

Chapter 4A

Comparison of Water Demands with Water Supplies to Determine Needs

This report 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.

As discussed in Chapter 3, allocations of existing 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 may impact the desirability or continued use of some water sources.

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 4A.1 presents a regional comparison of current supply and projected demand. Section 4A.2 presents a county-by-county comparison of current supply and projected demand. Section 4A.3 presents the comparison of current supply and projected demand for each WUG. Section 4A.4 discusses shortages for the WWPs in the region. Analysis of demands related to future potential users or to demands on supplies located in the ETRWPA, to meet water management strategies outside the region are not discussed in this section of the report. The discussion of these items is included in Chapter 4C, specifically for the LNVA, UNRMWA, and SRA.

4A.1 Regional Comparison of Supply and Demand

Table 4A.1 and Figure 4A.1 summarize the comparison of total currently available water supply and total projected water demand for the ETRWPA. The region as a whole has a currently available surplus of 168,115 acre-feet per year (ac-ft per year) in 2010, changing to a shortage of nearly 3,000 ac-ft per year by 2050, and increasing to a shortage of 55,933 by 2060. The actual total shortages of individual WUGs are greater, totaling 179,282 ac-ft per year by 2060. The individual shortages by water user are discussed in Section 4A.3.

As shown on Figure 4A.1, the region has supplies available to meet these needs. Unconnected water supplies are identified by comparing the supplies available to each city and category to the current regional water supply sources. Excluding unpermitted reservoir yields and brackish water, the difference between the total supply reported in Chapter 3 and the supply available to WUGs is between 2.1 and 1.5 million ac-ft per year in each decade of the planning period (Figure 4A.1). Additional infrastructure and/or contracts are needed to utilize these sources.

Table 4A.1 Summary of Supply and Demand for the ETRWPA

	2010	2020	2030	2040	2050	2060
Demands	730,912	1,083,549	1,277,416	1,340,598	1,411,268	1,490,596
Developed Supplies	899,027	1,177,638	1,360,002	1,387,741	1,408,340	1,434,663
Difference	168,115	94,089	82,586	47,143	-2,928	-55,933

Figure 4A.1 Comparison of Regional Water Supplies to Demands

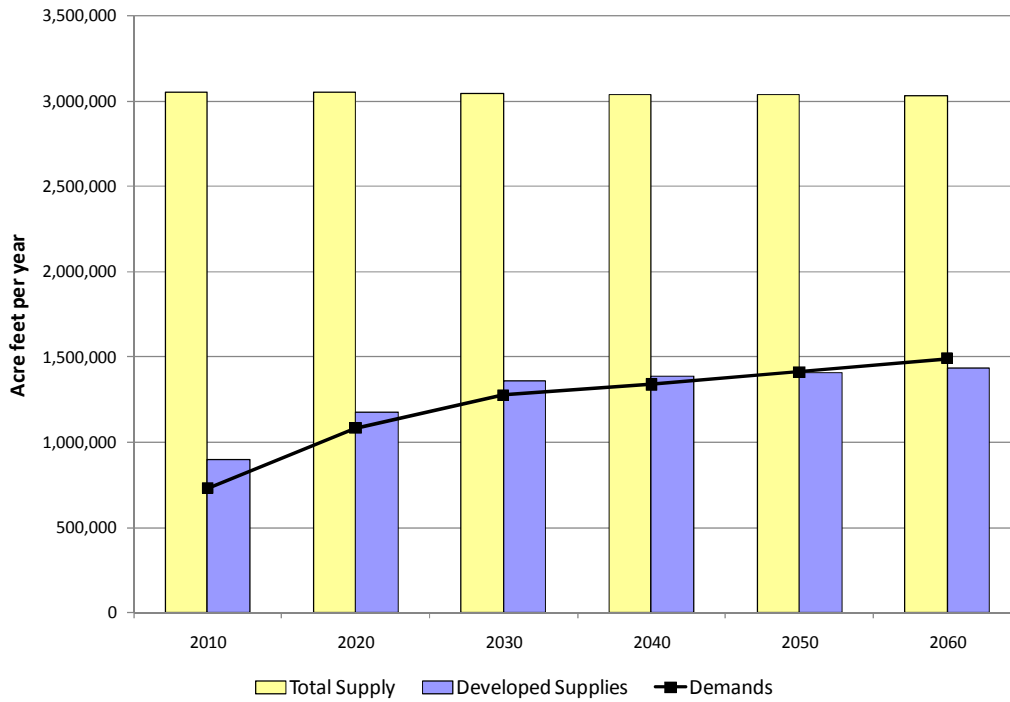
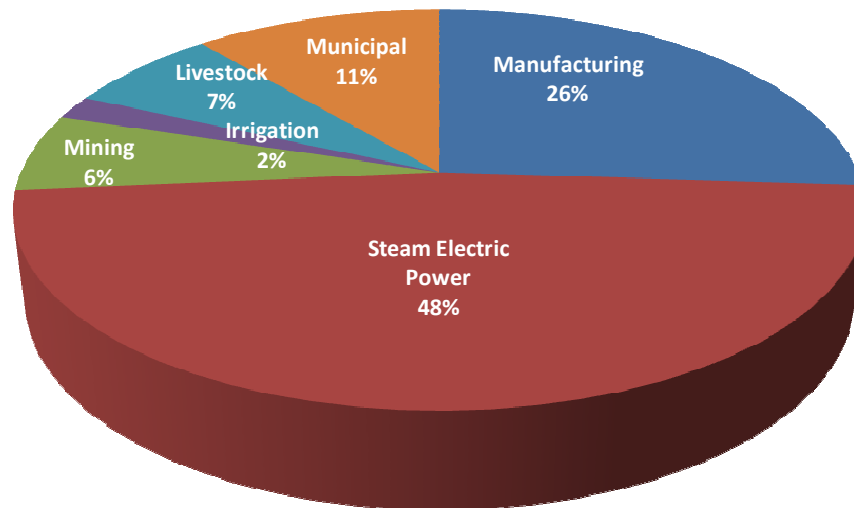


