

## Chapter 11

# Implementation and Comparison to the Previous Regional Water Plan

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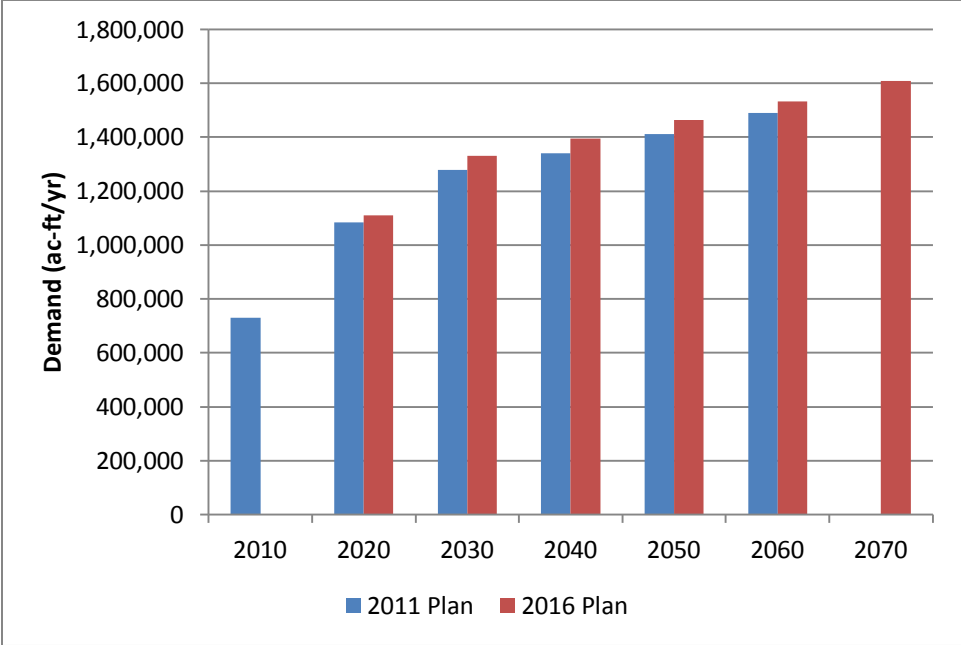
Chapter 11 is a new requirement for the 4<sup>th</sup> round of regional water planning. It includes a summary of the level of implementation of Recommended Water Management Strategies from the 2011 Plan that were created to meet needs, as well as a brief comparison of the 2011 Plan Compared to the 2016 Plan in the following categories:

- Water Demand Projections
- Drought of Record
- Water Availability
- Existing Water Supplies of Water User Groups
- Identified Needs
  - Water User Group Needs
  - Wholesale Water Provider Needs
- Water Management Strategies
  - Recommended Water Management Strategies
  - Alternative Water Management Strategies

### 11.1 Water Demand Projections

The total demand projections for the ETRWPA increased for every decade from the 2011 Plan to the 2016 Plan, as shown in Figure 11.1 and Table 11.1 below. This increase in demand is largely due to the increase in projected demands for the Water User Groups Jasper Manufacturing and Jefferson Irrigation.

