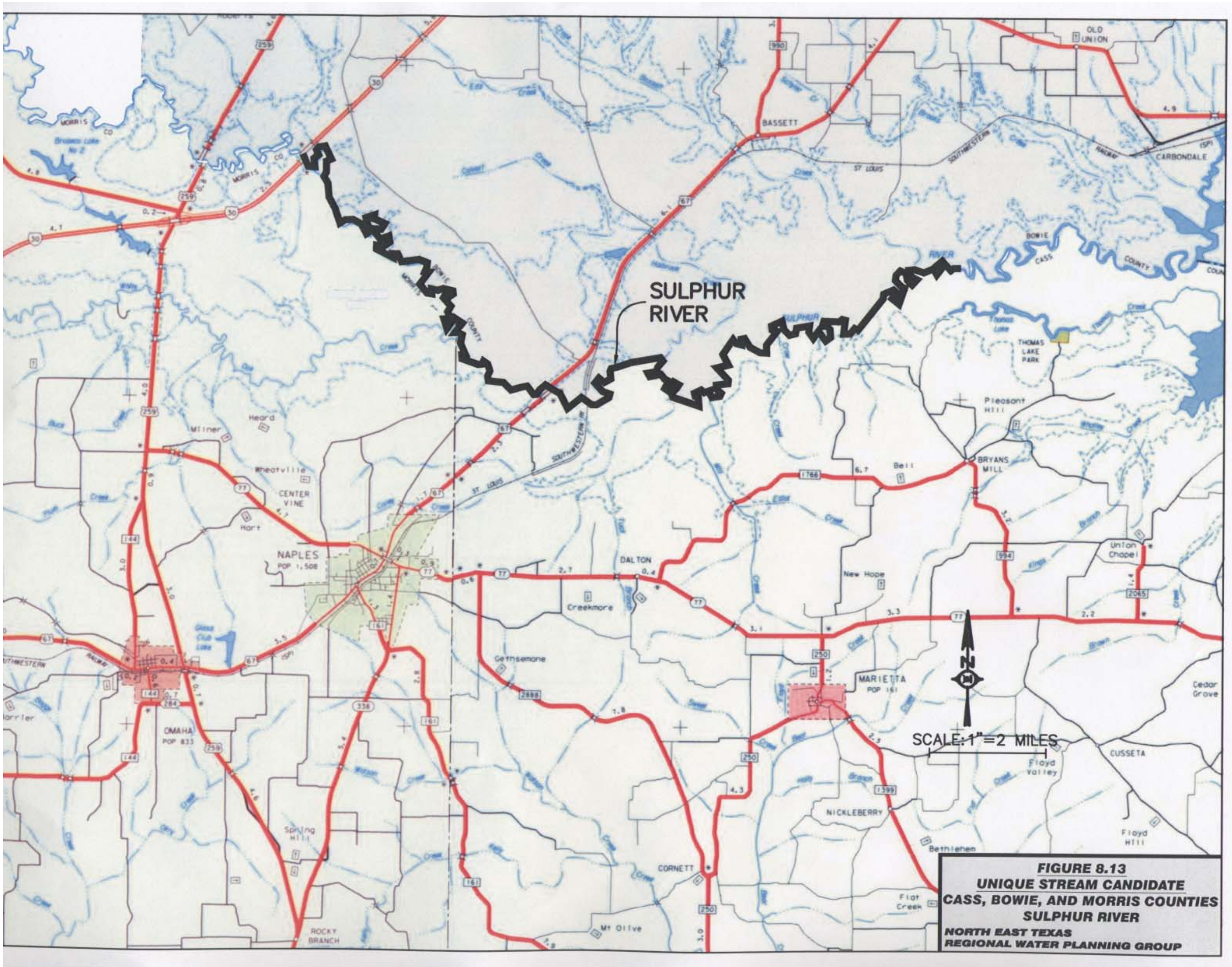



**FIGURE 8.12**
**UNIQUE STREAM CANDIDATE**
**LAMAR COUNTY**
**SANDERS CREEK**
**NORTH EAST TEXAS REGIONAL WATER PLANNING GROUP**


SULPHUR
RIVER
BASSETT
CARBONDALE
OLD UNION
THOMAS LAKE PARK
Pleasant Hill
BRYANS MILL
Bell
Union Chapel
NAPLES
POP 1,508
CENTER VINE
Wheatville
Milner
Heard
Hart
DALTON
Creekmore
New Hope
Gethsemane
MARIETTA
POP 161
OMAHA
POP 833
Cedar Grove
CUSSETA
Floyd Valley
NICKLEBERRY
Bethlehem
Floyd Hill
Spring Hill
CORNETT
Flat Creek
Mt Olive
ROCKY BRANCH
SCALE: 1" = 2 MILES
FIGURE 8.13
UNIQUE STREAM CANDIDATE
CASS, BOWIE, AND MORRIS COUNTIES
SULPHUR RIVER
NORTH EAST TEXAS
REGIONAL WATER PLANNING GROUP

## 8.2 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 Martin 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)

**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)
Pecan Bayou (Red River)

Figure 8.14 shows the approximate location of the previously proposed and potential reservoir sites in the North East Texas Region.