Table 4A.2 summarizes regional surpluses and shortages by category of water use. On a regional basis, sufficient supplies exist for municipal and irrigation water uses. Regional shortages are identified for manufacturing, steam-electric power, mining and livestock. Most of the manufacturing shortages 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 in Hardin County that are no longer substantiated based on current use. Livestock water use is also expected to grow in some counties, which will require the development of additional resources and/or infrastructure. Even though the municipal water use shows a net surplus in every decade of the planning period, there are individual cities that are projected to have shortages during the planning period.

Table 4A.2 Summary of Projected Surpluses or Shortages by Water Use Type

Water Use Type	2010	2020	2030	2040	2050	2060
Municipal	69,202	59,276	52,068	45,206	33,432	17,516
Manufacturing	3,615	-11,223	-20,179	-29,153	-37,157	-46,030
Steam- Electric Power	35,330	3,352	-9,871	-25,993	-52,366	-76,321
Mining	-13,432	-28,758	-8,602	-9,465	-10,319	-11,016
Irrigation	72,751	72,430	72,071	71,684	71,259	70,789
Livestock	649	-987	-2,900	-5,135	-7,776	-10,870

Figure 4A.2 Distribution of Regional Shortages by Use in 2060



4A.2 Comparison of Supply and Demand by County

Table 4A.3 shows the projected surpluses and shortages by county for each decade of the planning period. In general, some shortages exist throughout the region. Twelve counties are identified with shortages over the planning horizon, with Anderson, Jefferson, Orange and Rusk Counties having the largest projected shortages by 2060. Table 4A.4 shows the projected surpluses or shortages as a percentage of demand. Anderson and Angelina Counties are expected to have the largest percent shortages (52

and 56 percent) in 2060, and Tyler County is expected to have the largest percentage surplus (48 percent) in 2060.