Figure 11.1 Total Projected Demand for the ETRWPA from the 2011 and 2016 Plans



**Table 11.1 Summary of Projected Water Demands  
from the ETRWPA by Use Category and Decade**

<b>2011 Plan Projected Demands (ac-ft/yr)</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Municipal	189,559	196,828	202,761	208,193	218,705	233,622	NA
Manufacturing	299,992	591,904	784,140	821,841	857,902	893,476	NA
Mining	21,662	37,297	17,331	18,385	19,432	20,314	NA
Steam Electric Power	44,985	80,989	94,515	111,006	131,108	155,611	NA
Livestock	23,613	25,114	26,899	29,020	31,546	34,533	NA
Irrigation	151,100	151,417	151,771	152,153	152,575	153,040	NA
<b>2011 Total for ETRWPA</b>	<b>730,911</b>	<b>1,083,549</b>	<b>1,277,417</b>	<b>1,340,598</b>	<b>1,411,268</b>	<b>1,490,596</b>	<b>NA</b>
<b>2016 Plan Projected Demands (ac-ft/yr)</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Municipal	NA	188,646	196,302	204,157	214,540	226,622	239,607
Manufacturing	NA	608,667	800,989	838,639	874,546	909,373	945,886
Mining	NA	27,523	24,547	18,169	15,488	12,986	12,093
Steam Electric Power	NA	82,018	95,544	112,035	132,137	156,640	184,714
Livestock	NA	24,027	25,549	27,361	29,521	32,081	32,764
Irrigation	NA	177,919	187,894	194,851	197,546	195,445	192,186
<b>2016 Total for ETRWPA</b>	<b>NA</b>	<b>1,108,800</b>	<b>1,330,825</b>	<b>1,395,212</b>	<b>1,463,778</b>	<b>1,533,147</b>	<b>1,607,250</b>
<b>Percent Change in Texas Water Development Board Demand Projections from 2011 to 2016</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Municipal	NA	-4	-3	-2	-2	-3	NA
Manufacturing	NA	3	2	2	2	2	NA
Mining	NA	-26	42	-1	-20	-36	NA
Steam Electric Power	NA	1	1	1	1	1	NA
Livestock	NA	-4	-5	-6	-6	-7	NA
Irrigation	NA	18	24	28	29	28	NA
<b>Total for ETRWPA</b>	<b>NA</b>	<b>2</b>	<b>4</b>	<b>4</b>	<b>4</b>	<b>3</b>	<b>NA</b>

Green cells indicate values that are greater in the 2016 Plan compared to the 2011 Plan.

## 11.2 Drought of Record

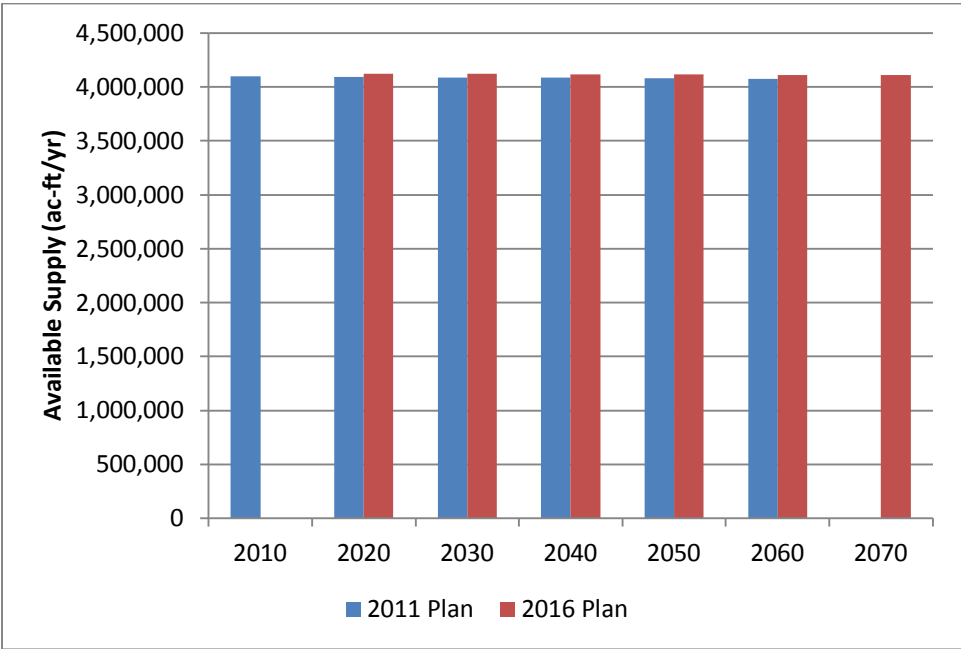
The drought of the 1950's was the drought of record used for regional water planning in the 2011 Plan; this is the same drought of record used in the 2016 Plan. In both plans, surface water supplies were determined using the TCEQ approved Water Availability Models (WAM) that only incorporate historical hydrologic conditions that occurred between 1940 and 1996. Chapter 7 of the 2016 Plan includes a detailed examination of more recent droughts within the region and suggests that the 2010-2012 period was one of significant drought for the ETRWPA. For a full evaluation of the impact of a potential new drought of record on surface water supply availability, the

WAMs should be updated to incorporate the hydrologic conditions that have occurred since 1996

### 11.3 Water Availability

The total water availability increased in every decade by less than 1% from the 2011 Plan to the 2016 Plan, as shown in Figure 11.2 and Table 11.2 below. This increase in availability is largely due to increased groundwater infrastructure, utilization of other undifferentiated aquifers, and an increased use of local supplies.

