Chapter 4

Comparison of Water Demands with Water Supplies to Determine Needs

This chapter describes the comparison of estimated current water supply for drought-of-record conditions (from Chapter 3) and projected water demand (from Chapter 2). From this comparison, water shortages or surpluses under drought-of-record conditions have been estimated. This comparison is called the first tier water needs. To better understand the water needs after conservation and direct reuse strategies have been implemented, a secondary needs analysis was also conducted. Listings of the first tier and second tier water needs by water user group are included in Appendices 4-A and 4-B respectively.

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

The comparison of current water supply and projected water demand in the ETRWPA is evaluated on a regional basis, by county, by WUG and by WWP. Section 4.1 presents a regional comparison of current supply and projected demand. Section 4.2 presents a county-by-county comparison of current supply and projected demand. Section 4.3 presents the comparison of current supply and projected demand for each WUG. Section 4.4 discusses shortages for the WWPs in the region. An economic impact analysis of not meeting the region's projected water shortages is summarized in Section 4.5.

4.1 Regional Comparison of Supply and Demand

Table 4.1 and Figure 4.1 summarize the comparison of total currently developed water supply and total projected water demand for the ETRWPA. The region as a whole has a currently available surplus of developed supplies of 8,049 acre-feet per year (ac-ft per year) in 2020, changing to a shortage of nearly 96,634 ac-ft per year by 2030, and increasing to a shortage of 279,402 by 2070. The actual total of the shortages of individual WUGs are greater, totaling approximately 513,000 ac-ft per year by 2070. The individual shortages by water user are discussed in Section 4.3.

As shown on Figure 4.1, the region has supplies available to meet these needs. Undeveloped (i.e. unconnected) water supplies are identified by comparing the supplies available to each city and category to the current regional water supply sources. The difference between the total fresh water supply reported in Chapter 3 and the supply available to WUGs is between 2.1 and 1.8 million ac-ft per year in each decade of the planning period. Additional infrastructure and/or contracts are needed to utilize these sources.

Table 4.1 Summary of Supply and Demand for the ETRWPA (ac-ft/yr)

	2020	2030	2040	2050	2060	2070
Demands	1,014,137	1,225,764	1,284,749	1,348,611	1,418,176	1,497,139
Developed Supplies	1,022,186	1,129,130	1,150,233	1,172,772	1,196,406	1,217,737
Difference	8,049	-96,634	-134,516	-175,839	-221,770	-279,402