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 second quarter 2002 price levels using the *Engineering News Record* Construction Cost Index.

## 8.2.1 Cypress Creek Basin

As indicated above, three potential reservoir sites in the Cypress Creek Basin were included in the *Reservoir Site Assessment Study* (Appendix B), *2001 North East Texas Regional Water Plan* for the North East Texas Region – Black Cypress, the enlargement of Caddo Lake, and Little Cypress. However the 2001 plan did not recommend the Black Cypress and the Caddo Lake enlargement, therefore, the Little Cypress is the only one included here and is briefly described below.

**8.2.1(a) 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 (2002), the total cost to develop the reservoir would be approximately $340.2 million with an annualized cost of nearly $24 million. The unit cost of water from the project on an annualized basis would be $164 per ac-ft ($0.51/1,000 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, 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. Also, 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 | $340,200 | $164 |

## 8.2.2 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, and Big Pine 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 and the 2001 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.

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.

### 8.2.2(a) 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.

### 8.2.2(b) 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 the 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.

#### 8.2.2(c) 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 $56.7 million dollars. The cost per ac-ft of firm yield on an annualized basis is $140 ($0.42/1,000 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.

## 8.2.3 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.

#### 8.2.3(a) 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 $86.1 million. The annualized cost per ac-ft of firm yield would be $144 ($0..44/1,000 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.

**8.2.3(b) 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 $405.5 million. The project would provide water at a unit cost of approximately $324 per ac-ft ($1.01 /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 site 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.

**8.2.3(c) <u>Carthage</u>**

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 $500.1 million. On an annualized basis, the unit cost of water from the project would be approximately $70 per ac-ft of firm yield ($0..22/1,000 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.

**8.2.3(d) <u>Kilgore II</u>**

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.

**8.2.3(e) <u>Prairie Creek</u>**

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 in 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 and 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 $61.0 million, which would provide water at an annualized cost of $277 per ac-ft of firm yield ($0.85/1,000 gallons). The addition of the diversion of flows from the Sabine River would increase the project development costs to $65.1 million and would reduce the unit cost of water to $174 per ac-ft ($0.54/1,000 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 $180 per ac-ft of firm yield ($0.55/1,000 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.

### 8.2.3(f)<u>Waters Bluff</u>

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 $504.6 million, with an annualized unit cost of water of $118 per ac-ft of firm yield ($0.38/1,000 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.

A summary of key characteristics of the six reservoir sites that were examined in the Sabine River Basin is provided in Table 8.4.

**Table 8.4 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 | 4,405 | 46,600 | $ 86,100 | $144 |
| Carl Estes | 393,000 | 24,900 | 95,630 | $ 405,500 | $324 |
| Carthage | 651,914 | 41,200 | 537,000 | $ 500,100 | $ 70 |
| Kilgore II | 16,270 | 817 | 5,500 | NA | NA |
| Prairie Creek | 45,164 | 2,280 | 17,215 | $ 61,000 | $ 277 |
| Prairie Creek with Diversion | 45,164 | 2,280 | 29,685 | $ 65,100 | $ 174 |
| Prairie Creek with Pipeline | 45,164 | 2,280 | 115,000 | $ 188,800 | $ 180 |
| Waters Bluff | 525,163 | 36,396 | 324,000 | $ 504,600 | $ 118 |

## 8.2.4 <u>Sulphur River Basin</u>

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, George Parkhouse II, and Pecan Bayou. Each is described below.

### 8.2.4(a) <u>Marvin Nichols I</u>

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 Cyresss 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 unappropriated 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 right for Marvin Nichols I Reservoir. Should that agreement happen, it will enhance the yield of Marvin Nichols I Reservoir.

The estimated cost to develop the Marvin Nichols I reservoir, updated to 2002 dollars, is $482.9 million. The total annualized cost of the project, including debt service and operations and maintenance costs, is $34.2 million, which results in a unit cost of roughly $66 per ac-ft of firm yield ($0.21/1,000 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. 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.

#### 8.2.4(b) <u>Marvin Nichols II</u>

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 $352 million in 2002 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 list seven birds, four fish, three mammals, one mollusk, four reptiles, and one vascular plant 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.

#### 8.2.4(c) 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 $243 million and the project would provide water at an annualized unit cost of approximately $163 per ac-ft of firm yield ($0.51/1,000 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 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.

**8.2.4(d) 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 $207 million to develop the reservoir, the annualized cost of water from the project would be $100 per ac-ft of firm yield ($0.31/1,000 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.