**Figure 11.2 Total Available Supply for the ETRWPA from the 2011 and 2016 Plans**



**Table 11.2 Summary of Available Supply in the ETRWPA by Decade**

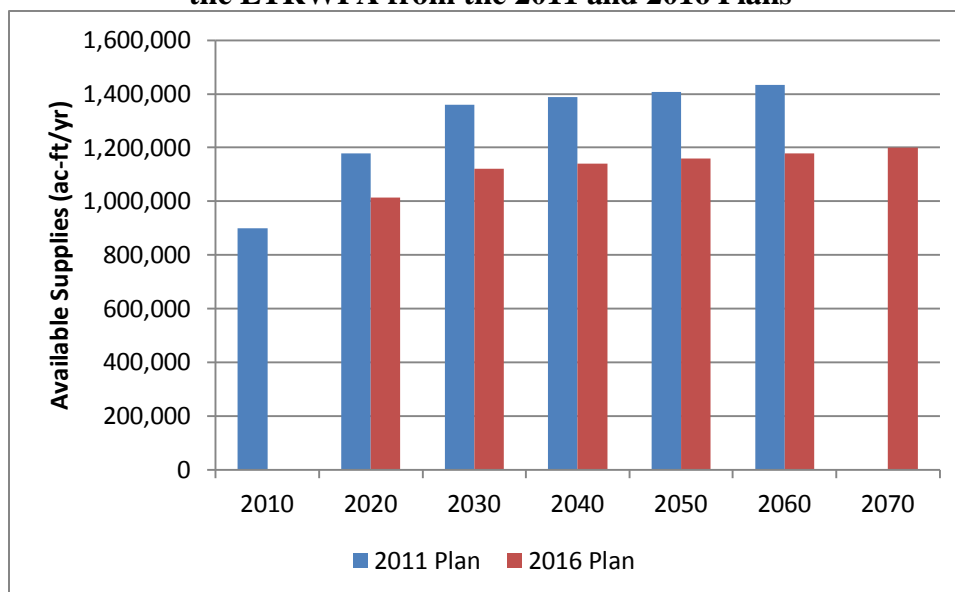
<b>2011 Plan Available Supply (ac-ft/yr)</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Reservoirs (permitted)	1,962,698	1,958,512	1,954,328	1,950,141	1,945,955	1,941,769	NA
Run-of-the-River (freshwater)	623,004	623,004	623,004	623,004	623,004	623,004	NA
Run-of-the-River (brackish)	1,035,982	1,035,982	1,035,982	1,035,982	1,035,982	1,035,982	NA
Groundwater	446,043	446,043	446,043	446,043	446,043	446,043	NA
Local Supplies	13,094	13,094	13,094	13,094	13,094	13,094	NA
Reuse	18,077	15,205	15,205	15,205	15,205	15,205	NA
<b>2011 Total for ETRWPA</b>	<b>4,098,898</b>	<b>4,091,840</b>	<b>4,087,656</b>	<b>4,083,469</b>	<b>4,079,283</b>	<b>4,075,097</b>	<b>NA</b>
<b>2016 Plan Available Supply (ac-ft/yr)</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Reservoirs (permitted)	NA	1,958,512	1,954,328	1,950,141	1,945,955	1,941,769	1,937,675
Run-of-the-River (freshwater)	NA	606,346	607,145	608,083	609,290	610,720	612,001
Run-of-the-River (brackish)	NA	1,036,462	1,036,462	1,036,462	1,036,462	1,036,462	1,036,462
Groundwater	NA	489,876	490,090	489,478	488,732	487,696	487,696
Local Supplies	NA	19,367	19,367	19,367	19,367	19,367	19,367
Reuse	NA	13,955	13,955	13,955	13,955	13,955	13,955
<b>2016 Total for ETRWPA</b>	<b>NA</b>	<b>4,124,518</b>	<b>4,121,347</b>	<b>4,117,486</b>	<b>4,113,761</b>	<b>4,109,969</b>	<b>4,107,156</b>
<b>Percent Change in Available Supply from 2011 to 2016</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Reservoirs (permitted)	NA	0	0	0	0	0	NA
Run-of-the-River (freshwater)	NA	-3	-3	-2	-2	-2	NA
Run-of-the-River (brackish)	NA	0	0	0	0	0	NA
Groundwater	NA	10	10	10	10	9	NA
Local Supplies	NA	48	48	48	48	48	NA
Reuse	NA	-8	-8	-8	-8	-8	NA
<b>Total for ETRWPA</b>	<b>NA</b>	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	<b>0.8</b>	<b>0.9</b>	<b>NA</b>

Green cells indicate values that are greater in the 2016 Plan compared to the 2011 Plan.