Figure 4.1 Comparison of Regional Water Supplies to Demands

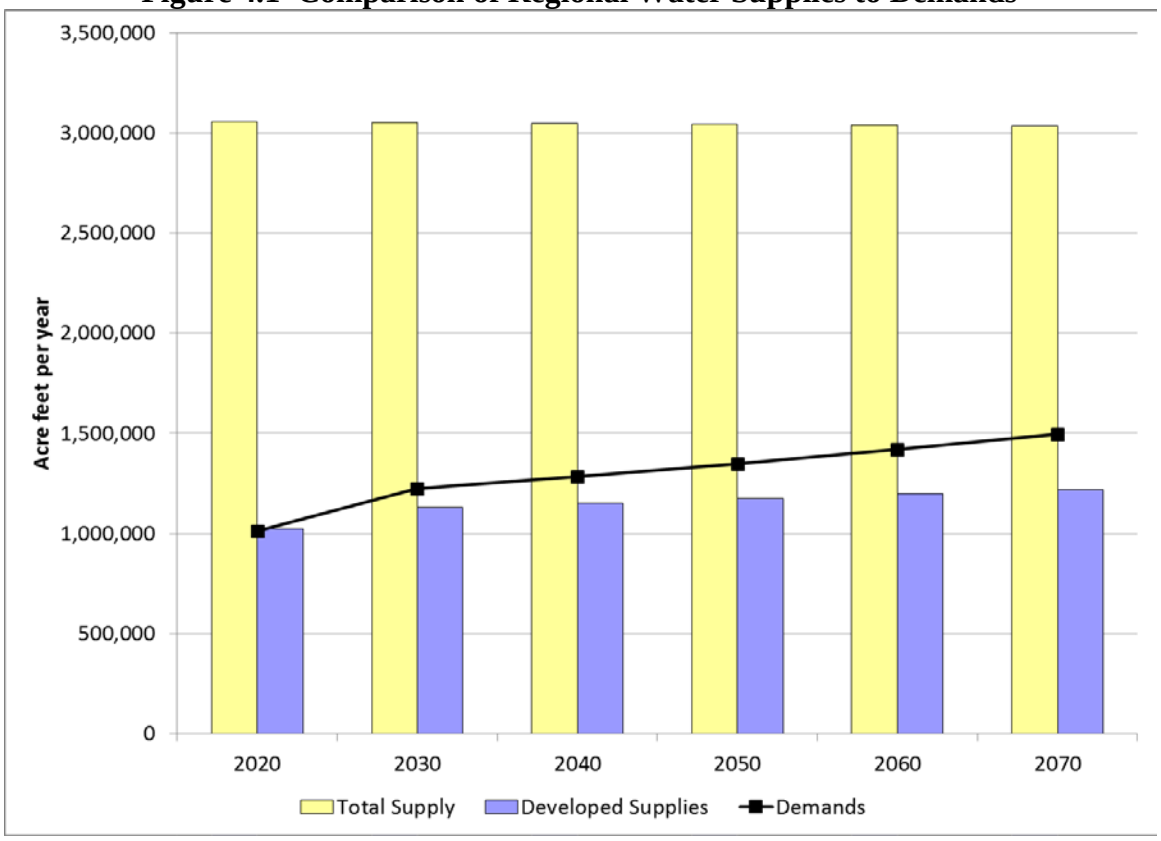

Table 4.2 summarizes regional surpluses and shortages by category of water use. On a regional basis, sufficient supplies exist for municipal and livestock water uses. By far, the greatest shortage is identified for manufacturing. However, lesser shortages are also identified for steam electric power, mining, and irrigation categories. Most of the manufacturing shortages are the result of considerable growth in demands and supplies that are limited to existing contract amounts. The steam electric power shortages are for projected growth that currently does not have an identified source or infrastructure. Mining shortages are largely associated with new mining demands associated with natural gas development and mining demands that have not been realized to date and do not have a current water supply. Even though the municipal water use shows a net surplus in every decade of the planning period, there are individual WUGs that are projected to have shortages during the planning period.

Table 4.2 Summary of Projected Surpluses or Shortages by Water use Type (ac-ft/yr)

Water Use Type	2020	2030	2040	2050	2060	2070
Municipal	48,557	46,690	43,979	38,230	31,501	24,460
Manufacturing	-185,300	-277,259	-299,401	-319,987	-339,240	-359,553
Mining	-5,194	-2,312	3,515	5,663	7,693	8,760
Steam Electric Power	10,863	-3,217	-20,201	-40,797	-65,792	-94,212
Irrigation	46,769	37,036	30,260	27,647	29,669	32,847
Livestock	1,640	257	-1,378	-3,348	-6,011	-6,772

4.2 Comparison of Supply and Demand by County

Table 4.3 shows the projected surpluses and shortages by county for each decade of the planning period both in acre-feet per year and as a percentage of demand. . In general, some shortages exist throughout the region. Ten counties are identified with shortages over the planning horizon, with Anderson, Jefferson, Orange, and Rusk Counties having the largest projected shortages by 2070. As previously discussed and shown in Figure 4.1, these shortages are based on the allocation of supplies with existing constraints. The region has sufficient supplies to meet these shortages. Figure 4.2 shows the amount of unallocated supplies by county in the region. The “Source-Balance” data table in Appendix 4-C lists each water source and the amount of water that is available for future use.