Table 4A.3 Comparison of Supply and Demand by County

County	2010	2020	2030	2040	2050	2060
Anderson	4,229	-7,509	-9,689	-12,285	-15,429	-19,219
Angelina	-4,993	-17,313	-17,671	-22,429	-27,748	-34,118
Cherokee	4,790	3,374	4,595	4,393	4,065	3,532
Hardin	-5,081	-6,418	-7,121	-7,831	-8,646	-9,435
Henderson (P)	676	232	-190	-607	-1,154	-1,849
Houston	1,988	1,512	949	346	-363	-1,178
Jasper	3,383	3,183	3,130	3,222	3,268	3,268
Jefferson	71,245	57,542	55,076	52,199	48,538	43,491
Nacogdoches	9,720	5,385	9,013	5,305	-6,827	-12,638
Newton	10,894	2,550	95	-2,931	-6,616	-11,097
Orange	19,080	13,507	6,860	111	-6,421	-13,977
Panola	4,704	4,411	4,233	4,070	3,896	3,636
Polk (P)	290	-75	-374	-602	-773	-959
Rusk	26,110	23,165	18,405	12,725	5,594	-3,381
Sabine	1,261	1,118	995	863	706	529
San Augustine	-1,422	-7,007	-107	-227	-383	-552
Shelby	927	-1,317	-1,206	-2,755	-4,637	-6,961
Smith (P)	17,874	15,669	13,708	11,742	8,161	3,165
Trinity (P)	194	160	156	139	116	91
Tyler	2,249	1,922	1,729	1,696	1,725	1,720
TOTAL	168,118	94,091	82,586	47,144	-2,928	-55,932

Table 4A.4 Surplus or Shortage as Percent of Demand by County

County	2010	2020	2030	2040	2050	2060
Anderson	32%	-30%	-35%	-41%	-47%	-52%
Angelina	-16%	-39%	-39%	-45%	-51%	-56%
Cherokee	34%	23%	33%	30%	26%	21%
Hardin	-26%	-31%	-33%	-35%	-38%	-40%
Henderson (P)	10%	3%	-3%	-8%	-14%	-21%
Houston	24%	17%	10%	4%	-3%	-10%
Jasper	5%	4%	4%	4%	4%	4%
Jefferson	21%	9%	7%	6%	6%	5%
Nacogdoches	41%	17%	32%	17%	-19%	-30%
Newton	121%	15%	0%	-13%	-25%	-36%
Orange	24%	16%	7%	0%	-6%	-12%
Panola	38%	34%	32%	30%	28%	25%
Polk (P)	12%	-3%	-12%	-19%	-23%	-27%
Rusk	76%	62%	44%	27%	10%	-5%
Sabine	46%	39%	33%	28%	21%	15%
San Augustine	-33%	-71%	-4%	-7%	-12%	-16%
Shelby	9%	-10%	-10%	-20%	-29%	-38%
Smith (P)	43%	36%	30%	25%	16%	6%
Trinity (P)	22%	17%	17%	15%	12%	9%
Tyler	73%	56%	48%	47%	48%	48%

4A.3 Comparison of Supply and Demand by Water User Group

The comparison of supply versus demands by user group for entities with shortages is presented in Table 4A.5. There are 68 WUGs with identified shortages that cannot be met by existing infrastructure and supply. These shortages total nearly 179,300 acre-feet per year by 2060.

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

The steam-electric power shortages are due to increases in demand above current facilities generation capacities. 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 and livestock shortages in Shelby County are also due to increased demands above current facilities' supplies. The city of Lufkin shows a deficit beginning in 2010, which is due to the production capacities of their existing groundwater wells. The City has purchased additional groundwater rights and is also planning on developing surface water supplies from their water rights in Lake Kurth and Sam Rayburn Reservoir. These supplies will also be used to meet the manufacturing shortages in Angelina County.

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.

4A.4 Comparison of Supply and Demand by Wholesale Water Provider

The comparison of supply versus demands for each WWP is presented in Appendix 4A-A. Of these providers, five were identified with projected shortages in the ETRWPA over the planning cycle. The SRA will need to implement strategies to meet demands outside the region. The WWPs with shortages are shown in Table 4A.6 and discussed below.

In addition to these providers, there are several WWPs that 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 4C.