## 11.4 Existing Water Supplies of Water User Groups

The existing water supplies of water user groups decreased between 13% and 18% in every decade from the 2011 Plan to the 2016 Plan. This is largely due to infrastructure limitations and lack of contracts with wholesale water providers. The largest decrease in supplies occurred in water user groups from Jefferson County who collectively had an average decrease in existing supplies of 250,000 acre-feet per year in every decade of the planning period.

**Figure 11.3 Total Existing Supplies of Water User Groups in the ETRWPA from the 2011 and 2016 Plans**



**Table 11.3 Summary of Existing Supplies of Water User Groups in the ETRWPA by Decade**

2011 WUG Existing Supplies (ac-ft/yr)							
	2010	2020	2030	2040	2050	2060	2070
Anderson	17,649	17,649	17,649	17,649	17,649	17,649	NA
Angelina	25,957	26,321	26,392	26,458	26,521	26,579	NA
Cherokee	18,684	18,273	18,625	19,046	19,539	20,126	NA
Hardin	14,296	14,296	14,296	14,296	14,296	14,271	NA
Henderson*	9,509	7,890	7,705	7,538	7,365	7,205	NA
Houston	10,248	10,246	10,246	10,247	10,246	10,246	NA
Jasper	72,835	76,218	78,731	80,928	82,575	82,638	NA
Jefferson	414,903	686,525	866,571	892,088	918,150	944,597	NA
Nacogdoches	33,596	37,693	37,289	36,856	29,640	29,129	NA
Newton	19,908	19,908	19,908	19,908	19,908	19,908	NA
Orange	98,484	98,484	98,484	98,484	98,484	98,484	NA
Panola	16,758	17,067	17,256	17,448	17,641	17,826	NA
Polk*	2,626	2,626	2,626	2,626	2,626	2,626	NA
Rusk	60,725	60,732	60,732	60,722	60,719	60,729	NA
Sabine	4,101	4,101	4,101	4,101	4,101	4,101	NA
San Augustine	2,933	2,933	2,933	2,933	2,933	2,933	NA
Shelby	11,430	11,445	11,458	11,471	11,482	11,496	NA
Smith*	59,273	58,953	58,711	58,484	58,186	57,842	NA
Trinity*	1,021	1,028	1,029	1,025	1,020	1,016	NA
Tyler	5,328	5,328	5,328	5,328	5,328	5,328	NA
<b>2011 Total for ETRWPA</b>	<b>900,264</b>	<b>1,177,716</b>	<b>1,360,070</b>	<b>1,387,636</b>	<b>1,408,409</b>	<b>1,434,729</b>	<b>NA</b>