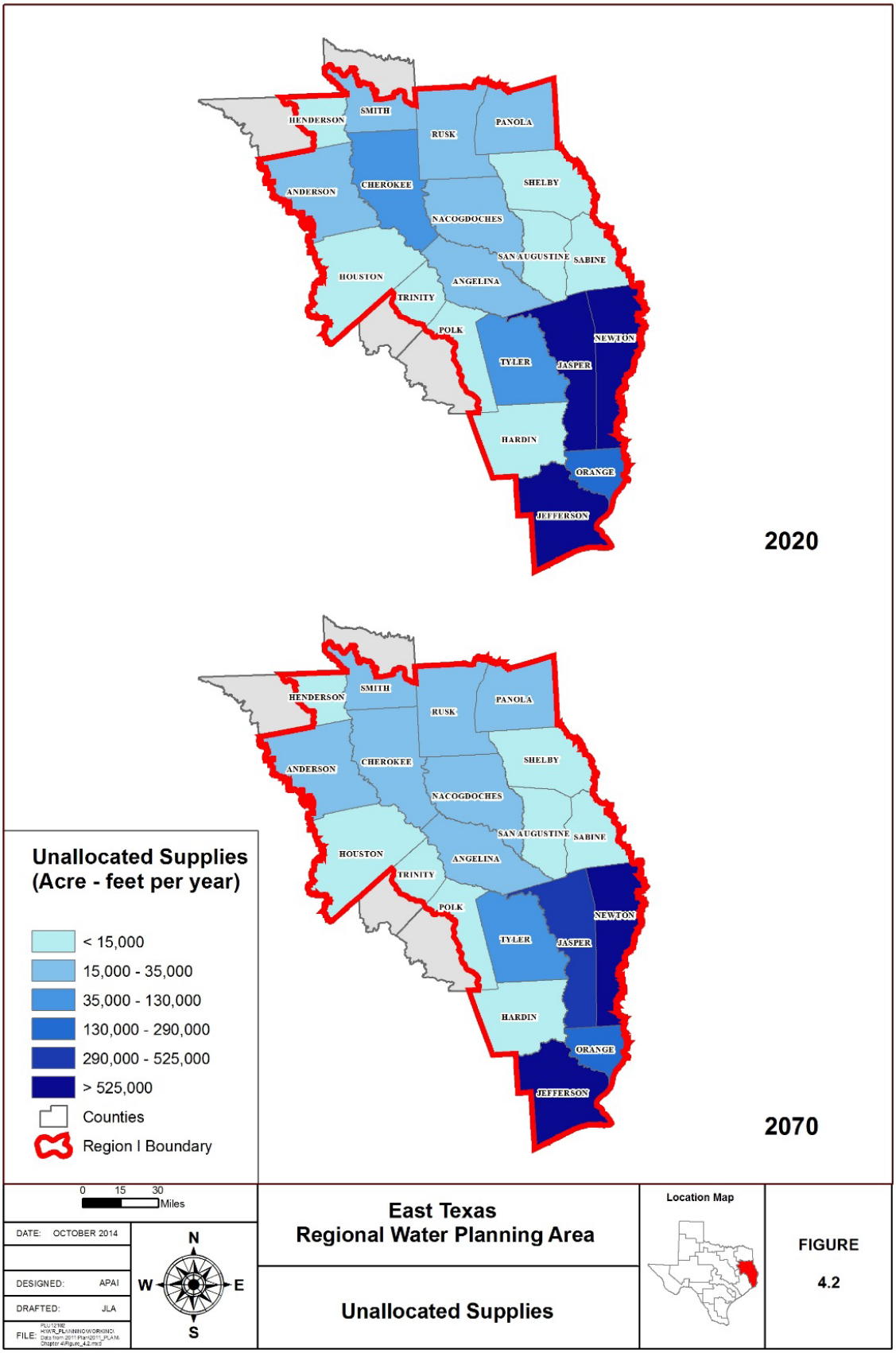
HENDERSON
SMITH
RUSK
PANOLA
ANDERSON
CHEROKEE
SHELBY
NACOGDOCHES
SAN AUGUSTINE
SABINE
HOUSTON
ANGELINA
TRINITY
POLK
NEWTON
TYLER
JASPER
HARDIN
ORANGE
JEFFERSON
2020
2070
Unallocated Supplies
(Acre - feet per year)
< 15,000
15,000 - 35,000
35,000 - 130,000
130,000 - 290,000
290,000 - 525,000
> 525,000
Counties
Region I Boundary
0 15 30
Miles
DATE: OCTOBER 2014
DESIGNED: APAI
DRAFTED: JLA
FILE:
N
W
E
S
East Texas
Regional Water Planning Area
Unallocated Supplies
Location Map
FIGURE
4.2

Table 4.3 Summary of Projected Surpluses or Shortages by County (ac-ft/yr)