Table 4A.5 Water User Groups with Projected Shortage (ac-ft per year)

Water User Group Name	County	2010	2020	2030	2040	2050	2060	
County-Other	Anderson	0	0	0	0	0	-132	
Frankston		0	0	-6	-24	-40	-54	
Mining		0	-19	-45	-70	-95	-119	
Steam Electric		0	-11,306	-13,218	-15,549	-18,390	-21,853	
Anderson County Total		0	-11,325	-13,269	-15,643	-18,525	-22,158	
County-Other	Angelina	0	0	-16	-133	-347	-659	
Diboll		-32	-187	-374	-618	-965	-1,441	
Four Way WSC		0	0	0	0	0	-225	
Hudson		0	0	-123	-360	-710	-1,174	
Hudson WSC		0	0	0	-104	-367	-735	
Livestock		0	0	0	-17	-52	-89	
Lufkin		-2,763	-4,869	-5,829	-6,905	-8,222	-9,785	
Manufacturing		-2,509	-10,006	-12,523	-15,070	-17,365	-19,827	
Mining		-1,990	-3,989	0	0	0	0	
Steam Electric		-1,000	-1,000	-1,000	-1,000	-1,000	-1,000	
Angelina County Total			-8,294	-20,051	-19,865	-24,207	-29,028	-34,935
Mining		Cherokee	-490	-1,494	0	0	0	-2
New Summerfield	0		0	-40	-76	-117	-165	
Rusk	0		0	0	-42	-116	-212	
Cherokee County Total		-490	-1,494	-40	-118	-233	-379	
County-Other	Hardin	-153	-263	-284	-305	-358	-431	
Irrigation		-1,002	-1,002	-1,002	-1,002	-1,002	-1,002	
Manufacturing		-27	-46	-63	-81	-97	-114	
Mining		-7,772	-8,620	-9,191	-9,760	-10,333	-10,770	
Hardin County Total		-8,954	-9,931	-10,540	-11,148	-11,790	-12,317	
Irrigation	Henderson	-3	-4	-5	-5	-6	-6	
Livestock		-466	-601	-729	-843	-959	-1,066	
Athens		-21	-36	-56	-77	-107	-147	
Brownsboro		0	0	0	0	0	-4	
County-Other		-75	-216	-348	-479	-683	-964	
Henderson County Total		-565	-857	-1138	-1404	-1755	-2187	
Irrigation	Houston	-382	-667	-986	-1,334	-1,720	-2,146	
Manufacturing		0	-2	-5	-8	-11	-15	
Livestock		-34	-210	-402	-609	-834	-1,077	
Houston County Total		-416	-879	-1,393	-1,951	-2,565	-3,238	
County-Other	Jasper	-309	-405	-423	-365	-338	-338	
Jasper County Total		-309	-405	-423	-365	-338	-338	

Table 4A.5 Water User Groups with Projected Shortage (ac-ft per year)

Water User Group Name	County	2010	2020	2030	2040	2050	2060	
Mining	Jefferson	0	0	0	0	-4	-9	
Steam Electric		0	-13,426	-15,696	-18,464	-21,838	-25,951	
Jefferson County Total		0	-13,426	-15,696	-18,464	-21,842	-25,960	
D&M WSC	Nacogdoches	0	0	-21	-70	-182	-310	
Lilly Grove SUD		0	0	0	0	-221	-463	
Livestock		0	0	-242	-559	-926	-1,347	
Mining		-2,495	-6,993	0	0	0	0	
Steam Electric		-2,588	-190	-1,358	-2,783	-11,241	-13,358	
Swift WSC		0	0	0	-64	-237	-427	
Nacogdoches County Total			-5,083	-7,183	-1,621	-3,476	-12,807	-15,905
Steam Electric		Newton	0	0	-2,343	-5,257	-8,808	-13,138
Manufacturing	-149		-264	-370	-477	-574	-667	
Newton County Total		-149	-264	-2,713	-5,734	-9,382	-13,805	
County-Other	Orange	-88	-2	0	0	0	0	
Manufacturing		0	-1,914	-7,892	-13,852	-19,143	-25,094	
Mauriceville WSC		0	-37	-81	-96	-158	-202	
Orange County Total		-88	-1,953	-7,973	-13,948	-19,301	-25,296	
Manufacturing	Panola	-96	-116	-132	-147	-160	-187	
Panola County Total		-96	-116	-132	-147	-160	-187	
County-Other	Polk	-208	-417	-578	-681	-745	-828	
Manufacturing		0	-64	-164	-269	-365	-449	
Polk County Total		-208	-481	-742	-950	-1,110	-1,277	
Mining	Rusk	0	0	0	-3	-83	-158	
Steam Electric		0	0	0	0	-1,501	-9,912	
Rusk County Total		0	0	0	-3	-1,584	-10,070	
County-Other	Sabine	-11	-23	-30	-38	-47	-62	
Livestock		-38	-81	-130	-187	-253	-325	
Sabine County Total		-49	-104	-160	-225	-300	-387	
Irrigation	San Augustine	-90	-90	-90	-90	-90	-90	
Livestock		-90	-168	-259	-364	-486	-620	
Mining		-1,500	-7,000	0	0	0	0	
Manufacturing		0	0	0	0	-1	-2	
San Augustine Total		-1,680	-7,258	-349	-454	-577	-712	
County-Other	Shelby	0	-57	-120	-132	-173	-242	
Livestock		-777	-1,707	-2,841	-4,222	-5,907	-7,961	
Mining		-500	-1,500	0	0	0	0	
Manufacturing		0	0	0	0	-5	-12	
Shelby County Total		-1,277	-3,264	-2,961	-4,354	-6,085	-8,215	