**Table 11.3 Summary of Existing Supplies of Water User  
Groups in the ETRWPA by Decade (Cont.)**

<b>2016 WUG Existing Supplies (ac-ft/yr)</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Anderson	NA	15,372	15,473	15,411	15,299	15,257	15,239
Angelina	NA	40,719	41,304	41,850	42,393	42,978	43,590
Cherokee	NA	17,454	17,563	17,683	17,922	18,243	18,852
Hardin	NA	17,934	18,232	18,441	18,573	18,581	18,552
Henderson*	NA	7,842	7,705	7,603	7,561	7,154	6,891
Houston	NA	11,448	11,488	11,540	11,604	11,680	11,830
Jasper	NA	102,073	102,015	101,942	101,884	101,847	101,833
Jefferson	NA	512,147	613,229	629,139	643,731	658,509	673,965
Nacogdoches	NA	28,089	28,713	29,436	30,239	31,210	32,363
Newton	NA	17,260	17,333	17,409	17,477	17,544	17,616
Orange	NA	80,249	80,307	80,430	80,557	80,675	80,776
Panola	NA	16,993	17,308	17,160	16,735	17,429	17,666
Polk*	NA	3,217	3,354	3,484	3,606	3,717	3,838
Rusk	NA	64,294	64,652	64,668	64,677	64,693	64,738
Sabine	NA	5,850	5,850	5,850	5,850	5,850	5,850
San Augustine	NA	4,573	4,670	4,781	4,910	5,052	5,052
Shelby	NA	14,667	14,677	14,670	14,972	14,317	14,663
Smith*	NA	40,131	42,343	44,662	47,352	50,396	53,634
Trinity*	NA	1,960	1,960	1,961	1,962	1,960	1,965
Tyler	NA	11,998	11,959	11,922	11,904	11,905	11,910
2016 Total for ETRWPA	NA	1,014,270	1,120,135	1,140,042	1,159,208	1,178,997	1,200,823
<b>Percent Change in WUG Existing Supplies from 2011 to 2016</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Anderson	NA	-13	-12	-13	-13	-14	NA
Angelina	NA	55	57	58	60	62	NA
Cherokee	NA	-4	-6	-7	-8	-9	NA
Hardin	NA	25	28	29	30	30	NA
Henderson*	NA	-1	0	1	3	-1	NA
Houston	NA	12	12	13	13	14	NA
Jasper	NA	34	30	26	23	23	NA
Jefferson	NA	-25	-29	-29	-30	-30	NA
Nacogdoches	NA	-25	-23	-20	2	7	NA
Newton	NA	-13	-13	-13	-12	-12	NA
Orange	NA	-19	-18	-18	-18	-18	NA
Panola	NA	0	0	-2	-5	-2	NA
Polk*	NA	23	28	33	37	42	NA
Rusk	NA	6	6	6	7	7	NA
Sabine	NA	43	43	43	43	43	NA
San Augustine	NA	56	59	63	67	72	NA
Shelby	NA	28	28	28	30	25	NA
Smith*	NA	-32	-28	-24	-19	-13	NA
Trinity*	NA	91	90	91	92	93	NA
Tyler	NA	125	124	124	123	123	NA
Total for ETRWPA	NA	-13	-17	-17	-17	-17	NA

Green cells indicate values that are greater in the 2016 Plan compared to the 2011 Plan.

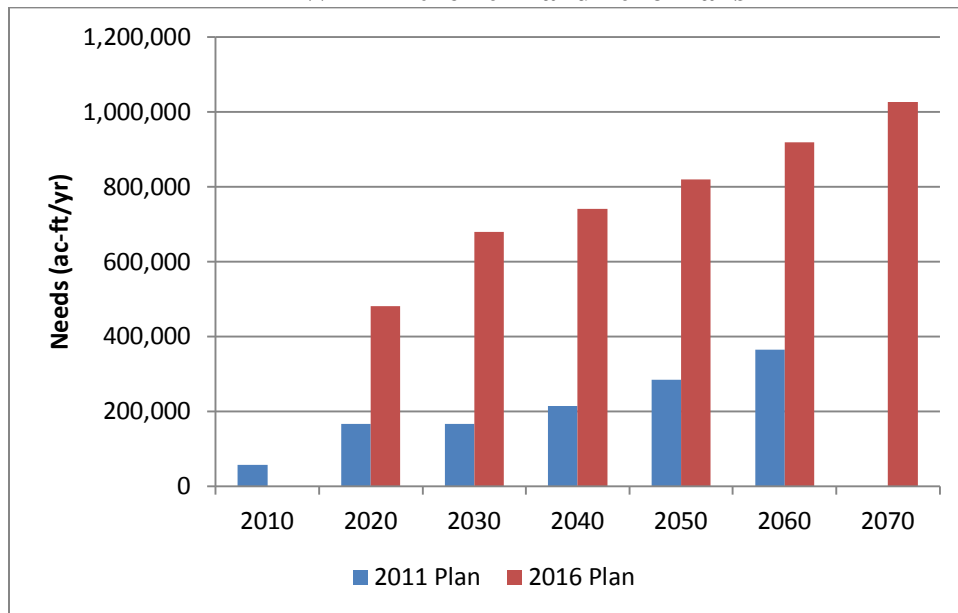
\* The counties marked with an asterisk are split between two water planning regions. The available supply presented in this table represents only the portion of those counties that are within the boundaries of Region I.

## 11.5 Water User Group and Wholesale Water Provider Needs

A comparison of WUG and WWP identified needs between the 2011 Plan and the 2016 Plan follows.