County	2020	2030	2040	2050	2060	2070
Anderson	-8,401	-10,332	-12,647	-15,451	-18,895	-23,000
Angelina	11,268	9,752	8,464	7,182	5,810	4,360
Cherokee	5,191	4,655	4,072	3,348	2,481	1,829
Hardin	7,709	7,495	7,337	7,204	7,068	6,960
Henderson*	3,314	3,012	2,792	2,514	1,882	1,407
Houston	2,791	2,562	2,302	1,975	1,571	1,022
Jasper	5,238	1,890	-975	-3,143	-3,217	-3,302
Jefferson	-146,885	-239,339	-260,586	-280,756	-297,625	-314,971
Nacogdoches	5,323	6,498	7,361	5,307	2,781	-319
Newton	18	-2,265	-5,040	-8,509	-12,772	-17,880
Orange	-2,582	-9,616	-16,776	-23,396	-30,825	-38,220
Panola	4,587	4,862	5,468	5,740	6,926	6,687
Polk*	757	767	780	790	804	804
Rusk	22,892	16,782	10,457	2,729	-6,656	-17,755
Sabine	2,789	2,815	2,852	2,874	2,891	2,942
San Augustine	-1,549	-515	1,033	1,342	1,641	1,862
Shelby	18	-963	-2,067	-3,072	-5,411	-5,058
Smith*	-641	-1,401	-2,182	-2,981	-3,882	-4,794
Trinity*	689	684	685	694	680	671
Tyler	6,000	5,998	6,083	6,151	6,202	6,228
TOTAL	**-81,474**	**-196,659**	**-240,587**	**-289,458**	**-338,546**	**-390,527**

*The counties marked with an asterisk are split between two water planning regions. The data presented in this table represents only the portion of those counties that are within the boundaries of Region I.

4.3 Comparison of Supply and Demand by Water User Group

The comparison of supply versus projected demands by user group for entities with shortages is presented in Table 4.4. There are 36 WUGs in 18 counties in the ETRWPA with identified shortages that cannot be met by existing infrastructure and supply. These projected shortages total over 513,000 acre-feet per year by 2070. This is more than double the projected shortages identified in the 2011 Plan.

Of the entities with shortages greater than 5,000 ac-ft per year, six are steam electric power uses (Anderson, Jefferson, Nacogdoches, Newton, Orange, and Rusk), one municipal user (Beaumont), manufacturing in Angelina, Jefferson, Jasper, and Orange County, mining in Nacogdoches County.

Table 4.4 Water User Groups with Projected Shortage (ac-ft/yr)

Water User Group	County	2020	2030	2040	2050	2060	2070
Steam Electric Power		-11,306	-13,218	-15,549	-18,390	-21,853	-25,968
Anderson County Total	**Anderson**	**-11,306**	**-13,218**	**-15,549**	**-18,390**	**-21,853**	**-25,968**
Manufacturing	Angelina	-10,722	-12,009	-13,313	-14,470	-15,705	-17,037
Mining	Angelina	-473	-572	-397	-299	-224	-167
Angelina County Total	**Angelina**	**-11,195**	**-12,581**	**-13,710**	**-14,769**	**-15,929**	**-17,204**
Alto Rural WSC	Cherokee	0	0	2	-66	-137	-215
Mining	Cherokee	-238	-247	-210	-147	-84	-40
Cherokee County Total	**Cherokee**	**-238**	**-247**	**-208**	**-213**	**-221**	**-255**
Chandler	Henderson	0	0	0	-77	-196	-312
Athens	Henderson	-2	-3	-2	-1	-17	-33
R-P-M WSC	Henderson	-4	-23	-36	-54	-71	-86
Manufacturing	Henderson	-48	-56	-64	-72	-79	-88
Henderson County Total	**Henderson**	**-54**	**-82**	**-102**	**-204**	**-363**	**-519**
Irrigation	Hardin	-750	-996	-1,264	-1,562	-1,891	-2,339
Houston County Total	**Hardin**	**-750**	**-996**	**-1,264**	**-1,562**	**-1,891**	**-2,339**
Manufacturing	Jasper	0	-3,049	-6,021	-8,250	-8,335	-8,420
Jasper County Total	**Jasper**	**0**	**-3,049**	**-6,021**	**-8,250**	**-8,335**	**-8,420**
Beaumont	Jefferson	0	0	-500	-2,245	-4,403	-6,896
County Other	Jefferson	0	0	0	-680	-1,924	-3,296
Steam Electric Power	Jefferson	-13,426	-15,696	-18,464	-21,838	-25,951	-30,839
Manufacturing	Jefferson	-180,461	-261,473	-273,106	-284,779	-296,461	-308,603
Jefferson County Total	**Jefferson**	**-193,887**	**-277,169**	**-292,070**	**-309,542**	**-328,738**	**-349,634**
D&M WSC	Nacogdoches	0	0	0	0	-112	-234
Mining	Nacogdoches	-5,475	-2,975	-118	0	0	0
Steam Electric Power	Nacogdoches	0	-1,521	-3,238	-5,268	-7,677	-10,472
Livestock	Nacogdoches	-1,644	-1,837	-2,061	-2,320	-2,617	-3,059
Nacogdoches County Total	**Nacogdoches**	**-7,119**	**-6,333**	**-5,417**	**-7,588**	**-10,407**	**-13,765**
Mining	Newton	-115	-59	0	0	0	0
Steam Electric	Newton	-690	-3,080	-5,994	-9,545	-13,875	-19,021
Newton County Total	**Newton**	**-805**	**-3,139**	**-5,994**	**-9,545**	**-13,875**	**-19,021**

