2026 REGION B REGIONAL WATER PLAN

DRAFT

REGION B

2026 INITIALLY PREPARED PLAN

Prepared for

Region B Water Planning Group

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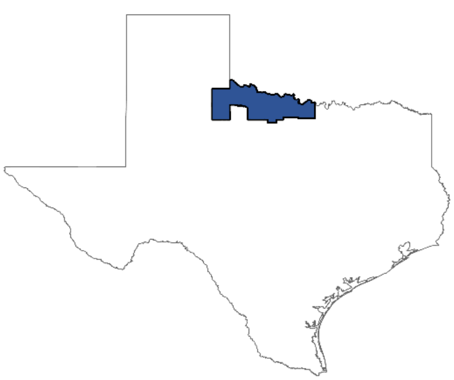
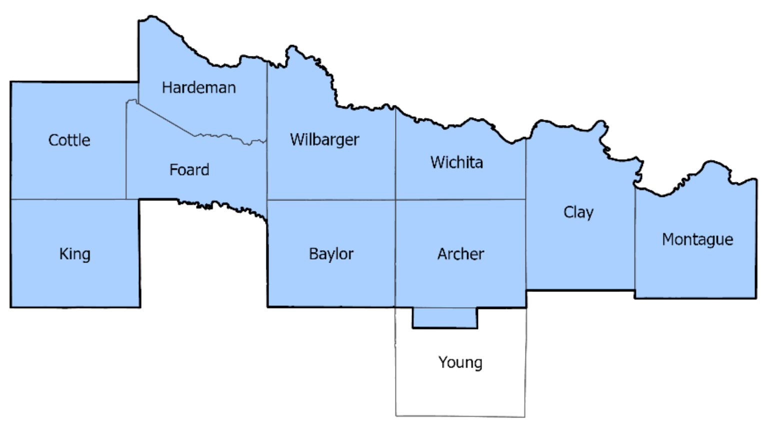
March 2025





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Partial List of Acronyms

Acronym	Name	Description
ac-ft	Acre-Feet	Measurement of water volume equating to one foot of water depth over a surface area of one acre, or 325,851 gallons.
ac-ft/yr	Acre-Feet per Year	Measurement of annual water volume. Typically used to measure large volumes of water such as demand for a water supplier or yield of a water supply source.
ASR	Aquifer Storage and Recovery	A water management strategy that involves storing water in an aquifer for later recovery and use.
BMP	Best Management Practices	Water efficiency measures intended to increase water conservation.
DFC	Desired Future Condition	Criteria for which is used to define the amount of available groundwater from an aquifer.
GAM	Groundwater Availability Model	Numerical groundwater flow model. GAMs are used to determine the aquifer response to pumping scenarios. These are the preferred models to assess groundwater availability.
GCD	Groundwater Conservation District	Generic term for all or individual state recognized Districts that oversee the groundwater resources within a specified political boundary.
GMA	Groundwater Management Area	Sixteen GMAs in Texas. Tasked by the Legislature to define the desired future conditions for major and minor aquifers within the GMA.
GPCD	Gallons per Capita per Day	Measurement of water use rate per capita.
gpm	Gallons per minute	Measurement of flow rate. Typically used to describe a diversion rate or capacity of water wells.

Acronym	Name	Description
IPR	Indirect Potable Reuse	The process of adding treated wastewater effluent to an existing water supply, such as a reservoir, to increase the water availability.
MAG	Modeled Available Groundwater	The MAG is the amount of groundwater that can be permitted by a GCD on an annual basis. It is determined by the TWDB based on the DFC approved by the GMA. Once the MAG is established, this value must be used as the available groundwater in regional water planning.
MAR	Managed Aquifer Recharge	The process of intentionally recharging an aquifer with water for later use. Can be considered a form of ASR.
MCL	Maximum Contaminant Level	A water quality standard set by the EPA for the highest level of a contaminant that is allowed in drinking water.
MGD	Million Gallons per Day	Measurement of rate of use. Typically used when sizing infrastructure.
MWP	Major Water Provider	A Water User Group or a Wholesale Water Provider of particular significance or importance to the region's water supply as determined by the Regional Water Planning Group. Region B has identified two MWPs; Wichita Falls and WCWID#2.
OPS	Oklaunion Power Station	Power generation facility in Wilbarger County that receives water from Lake Kemp under a joint contract with Wichita Falls and WCWID#2.
PGMA	Priority Groundwater Management Area	Area designated by TCEQ that is experiencing critical groundwater problems or is expected to do so within 50 years.
RRA	Red River Authority of Texas	A political subdivision of the state that operates public water systems across the Red River Basin, including within Region B. RRA is the designated political subdivision for Region B.
RWPG	Regional Water Planning Group	The generic term for the planning groups that oversee the regional water plan development in each respective region in the State of Texas.
SB1	Senate Bill 1	Legislation passed by the 75th Texas Legislature that is the basis for the current regional water planning process.
SB2	Senate Bill 2	Legislation passed by the 77th Texas Legislature that built on policies created in SB1.
TCEQ	Texas Commission on Environmental Quality	Texas agency charged with oversight of Texas surface water rights and WAM program.