**11.5.1 Water User Group Needs.** In the last round of planning, there were 67 WUGs with identified needs; approximately 70% of these needs were from Municipal WUGs and Steam Electric Power. In the 2016 Plan, there are 40 WUGs with identified needs; approximately 80% of these needs are from Manufacturing. Even though there are fewer WUGs with an identified need in this round of planning compared to the previous round of planning, the total volume of needs for the region has increased by over 150% in every decade of the planning period. In both rounds of planning, the identified needs are largely due to infrastructure limitations and lack of contracts with wholesale water providers.

**Figure 11.4 Total Identified WUG Needs for the ETRWPA in the 2011 and 2016 Plans**





**Table 11.4 Summary of Identified Water User Group Needs  
from the ETRWPA by Use Category and Decade**

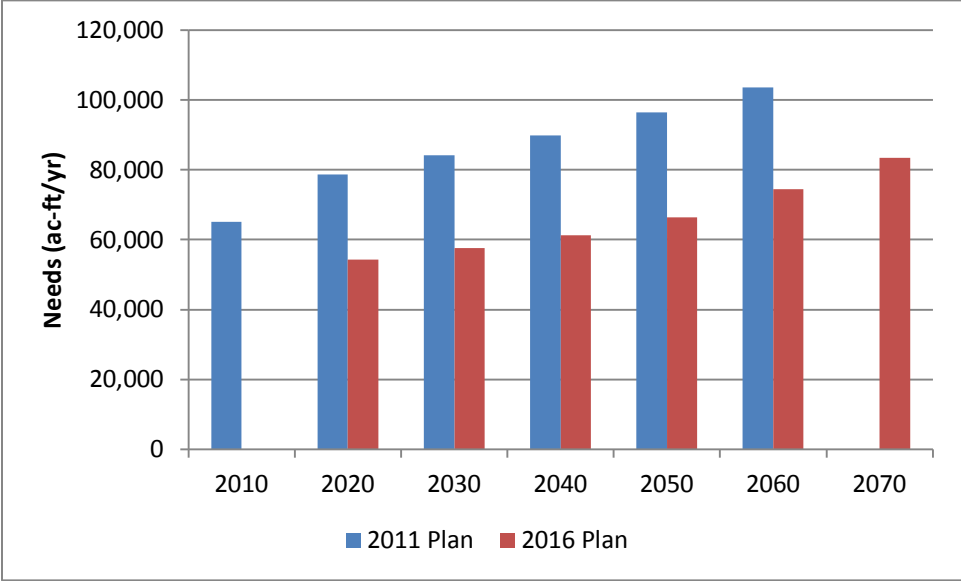
<b>2011 Plan Identified WUG Needs (ac-ft/yr)</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Municipal	20,899	38,900	20,865	24,244	29,072	45,201	NA
Manufacturing	3,392	16,014	24,580	33,256	40,999	49,588	NA
Mining	0	0	0	0	0	0	NA
Steam Electric Power	3,588	25,922	33,615	43,053	62,775	75,212	NA
Livestock	977	2,196	4,093	6,347	9,020	12,144	NA
Irrigation	28,856	83,032	83,153	106,900	141,866	182,145	NA
2011 Total for ETRWPA	57,712	166,064	166,306	213,800	283,732	364,290	NA
<b>2016 Plan Identified WUG Needs (ac-ft/yr)</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Municipal	NA	3,945	4,852	6,236	9,821	14,373	19,485
Manufacturing	NA	197,877	289,385	311,457	331,980	351,182	371,436
Mining	NA	10,264	7,678	2,969	2,338	2,048	1,916
Steam Electric Power	NA	25,422	33,529	44,283	57,789	82,036	110,014
Livestock	NA	3,157	4,366	5,826	7,593	9,725	10,167
Irrigation	NA	240,665	339,810	370,771	409,521	459,364	513,018
2016 Total for ETRWPA	NA	481,330	679,620	741,542	819,042	918,728	1,026,036
<b>Percent Change in Identified WUG Needs from 2011 to 2016</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Municipal	NA	-90	-77	-74	-66	-68	NA
Manufacturing	NA	1,136	1,077	837	710	608	NA
Mining	NA	NA	NA	NA	NA	NA	NA
Steam Electric Power	NA	-2	0	3	-8	9	NA
Livestock	NA	44	7	-8	-16	-20	NA
Irrigation	NA	190	309	247	189	152	NA
Total for ETRWPA	NA	190	309	247	189	152	NA

Green cells indicate values that are greater in the 2016 Plan compared to the 2011 Plan.