Table 4.4 Water User Groups with Projected shortage (ac-ft/yr) (Cont.)

Water User Group	County	2020	2030	2040	2050	2060	2070
Irrigation	Orange	-2,432	-2,685	-2,858	-2,920	-2,855	-2,758
Manufacturing	Orange	-3,621	-9,599	15,559	-20,850	-26,801	-33,186
Steam Electric Power	Orange	0	-14	-1,038	-2,286	-3,807	-4,846
Orange County Total	**Orange**	**-6,053**	**-12,298**	**-19,455**	**-26,056**	**-33,463**	**-40,790**
Manufacturing	Panola	-134	-156	-176	-194	-230	-309
Panola County Total	**Panola**	**-134**	**-156**	**-176**	**-194**	**-230**	**-309**
Overton	Rusk	0	0	-12	-65	-123	-184
Mining	Rusk	-1,075	-2,092	-1,955	-1,809	-1,686	-1,677
Steam Electric Power	Rusk	0	0	0	-462	-8,873	-18,868
Rusk County Total	**Rusk**	**-1,075**	**-2,092**	**-1,967**	**-2,336**	**-10,682**	**-20,729**
Mining	San Augustine	-2,102	-1,102	0	0	0	0
San Augustine Total	**San Augustine**	**-2,102**	**-1,102**	**0**	**0**	**0**	**0**
Livestock	Shelby	-1,367	-2,375	-3,602	-5,099	-6,924	-6,924
Shelby County Total	**Shelby**	**-1,367**	**-2,375**	**-3,602**	**-5,099**	**-6,924**	**-6,924**
Bullard	Smith	-51	-223	-397	-587	-783	-985
Crystal System Inc.	Smith	-12	-105	-219	-356	-510	-642
Lindale	Smith	-52	-180	-310	-451	-596	-746
Manufacturing	Smith	-1,464	-1,655	-1,838	-1,993	-2,206	-2,437
Mining	Smith	-108	-113	-114	-83	-54	-32
Smith County Total	**Smith**	**-1,687**	**-2,276**	**-2,878**	**-3,470**	**-4,149**	**-4,842**
Irrigation	Trinity	-330	-330	-330	-330	-330	-330
Trinity County Other	**Trinity**	**-330**	**-330**	**-330**	**-330**	**-330**	**-330**
TOTAL Regional Shortage		**-237,013**	**-319,365**	**-338,745**	**-366,968**	**-456,268**	**-509,974**

Note: The Total Regional Shortage is the sum of all shortages in the Region.

The steam electric power shortages are due to increases in demand above generation capacities of current facilities. Some of this demand is predicated on power facilities that are not going forward at this time, but have the potential for development in the future. The manufacturing shortages in Angelina and Orange Counties are due to increased demands above current facilities' supplies. The large manufacturing shortages in Jefferson County are due to increased demands associated with potential future LNG facilities. The City of Beaumont's shortage is due to current surface water treatment capacity. In addition to these shortages, there are several near-term mining shortages associated with renewed interest in natural gas exploration in the Haynesville/ Bossier Shale in East Texas.

4.4 Comparison of Supply and Demand by Wholesale Water Provider

The comparison of supply versus demands for each WWP is presented in Appendix 4-D. Seven WWPs were identified with projected shortages in the ETRWPA over the planning cycle. The SRA does not have a projected shortage within the ETRWPA, but will need to implement strategies to meet demands outside the region. The WWPs with shortages within the region are shown in Table 4.5 and discussed below. WWPs with surpluses within the region are shown in Table 4.6.