### 8.2.4(e) Pecan Bayou

The Pecan Bayou reservoir site is located in Red River County on Pecan Bayou, which is a tributary of the Sulphur 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 112 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 $15.0 million. The unit cost of water from the reservoir would be $689 per ac-ft of firm yield ($2.12/1,000). Potential beneficiaries of this project include municipal and industrial water users in the vicinity of the site in Red River County.

Based on a review of readily available information, there are 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 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.

A summary of key characteristics of the five reservoir sites that were examined in the Sulphur River Basin is provided in Table 8.5.

**Table 8.5 Potential Reservoir Sites in the Sulphur 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 | $ 482,900 | $ 66 |
| Nichols II | 772,000 | 35,900 | 280,100 | $ 270,700 | |
| Parkhouse I | 685,706 | 29,740 | 113,500 | $ 243,000 | $ 163 |
| Parkhouse II | 243,600 | 12,300 | 131,850 | $ 207,000 | $ 100 |
| Pecan Bayou | 688 | 112 | 1,866 | $ 15,000 | $ 689 |

### 8.2.5 Recommendations for Unique Reservoir Site Identification, Development and Reservoir Site Preservation

The North East Texas Water Planning Group recommends that any new reservoir in Region D be pursued only after all other viable alternatives have been exhausted. The NETRWPG further recommends that no reservoir sites in Region D be designated as unique reservoir sites in this plan or in the 2007 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 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.

## 8.3 Legislative Recommendations

TWDB rules for the 2006 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 2006 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 Marvin Nichols reservoir site in the Sulphur River Basin as a water management strategy for providing water outside the Region. The North East Regional Water Planning Group amended the wording in the 2001 Regional Water Plan to change Marvin Nichols Reservoir site from a proposed site to a potential site. Other issues that were addressed by resolution were the apparent disregard of the regional water planning process by the General Land Office; standards for arsenic in drinking water; and the mandating and managing of mitigation lands by the USACE. Issues that remained from the 2001 plan are future interbasin transfers from the North East Texas Region; conversion from groundwater to surface water supplies; groundwater policy; 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.

### 8.3.1 Marvin Nichols Reservoir Site

The Marvin Nichols Reservoir Site in the Sulphur River Basin as designated in the 2001 plan has been of great concern in the meetings for the 2006 plan preparations. In December 2002 the NETRWPG amended the 2001 plan to change the designation of the site from a proposed site to a potential site but the issue has remained at each of the subsequent planning meetings. At issue were basic rights of the property owners and the local government entities. Subject to the comments in Chapter 7, the following recommendations should apply to all reservoirs considered in the NETRWPG area:

- All other alternatives such as conservation and alternate available water supply sources 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 additional 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.

**8.3.2 Arsenic Standards in Drinking Water** The NETRWPG recommends that the requirement of a maximum of 50 ppb standard for the arsenic be reinstated until such time as water inventory considerations and scientific data are taken into account and that any recommendation to change the standards be broad based and discussed in the light of public scrutiny. The current Arsenic Rule (AR) provides for improved health, safety, and welfare of the public by requiring public water systems to minimize arsenic levels in the potable water system. The AR establishes monitoring requirements and includes maximum contaminant levels for arsenic. This rule also clarifies two compliance requirements for IOCs, VOC's, and SOCs. All public water systems are required to comply.

**8.3.3 Mitigation Lands Jurisdiction by the USACE** The NETRWPG recommends that the total concept of mandating and managing mitigation lands be removed from the USACE and turned over to the individual states. The NETRWG believes that in current form the regulations and requirements for the mitigation of certain developments in environmentally sensitive area are both restrictive and onerous in their application. In a December 2002 USACE news release entitled *Protecting and Restoring America's Wetlands: Agency Actions to Improve Mitigation and Further the Goal of "No Net Loss" of Wetlands* the USACE states that "In combination with the Department of Agriculture's Wetlands Reserve and Conservation Reserve Programs, these restoration efforts are expected to take the country from annual net loss to net wetlands gain." The NETRWPG does not support the net loss of wetlands but believes that the removal of productive forest lands from the economy is best left to the individual states to determine what a proper and just mitigation is.

**8.3.4 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 via a proposed pipeline from Toledo Bend to the Prairie Creek Reservoir, Lake Fork Reservoir, and/or Lake Tawakoni will be used as a supply source for the upper Sabine Basin.

**8.3.5 Recommendations 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 water supply. Current TCEQ regulations require a public water supply well to have a 150 foot sanitary easement in relation to an oil or gas well, but there is no similar requirement for the drilling of an oil or gas well in proximity to water wells. The initial drilling of a production well allows for the placement of 100 feet of surface pipe even though the aquifer may have 800 feet of formation. Finally, the plugging of wells termed dry holes has not kept up with TCEQ requirements and the existing regulations should be strictly enforced.