**11.5.2 Wholesale Water Provider Needs.** In the last round of planning, there were five WWP's out of 16 total with identified needs; over 60% of this need is from the Angelina Neches River Authority. In the 2016 Plan, there are seven WWP's with identified needs; approximately 70% of these needs are again, from the Angelina Neches River Authority. Even though there are more WWP's with an identified need in this round of planning compared to the previous round of planning, the total needs for the region has decreased by approximately 30% in every decade of the planning period. In

both rounds of planning, the WWP's have identified multiple water management strategies to obtain available water in the region to meet their identified needs.

**Figure 11.5 Total Identified WWP Needs for the ETRWPA in the 2011 and 2016 Plans**



**Table 11.5 Summary of Identified Wholesale Water Provider Needs from the ETRWPA by Use Category and Decade**

<b>2011 Plan Identified WWP Needs (ac-ft/yr)</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
AN WCID #1	0	0	0	0	0	0	NA
ANRA	53,870	53,870	53,870	53,870	53,870	53,870	NA
Athens MWA	0	2,984	3,602	4,303	5,219	6,351	NA
Beaumont	0	0	0	0	0	0	NA
Center	0	0	0	0	0	0	NA
HC WCID #1	194	218	238	257	277	301	NA
Lufkin	8,294	16,918	19,664	22,694	26,189	30,162	NA
UNRMWA	2,677	4,708	6,740	8,773	10,808	12,843	NA
2011 Total for ETRWPA	65,035	78,698	84,114	89,897	96,363	103,527	NA
<b>2016 Plan Identified WWP Needs (ac-ft/yr)</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
AN WCID #1	NA	1,212	2,039	2,866	3,692	4,519	5,305
ANRA	NA	45,319	45,319	45,319	45,319	45,319	45,319
Athens MWA	NA	2,766	3,048	3,289	3,637	6,323	9,633
Beaumont	NA	0	0	578	2,570	4,994	7,754
Center	NA	0	0	0	0	0	171
HC WCID #1	NA	244	268	296	321	352	386
Lufkin	NA	0	0	0	0	0	0
UNRMWA	NA	4,831	6,849	8,869	10,892	12,919	14,940
2016 Total for ETRWPA	NA	54,372	57,523	61,217	66,431	74,426	83,508
<b>Percent Change in Identified WWP Needs from 2011 to 2016</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
AN WCID #1	NA	NA	NA	NA	NA	NA	NA
ANRA	NA	-16	-16	-16	-16	-16	NA
Athens MWA	NA	-7	-15	-24	-30	0	NA
Beaumont	NA	NA	NA	NA	NA	NA	NA
Center	NA	NA	NA	NA	NA	NA	NA
HC WCID #1	NA	12	13	15	16	17	NA
Lufkin	NA	-100	-100	-100	-100	-100	NA
UNRMWA	NA	3	2	1	1	1	NA
Total for ETRWPA	NA	-31	-32	-32	-31	-28	NA

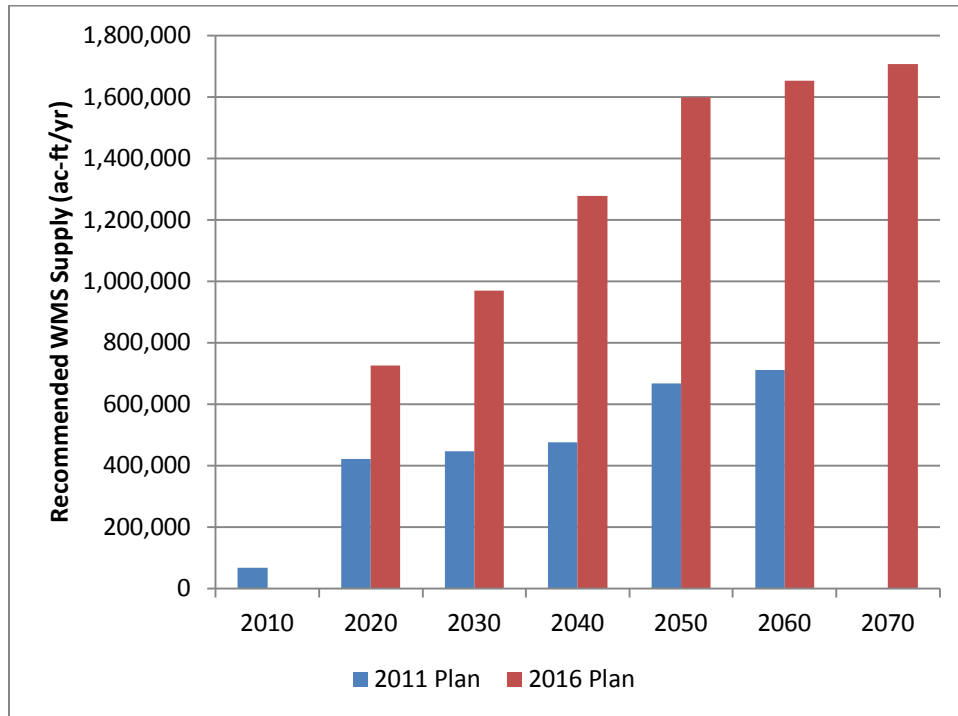
Green cells indicate values that are greater in the 2016 Plan compared to the 2011 Plan.