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

Table 4.5 Wholesale Water Providers with Projected Regional Shortages for current Customers (ac-ft/yr)

Water Provider	2020	2030	2040	2050	2060	2070
ANRA	-45,254	-45,249	-45,249	-45,249	-45,249	-101,299
A N WCID#1	0	0	-2,866	-3,692	-4,519	-5,305
Athens MWA	0	0	0	0	-2,652	-5,986
Beaumont	0	0	-578	-2,570	-4,994	-7,754
Center	0	0	0	0	-196	-450
Houston County WCID 1	-291	-321	-350	-375	-407	-441
UNRMWA	-4,831	-6,849	-8,869	-10,892	-12,919	-14,940
Total	**-50,375**	**-52,419**	**-57,911**	**-62,778**	**-70,936**	**-136,175**

Note: The shortages shown above are for current customers only. Potential future customers may place additional demands on these providers.

Table 4.6 Wholesale Water Providers with Projected Regional Surpluses for current Customers (ac-ft/yr)

Water Provider	2020	2030	2040	2050	2060	2070
Angelina Nacogdoches WCID #1	7,077	6,250	0	0	0	0
Center	756	511	278	55	0	0
Carthage	2,839	2,799	2,767	2,730	2,653	2,570
Jacksonville	2,915	2,635	2,344	1,947	1,475	955
LNVA	642,968	514,337	498,421	482,660	466,462	449,560
Lufkin	0	8,307	7,757	7,213	6,627	6,035
Nacogdoches	13,415	12,163	10,898	9,562	8,066	6,510
Panola Co.FWSD 1	4,201	3,648	3,546	3,425	3,226	2,464
SRA	642,875	624,319	346,838	124,727	86,754	9,196
Tyler	14,397	12,797	11,122	9,206	7,019	4,716
Total	**1,324,367**	**1,181,516**	**883,971**	**641,525**	**582,282**	**482,007**

Note: The surpluses shown above are for current customers only. Potential future customers may place additional demands on these providers. Port Arthur is not included in Table 4.5 and 4.6 because there is no shortage or surplus.

4.4.1 Angelina and Neches River Authority. ANRA is projected to have a shortage of 105,103 ac-ft per year. ANRA has contractual demands for water from Lake Columbia that are estimated to begin by 2020 (assuming that Lake Columbia is completed by 2020). ANRA has no currently available water supply to meet these contractual demands. The potential management strategy to meet this shortage is the construction of Lake Columbia.

4.4.2 Angelina and Nacogdoches Counties Water Control and Improvement District No. 1. The maximum projected shortage for A-N WCID No. 1 is 5,305 ac-ft per year for Year 2070. Most of this shortage is associated with a contract with the City of Henderson for future use.

4.4.3 Athens Municipal Water Authority. The maximum projected shortage for Athens MWA is 5,986 ac-ft per year. Most of this shortage is associated with operational constraints of Lake Athens for the Athens Fish Hatchery. Several water management strategies are being considered for Athens MWA to meet this need,

including reuse from return flows from the Athens Fish Hatchery and developing groundwater supplies from the Carrizo-Wilcox aquifer.

4.4.4 City of Beaumont. The City of Beaumont is projected to have a water shortage under drought-of-record conditions of 578 ac-ft per year beginning in Year 2040, growing to 7,754 ac-ft per year for Year 2070. Much of the projected shortages are associated with increased demands for manufacturing needs and local growth.

4.4.5 City of Center. The projected water shortage for City of Center is 196 ac-ft per year beginning in 2060 and 450 ac-ft per year beginning in 2070. Much of the projected shortages are associated with increased demands for manufacturing needs and local growth.

4.4.6 Houston County Water Control and Improvement District No. 1. Houston County WCID No. 1 has contractual demands that exceed its permitted supply from Houston County Lake. Houston County WCID No. 1 is currently seeking a permit amendment to increase the permitted diversions from this source.

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

4.5 Socioeconomic Impacts of Not Meeting Needs

Administrative Rules in 31 TAC §357.10 require regional water planning groups to evaluate socioeconomic impacts of not meeting water needs as part of the regional water planning process.

The socioeconomic analysis was conducted by the TWDB after submission of the IPP to the TWDB. The findings were summarized and presented in appendix 4-E to this chapter.

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