### 8.3.6 Recommendation on Mitigation

Any Planning group or entity proposing a new reservoir or any other water management strategy should address the subject of mitigation as early in the process as practical and as fully as possible. A study on possible mitigation effects should be undertaken and completed at the earliest practical date. Information should include estimates of mitigation, predication ratios, and other information useful to landowners potentially affected by mitigation requirements.

### 8.3.7 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 2002 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, not to the water planning regions. 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 new reservoirs.

### 8.3.8 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 2060 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 68 individual water user groups are projected to experience shortages during the planning period. 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. In the Sabine Basin, existing supply in the Toledo Bend Reservoir will be returned to the upper basin.

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

Shifting demographics and economic and technological change could result in substantially higher demand for water in the North East Texas Region than is currently projected. For example, there is an observed trend over the past decade in many areas of the U.S. of higher population growth in small and medium sized cities and rural areas. This has been attributed in part to advancements in telecommunications and the evolving information and service based economy, which no longer requires a concentration of labor in large cities. Another factor is the aging of the population and the trend toward retirement in rural areas. Also, development of a new reservoir in the region could, itself, act as a significant catalyst for economic development and growth. 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 NETRWPG may want to review a possible policy recommendation regarding the definition of "need" in the basin of origin. Some members have also suggested broadening the test of need for interbasin transfers to consideration of projected needs throughout the *region* of origin, not just the basin of origin.

### 8.3.9 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. 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.

### 8.3.10 Compensation

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. There are several ways that compensation for the transfer of additional water supplies from the region could be approached. Examples include:

- Retaining ownership of the 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 governmental entities in the impacted area.

There are significant implications of new reservoir development and future interbasin transfers across regional lines 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.

### 8.3.11 <u>Conversion of Public Water Supplies from Groundwater to Surface Water</u>

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.

### 8.3.12 Recommendations

Given the potential limitations on both the quantity and quality of groundwater supplies within the North East Texas Region, the NETRWPG recommends the following:

- The TWDB should provide funding support for an in-depth assessment of groundwater-supplied public water systems that have or may have difficulty achieving compliance with state and federal drinking water standards due to the quality of source waters. The assessment should identify and evaluate alternative means of achieving or maintaining compliance with state and federal standards including the potential for acquisition of alternative water supplies and regionalization of systems of public water supply systems within the North East Texas Region. This assessment should be completed on a schedule that will allow the results to be incorporated, as appropriate, into the next update of the North East Texas Regional Water Plan.

### 8.3.13 Groundwater Policy

The NETRWPG has concerns about policies relating to groundwater availability. The concerns relate to the methods prescribed by the TWDB to estimate water availability from the major and minor aquifers within the region.

The Carrizo-Wilcox formation is the major aquifer in the region for water supply purposes. The methodology used in the past by the TWDB indicates that there are large quantities of groundwater available from this formation which may, in fact, be unavailable at the locations, depths, or standards of quality that permit economically feasible development by water users. That is, the variability of the aquifers is such that suitable areas for groundwater development could be great distances from the areas of need, requiring construction of expensive pipelines to transport the groundwater. Alternatively, a suitable groundwater supply formation may be at such depths below the surface that drilling and energy costs to develop the source would be prohibitive, especially for small rural water systems. In some areas, groundwater quality is poor and would require costly treatment to achieve compliance with state and federal drinking water standards (i.e., removal of natural contaminants such as iron, fluoride, hydrogen sulfide, salts, or other elements). These same concerns also apply to other smaller aquifers within the North East Texas Region.

Another area of concern regarding groundwater has been the role it should play in planning for overall water supply. Some have proposed reserving this resource for agriculture and/or rural water users while directing other users to surface water supplies. Another suggestion is to reserve groundwater primarily as a backup supply in periods of drought and use renewable surface water supplies as the primary source under normal conditions. Since the management of water across the region is divided among hundreds of mostly small water providers, such policies would have the effect only of articulating broad planning goals to work toward in the future.

### 8.3.14 Recommendations

The NETRWPG supports the completion of the TWDB's Groundwater Availability Modeling (GAM) Program. It is hoped that the development of new modeling tools will result in more accurate and realistic assessments of groundwater availability within the North East Texas Region. In particular, TWDB is urged to consider water quality and economic factors in future estimates of groundwater availability. Specifically, any groundwater availability model developed for aquifers within the North East Texas Region should have the ability to generate estimates of the quantity of groundwater that is available that meets current state and federal drinking water standards for total dissolved solids without treatment (i.e., 1,000 mg/l).

### 8.3.15 Texas Commission on Environmental Quality Regulations

The TCEQ minimum requirement of 0.6 gallons per minute per connection for public drinking water systems is a significant issue for many water providers in the North East Texas Region. Currently, this requirement is not 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.

MTBE and other contaminants pose a significant threat to water supply sources in the North East Texas Region, as the recent MTBE spill into Lake Tawakoni illustrated all too well. There are two dimensions to this issue. First, 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. Second, since 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 threats to drinking water sources that may lead to placement on the state's list of impaired lakes.