## **11.6 Recommended and Alternative Water Management Strategies**

The following is a summary of both recommended and alternative water management strategies (WMS) included in the 2011 and 2016 Plans.

**11.6.1 Recommended Water Management Strategies.** The 2011 Plan included 130 Recommended WMSs with a total supply of 67,848 acre-feet per year beginning in 2010 and increasing to over 700,000 acre-feet per year beginning in 2060. In the 2016 Plan, there are 70 Recommended WMSs with a total supply of over 725,000 acre-feet beginning in 2020 and increasing to over 1,700,000 acre-feet per year beginning in 2070. These shifts in the number and total supply of recommended strategies are due to changes in WUG and WWP long term water planning.

**Figure 11.6 Total Supply of Recommended Water Management Strategies for the ETRWPA in the 2011 and 2016 Plans**



**11.6.2 Alternative Water Management Strategies.** The 2011 Plan included five Alternative WMSs with a total supply of 4,500 acre-feet per year beginning in 2010 and increased to over 22,000 acre-feet per year beginning in 2060. The 2016 Plan includes four Alternative WMSs with a total of 33,574 acre-feet per year for every decade in the planning period (2020-2070). This increase in supply from alternative strategies is due to more WUGs and WWPs being proactive about having backup projects ready in the event their recommended WMS cannot be implemented.

**Table 11.6 Summary of Water Management Strategies in the ETRWPA by Decade**

<b>2011 Plan Water Management Strategies Supply (ac-ft/yr)</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Recommended WMSs	67,848	422,443	447,041	476,493	668,575	712,724	NA
Alternative WMSs	4,500	33,541	22,541	22,753	22,753	22,753	NA
<b>2016 Plan Water Management Strategies Supply (ac-ft/yr)</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Recommended WMSs	NA	726,190	970,814	1,278,989	1,598,554	1,652,293	1,707,025
Alternative WMSs	NA	33,574	33,574	33,574	33,574	33,574	33,574
<b>Percent Change in Water Management Strategy Supply from 2011 to 2016</b>							
	<b>2010</b>	<b>2020</b>	<b>2030</b>	<b>2040</b>	<b>2050</b>	<b>2060</b>	<b>2070</b>
Recommended WMSs	NA	72	117	168	139	132	NA
Alternative WMSs	NA	0	49	48	48	48	NA

Green cells indicate values that are greater in the 2016 Plan compared to the 2011 Plan.

**11.6.3 Texas Water Development Board Implementation Survey.** Title 31 of the Texas Administrative Code (31 TAC) §357.45(a) requires the 2016 Plan to report the level of implementation of previously recommended Water Management Strategies meeting needs. The status of each of these projects was not directly available to the consulting team and the surveys were completed to the best of the consultants’ knowledge using other available information.

The ETRWPG and consultants were responsible for gathering information and completing the surveys. Methods used to gather information will include:

- Contact Recommended Water Management Strategy Project Sponsors.
- Track changes in supplies since completion of the 2011 Plan.
- Evaluate TWDB funding records to identify projects.
- Analyze conservation implementation reports submitted to the TWDB.

The results of this survey are presented in Appendix 11-A of the Final 2016 Plan submitted to the TWDB December 1, 2015.

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