Table 4A.5 Water User Groups with Projected Shortage (ac-ft per year)

Water User Group Name	County	2010	2020	2030	2040	2050	2060
Bullard	Smith	0	-13	-42	-71	-124	-195
Community Water Company		-37	-88	-111	-132	-171	-227
Irrigation		-6	-36	-68	-100	-133	-168
Jackson WSC		0	0	-38	-83	-118	-157
Lindale Rural WSC		0	0	0	0	0	-74
Manufacturing		0	0	-5	-101	-183	-294
Mining		-47	-126	-159	-215	-255	-288
Whitehouse		-27	-54	-79	-105	-155	-224
Smith County Total		-117	-317	-502	-807	-1,139	-1,627
County-Other	Trinity	0	0	0	-9	-32	-57
Trinity County Other		0	0	0	-9	-32	-57
County-Other	Tyler	0	-142	-239	-251	-232	-232
Tyler County Total		0	-142	-239	-251	-232	-232
TOTAL Regional Shortage		-27,775	-79,450	-79,756	-103,658	-138,785	-179,282

Table 4A.6 Wholesale Water Providers with Projected Shortages for Current Customers (ac-ft per year)

Water Provider	2010	2020	2030	2040	2050	2060
ANRA	-53,869	-53,869	-53,869	-53,869	-53,869	-53,869
Athens MWA	-2,674	-3,190	-3,803	-4,499	-5,408	-6,533
Houston County WCID 1	-219	-243	-263	-282	-302	-326
Lufkin	-6,354	-14,978	-17,725	-20,755	-24,249	-28,222
UNRMWA	-2,677	-4,708	-6,740	-8,773	-10,808	-12,843

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

4A.4.1 Angelina and Neches River Authority. ANRA is projected to have a shortage of 53,869 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.

4A.4.2 Athens Municipal Water Authority. The maximum projected shortage for Athens MWA is 6,533 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, obtaining water from Forest Grove Reservoir and increasing the supplies from Lake Athens.

4A.4.3 City of Lufkin. The City of Lufkin is projected to have a water shortage under drought of record conditions of 6,354 ac-ft per year beginning in Year 2010, growing to 28,222 ac-ft per year for Year 2060. Much of the projected shortages are associated with increased demands for manufacturing needs and local growth. The City currently has a three-part plan to address these needs.

4A.4.4 Houston County Water Control and Improvement District No. 1. Houston County WCID 1 has contractual demands that exceed its permitted supply from Houston County Lake. Houston County WCID 1 is currently seeking a permit amendment to increase the permitted diversions from this source.

4A.4.5 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 Lake Fastrill.

4A.5 Socioeconomic Impacts of Not Meeting Needs

Administrative Rules in 31 TAC §357.7 require regional planning groups to evaluate socioeconomic impacts of not meeting water needs as part of the regional planning process. Rules direct the TWDB to provide technical assistance upon request

for water supply and demand analysis, including methods to evaluate the social and economic impacts of not meeting needs. The ETRWPG convened February 17, 2010, and directed Chairman Kelley Holcomb to write an official request for technical assistance. The official request was sent to the TWDB February 26, 2010, and is provided as correspondence in Appendix 2-A.

The socioeconomic analysis will be conducted after submission of the IPP to the TWDB. Once the analysis has been conducted, the findings will be presented in Appendix 4A-B.