### 8.3.16 Recommendations

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 public 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 risks to drinking water supplies.

### 8.3.17 Water Availability Model (WAM) Results October 2005

The NETRWPG has received the results of the Water Availability Model (WAM) incorporating the effects of the proposed water management strategies dated October 2005. These results are at the 20 Control Points selected by the NETRWPG for the streams in the North East Texas Region based on the TWDB's Run 8 Model. The NETRWPG does want to comment on these results but has not completed the evaluation of the long term effects on the streams at the identified Control Points and ultimately the Region as a whole. The results provided include recommended water management strategies from all Regions, not just the NETRWPG Area, therefore the NETRWPG requests that the TWDB provide similar results for those Control Points with only the NETRWPG recommended water management strategies shown. The NETRWPG does reserve the right to provide additional comments on these results and any future data provided.

### 8.3.18 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 demand, 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 accelerates 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" for approved municipal water demand projections. Some usage rates are in the 70-80 gpcpd range, a sharp contrast with large urban areas where 200 gpcpd or more is not uncommon. Landscape watering, a prime target for urban water conservation programs, is much less prevalent in rural areas. Further, the housing stock is not undergoing rapid growth or replacement, thus reducing the potential impact of plumbing fixture efficiency standards.

The NETRWPG also has concerns about the TWDB requirement that regional water plans include a single specific recommendation as the strategies to be implemented to meet the water needs of individual water user groups. In many cases it is believed that while there may be a "preferred strategy," flexibility is necessary to allow for changing circumstances and conditions.

**8.3.19 Recommendations**

The NETRWPG offers the following recommendations with regard to improvements to the S.B. 1 regional water planning process:

- TWDB should revise its rules for regional water planning to permit greater flexibility in the calculation of future water demands to allow for the consideration of alternative scenarios of population growth and economic development;

- 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;

- TWDB should revise its rules for regional water planning to allow multiple options to be put forth as recommended strategies for meeting the needs of individual water user groups.

- TWDB should consider the entire text of the Regional Water plans in making consistency determinations of inter-region conflicts.

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# 9.0 Infrastructure Finance Report

## 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 RWPGs propose for the State in financing the recommended water supply projects.

### 9.1 (a) 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 was then entered into a TWDB-created Excel spreadsheet, included in the Appendix to Chapter 9.

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. Because 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 second 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 NETMWD. The RWPG 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 is 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. Both TXU 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 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. A capital cost cannot be included for this alternative since the location of the future generator facilities is unknown.

## 9.3 IFR Spreadsheet

The North East Texas RWPG identified 64 entities with water shortages during the second round of planning. Of these, 23 entities had contractual shortages, meaning that a simple renewal of their existing water supply contract or renewal with an increase in supply would solve the WUGs' water needs. Since there is no capital funding required to meet this type of water need, these entities were not included in the IFR. Of the remaining 41 entities with identified shortages, four were county aggregate WUGs, and are discussed in section 9.2 of this report. Therefore, 37 WUGs were involved in the IFR survey process.

The RPWG consultants contacted the 37 entities with water management strategies requiring capital costs by mailing out the TWDB survey form. This form contained the WUG's 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, telephone, or in person. Actual completed survey forms have been included in the Appendix to Chapter 9.

Once attempts had been made to contact all 37 WUGs, the survey results were compiled into an Excel spreadsheet, which was provided by TWDB. This spreadsheet has been included in the Appendix to Chapter 9. A breakdown of the capital costs, strategies, and implementations is included as Table 9.1.

**Table 9.1 – Capital Costs and Strategies by Political Subdivision**

| Name of Political Subdivision | Recommended Strategy | Capital Cost | Implementing Strategy? (Y/N) | Alternative Strategy |
|---|---|---|---|---|
| Red River Redevelopment Authority | Caney Creek Lake/Elliott Creek Lake | $ 50,000 | Y | |
| Woodland Harbor | Groundwater, Carrizo-Wilcox | $ 775,872 | | |
| Linden, City of | Groundwater, Carrizo-Wilcox | $ 340,579 | Y | |
| Ben Franklin WSC | DC MUD, Big Creek Lake | $ 363,517 | N | Does not believe they will have a shortage. |
| Clarksville City, City of | Groundwater, Carrizo-Wilcox | $ 1,518,443 | Y | |
| Liberty City WSC | Groundwater, Carrizo-Wilcox | $ 2,096,569 | Y | |
| West Gregg SUD | Groundwater, Carrizo-Wilcox | $ 1,502,847 | Y | |
| Starrville-Friendship WSC | Groundwater, Carrizo-Wilcox | $ 316,158 | Y | |
| Waskom, City of | Groundwater, Carrizo-Wilcox | $ 455,466 | Y | |
| Blocker-Crossroads WSC | Groundwater, Carrizo-Wilcox | $ 483,057 | Y | |

| | | | | |
|---|---|---|---|---|
| Caddo Lake WSC | Groundwater, Carrizo-Wilcox | $ 227,734 | Y | |
| Leigh WSC | Groundwater, Carrizo-Wilcox | $ 139,610 | Y | |
| Scottsville, City of | Groundwater, Carrizo-Wilcox | $ 167,953 | Y | |
| Talley WSC | Groundwater, Carrizo-Wilcox | $ 760,772 | Y | |
| Miller Grove WSC | Groundwater, Nacatoch | $ 479,955 | | |
| Campbell WSC | City of Commerce, Lake Tawakoni | $ 618,674 | Y | |
| Celeste, City of | City of Greenville, Lake Tawakoni | $ 1,938,749 | N | If needed, will construct more wells or purchase water from local utilities. |
| Hickory Creek SUD | Groundwater, Woodbine | $ 6,880,290 | Y | |
| Wolfe City | City of Commerce, Lake Tawakoni | $ 3,580,323 | | |
| West Leonard WSC | Groundwater, Woodbine | $ 890,430 | Y | |
| Little Creek Acres | Cash WSC, Lake Tawakoni | $ 100,670 | N | Groundwater |
| Crystal Systems Inc. | Groundwater, Carrizo-Wilcox | $ 992,200 | Y | |
| Lindale Rural WSC | Groundwater, Carrizo-Wilcox | $ 316,158 | Y | |
| Lindale, City of | Groundwater, Carrizo-Wilcox | $ 510,648 | Y | |
| Star Mountain WSC | Groundwater, Carrizo-Wilcox | $ 316,158 | Y | |
| Prichett WSC | Groundwater, Carrizo-Wilcox | $ 270,925 | Y | |
| Bethel Ash WSC | Groundwater, Carrizo-Wilcox | $ 337,913 | Y | |
| Canton, City of | Groundwater, Carrizo-Wilcox | $ 1,229,656 | | |
| Grand Saline, City of | Groundwater, Carrizo-Wilcox | $ 574,243 | Y | |
| R-P-M WSC | Groundwater, Carrizo-Wilcox | $ 574,243 | Y | |
| Corinth WSC | Groundwater, Carrizo-Wilcox | $ 281,295 | Y | |
| Crooked Creek WSC | Groundwater, Carrizo-Wilcox | $ 212,882 | | |
| Edom WSC | Groundwater, Carrizo-Wilcox | $ 661,715 | Y | |
| Fruitvale WSC | Groundwater, Carrizo-Wilcox | $ 1,944,744 | Y | |
| Little Hope-Moore WSC | Groundwater, Carrizo-Wilcox | $ 1,395,045 | Y | |
| Mineola, City of | Groundwater, Carrizo-Wilcox | $ 243,334 | N | New storage tank with larger capacity |
| Yantis, City of | Groundwater, Carrizo-Wilcox | $ 227,734 | Y | |

Survey findings are as follows:

- Thirty-two of the thirty-seven WUGs were successfully contacted regarding the IFR survey.

- Twenty-seven of the 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 $24,090,774. Of these 27 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. Several small systems are in need of anywhere from $40,000 to $300,000. The fiscal and legal cost of issuing bonds, or the administrative requirements to administer State programs, makes it cost prohibitive to utilize many of the State assistance programs currently available. Therefore, systems are forced to seek financing from private sources and pay higher interest rates than systems that utilize State 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.

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## 10.0 Adoption of the Plan and Public Participation

This chapter summarizes the public participation process used in the development and adoption of the North East Texas Regional Water Plan, the NETRWPG's responses to public comments, procedural approaches used in facilitating adoption of the plan, and comments expressed by participants at public comment sessions. There is a copy of all public written comments received in the Appendix along with notes of oral comments made during the public meetings.

## 10.1 Introduction

The North East Texas Regional Water Planning Group (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 RWPG could hold public hearings. Therefore, the Planning Group held its public meetings and its monthly meetings in the central locations of Mount Pleasant in Titus County and Gilmer in Upshur County. There is no newspaper with 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 dailies 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 (a) Public Comment Opportunities at NETRWPG Meetings

Every meeting of the NETRWPG 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 (b) 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 for the regional planning process.

A required public hearing was held in Gilmer in Upshur County, a central location in the North East Texas Region, on December 9, 2004, and was attended by approximately 70 people. The comments were summarized in Appendix B of this report and addressed such issues as reservoir development, mitigation, interbasin transfers, groundwater quality, the link between water planning and economic development, and community concerns about displacement due to reservoir development and many other issues.

### 10.2 (c) Public hearing on the Initially Prepared Plan

As required by TWDB rules, the NETRWPG held a second public hearing on the Initially Prepared Plan to solicit public input on aspects of the plan. The hearing was held at Gilmer in Upshur County on August 2, 2005, and was attended by approximately 95 persons. Comments made at the public hearing were dominated by the opposition to the development of additional and are summarized in the Appendix B of this report.

### 10.2 (d) 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 RWPG 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 (e) 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 RWPG members, the Regional Administrator (the North East Texas Municipal Water District), the NETRWPG presidents Tony Williams and Jim Thompson.  The public outreach program consisted of three elements: 1) public comment periods at the conclusion of each meeting 2) distribution of press releases prepared on the day following each monthly meeting to all daily and weekly papers in the region; and 3) a newsletter published at least three (3) times in 2002, five (5) times in 2003, six (6) times in 2004 and five (5) times in 2005, mailed to public officials, activists, news media outlets, and others who asked to receive the publication. The publication focused on outcomes of the NETRWPG’s meetings, future projects, issues of public concern and planning strategies.

### 10.2 (f) 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 (g) Preparation and Distribution of News Releases After RWPG Meetings

A summary of each meeting in the form of a press release was prepared and was distributed to the daily and weekly papers across the region. These press 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 2002, four (4) news releases corresponding with Planning Group meetings were distributed to all newspapers within the 19-county region. Two (2) such releases were distributed in 2003, eight (8) news releases were distributed in 2004, and eight (8) news releases were distributed in 2005.

### 10.2 (h) 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 are contained herein.

### 10.2 (i) Contacts with Media

In addition to distributing press 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 (j) 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.

## 10.3 Public Meetings and Hearings

### 10.3 (a) Public Hearings and Comments Prior to Submission of the Draft Regional Plan

The NETRWPG conducted public comment sessions at the conclusion of each NETRWPG meeting. The first of two prescribed public hearings was held on December 9, 2004, at Gilmer in Upshur 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 while the Regional Water Plan 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. A number of petitions were also accepted at the Gilmer meeting.

The public comment sessions were well-publicized with press releases, a NETRWPG newsletter distribution, and advance notice at a previous NETRWPG monthly public meeting. Approximately 95 people attended the public comment sessions in Gilmer. Not all of the individuals, however, choose to make oral or written comments. Individuals attending and registering were from DeKalb, Bogata, Pattonville, Paris, Lake Creek, Cooper, Mexia, Denton, Clarksville, Gilmer, Kilgore, Talco, Avinger, Linden, Melissa, Roxton, Prairie Creek, Atlanta, Maud, Longview, Mount Pleasant and Sulphur Springs.

### 10.3 (b) Categories of Public Comments

The public comments were divided into three categories:

1. <u>Property Rights (mitigation, pipelines from existing lakes, new lakes, and other).</u> In this category, 13 individuals registered to speak. Not all of those who registered actually made comments as some individuals were commenting on identical issues.
2. <u>Environment and Natural Resources (wildlife, recreation, forestry, and other)</u>. In this category, ten individuals registered to speak. Some were the same individuals who registered for the Property Rights category. Again not everyone who registered actually spoke.
3. <u>Water Supply Issues (surface, groundwater, reuse, conservation, desalination, per-capita water usage, infrastructures, and other)</u>. In this category, five individuals registered to speak. Some were individuals who also registered for Property Rights and Environmental and Natural Resources. Again not everyone who registered actually spoke

Eighteen individuals submitted written comments, using forms provided at the Public Comment Session or letters written to the NETRWPG. Twelve individuals made oral comments in the three comment sessions. Thirteen petitions containing 165 names were submitted by the Sulphur Oversight Society and Friends United for a Safe Environment in opposition to Marvin Nichols Reservoir and George Parkhouse Reservoirs I and II "as unneeded and injurious to the land and people, threatening to deprive Northeast Texans of their homes, property, and water," and urging the NETRWPG "to do all in your power to stop this."

**10.3 (c) Synopsis of Oral and Written Comments at the December 9, 2004 Public Hearing**

The following comments represent the consolidation of written and oral comments made during the December 9, 2004, public hearing comment session in Gilmer in Upshur County. The full text of the written and oral comments is contained in Appendix B.

- Region D should have within its mission an effort to protect property rights.
- There exists enough water to serve Northeast Texas' needs without building any new reservoirs.
- Region D and Texas, as a whole, should focus more on desalination efforts.
- More conservation and reuse projects are needed in Region D.
- The Dallas area should be made to slow down its growth and water usage so it will not need water from Region D.
- Marvin Nichols is not needed, and "we on the Sulphur River are fighting for our lives and property."
- Building lakes is a nineteenth century strategy; it is outdated.
- There are already enough lakes in Northeast Texas to serve its needs.
- Dallas needs to learn how to conserve water.
- A mitigation bank is needed for roads and pipelines.
- The projections for population growth in Northeast Texas are out of synch.
- Raise the dam of Wright Patman Lake if we need more water.
- Patman Lake is discharging 5,000 cubic feet of water per second down river.
- All Region D votes should be done by raising hands.
- Region D consultants should distribute copies of their reports to the public.
- Region D members should not be voting on the plan without reading it.
- Region D's job should be to protect property rights.
- Public attendance at Region D meetings is not reflective of the opposition; there are many more opposed to Marvin Nichols.
- Region C is in the process of creating wetlands (mitigation) while being opposed to mitigation in Region D.
- Consultants are getting 30% of the money for pipelines going to Dallas.
- Marvin Nichols would take 70,000 acres of timberland out of productivity and injure the region's economy.
- Region D needs to look at Toledo Bend Reservoir if new water is needed in the region.
- The Texas Railroad Commission has not represented the public interest in respect to groundwater protection.
- Oil wells should not be drilled next to groundwater wells.

- Our lands in the Marvin Nichols lake site are "endangered, many of us have lived in the area 46 years."
- "What a mockery to say you want to hear our concerns, and encourage us to participate...when most of the board members did not even stay to hear the public comments."
- People should contact their legislators about water issues in Region D.
- Please spare our lands and homes.
- Do not consider Prairie Creek as an option; instead consider Big Sandy...it can be built for much less cost.
- The loss of timberland to the (Nichols) reservoir site and required mitigation would be at a minimum of 250,000 acres.
- "We live in a time when the whole state is in turmoil trying to capitalize on our precious natural resources; the new lake building epidemic is out of control..."
- "I am a sixth generation Texan and will someday inherit family land in the Sulphur River basin. On this land an old family cemetery is located where my great-great-great-great grandparents are buried..."
- The Sulphur River lakes do not need to be built. "Let the land alone. The water needs to flow."
- "For every five farmers that go under and fail, one business will fail. This is why hospitals and schools close..."
- The Wilcox Cortez (Carrizo?) Fresh Water Aquifer is one of the state's largest; this very aquifer provides the source (of water) for many cities in East Texas...this aquifer has been drilled through more than 40,000 times within the East Texas oil field; what this means is that you have a conduit which connects the oil formation with the freshwater formation..."

**10.3 (d) Summary of the August 2, 2005, Public Hearing**

In advance of the August 2, 2005, public hearing held to solicit comments on the NETRWPG Initially Prepared Plan; the hearing was well-publicized with press releases, a NETRWPG newsletter distribution, and advance notice at a previous NETRWPG monthly public meeting.

Approximately 90 people representing about 30 communities attended the public hearing sessions in Gilmer. Eleven individuals choose to make oral comments; others submitted written comments during the hearing and during the thirty-day comment following the hearing. Communities and cities represented at the hearing included Annona, Atlanta, Avinger, Bogata, Clarksville, Cooper, DeKalb, Douglasville, Gilmer, Greenville, Hallsville, Hughes Springs, Jefferson, Karnack, Kilgore, Klondike, Lindale, Longview, Maud, Mount Pleasant, Mount Vernon, Paris, Pittsburgh, Quitman, Sulphur Springs, Talco, Texarkana and Wylie.

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 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 Richards voiced support for new reservoirs. "With new reservoirs, we can create a better tax base, which will be better for our children," she said.

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 two public hearings 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 David Shumake.

### 10.3 (e) Synopsis of the Oral and Written Comments

The following represents a synopsis of the oral and written comments made at the August 2, 2005, Public Hearing at Gilmer, in Upshur County:

- There should be no more dams built on the Sulphur River.
- There is enough surplus water in Texas to supply the nation' population without building new lakes. It is absurd to build new lakes when we have sufficient water.
- Texas should do more to emphasize a per capita limit on water usage.
- Dallas wants our water, and they want it cheap, so more profits can be made in Dallas.
- The Region D board should be thanked for building trust among the people of North East Texas. You have done an exceptional job.
- You, as Region D board members, are charged with protecting the agricultural economy of this region.
- I encourage you, as water planners, to consider raising the level of Wright Patman Reservoir instead of building new lakes. Use brackish water and more groundwater as alternatives to new lakes.
- I hope we're all here to keep out the new lakes. We need to keep our lands for our kids and grandchildren. We have prime hardwoods and trees, and Dallas can get its water somewhere else.
- Thank you, Region D, for taking a long, hard look at Marvin Nichols.
- Marvin Nichols would take a third of all land in Red River County if it is built.
- The destiny of Region D will be determined by what is done in planning our water resources, including new reservoirs.
- I hope you will keep your finger on our resources for our needs. The cities are coming our way, and in ten to twenty years water will be as valuable as oil. If you let someone else do your work, they will own you.

## 10.4 Attachments

- Petitions from individuals and groups opposed to Marvin Nichols Reservoir.

- Comment registration sheets for the December 9, 2004, Public Hearing at Gilmer, Texas.

- Recorded comments at the December 9, 2004, Public Hearing and the August 2, 2005, Public Hearing.

- Resolutions passed by various government entities.

- Written comments submitted by individuals and organizations at both public hearings.

- Newsletters published during 2002, 2003, 2004 and 2005.

- News releases published during 2002, 2003, 2004 and 2005.