Acronym	Name	Description
TWDB	Texas Water Development Board	Texas agency charged with oversight of regional water plan development and oversight of GCDs.
USACE	United State Army Corps of Engineers	Federal agency that oversees projects and operates infrastructure for public benefit including water resources.
WAM	Water Availability Model	Computer model of a river watershed that evaluates surface water availability based on Texas water rights.
WCWID#2	Wichita County Water Improvement District #2	Entity responsible for operating the Lake Kemp and Diversion system for irrigation use.
WMS	Water Management Strategy	Strategies available to the RWPG to meet water needs identified in the regional water plan.
WUG	Water User Group	A group that uses water. Six major types of WUGs: municipal, manufacturing, mining, steam electric power, irrigation and livestock.
WWP	Wholesale Water Provider	Entity that has or is expected to have contracts to sell 1,000 ac-ft/yr or more of wholesale water.

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EXECUTIVE SUMMARY

2026 REGION B INITIALLY PREPARED PLAN

Chapter Outline

DB27 Reports

DB27 reports for Region B are available to view through the TWDB Database Reports application. The reports can be accessed by following the instructions below:

1. Navigate to the TWDB Database Reports application at https://www3.twdb.texas.gov/apps/SARA/reports/list
2. Enter '2026 Regional Water Plan' into the "Report Name" field to filter to all DB27 reports associated with the 2026 Regional Water Plans
3. Click on the report name hyperlink to load the desired report
4. Enter planning region letter parameter, click view report

A list of the 19 available DB27 reports is provided below:

1. WUG Population
2. WUG Water Demand
3. Source Availability
4. WUG Existing Water Supply
5. WUG Needs/Surplus
6. WUG Second-Tier Identified Water Need
7. WUG Data Comparison to 2021 RWP
8. Source Data Comparison to 2021 RWP
9. WUG Unmet Needs
10. Recommended WUG Water Management Strategies
11. Recommended Projects Associated with Water Management Strategies
12. Alternative WUG Water Management Strategies
13. Alternative Projects Associated with Water Management Strategies
14. WUG Management Supply Factor

15. Recommended Water Management Strategy Supply Associated with a new or amended IBT Permit
16. WUG Recommended WMS Supply Associated with a new or amended IBT Permit and Total Recommended Conservation WMS Supply
17. Sponsored Recommended WMS Supplies Unallocated to WUGs
18. MWP Existing Sales and Transfers
19. MWP WMS Summary

ES.1 Introduction

Senate Bill 1 of the 75th Texas Legislature was passed in 1997 to set the process of developing a comprehensive state water plan. To accomplish this task, the state was divided into 16 regional water planning groups. This report describes Region B as designated by Senate Bill 1. Region B is comprised of ten entire counties and a portion of one county in north central Texas. Specifically, those counties are Archer, Baylor, Clay, Cottle, Foard, Hardeman, King, Montague, Wichita, Wilbarger, and the northern portion of Young County that includes the City of Olney. Since the initiation of this process, the Region B Regional Water Planning Group (RWPG) has developed five regional water plans and this plan, the 2026 Initially Prepared Plan (IPP) is the sixth regional water plan, which is an update of the 2021 Regional Water Plan for Region B.

This IPP was developed in accordance with the Planning Guidelines set forth in 31 Texas Administrative Code 357 and all applicable rules. As required by rule, the plan is organized into ten chapters as follows:

1. Planning Area Description
2. Population and Water Demand Projections
3. Water Availability and Existing Water Supplies
4. Identification of Water Needs
5. Water Management Strategies and Water Management Strategy Projects
6. Impacts of the Regional Water Plan
7. Drought Response Information, Activities, and Recommendations
8. Unique Stream Segments and Reservoir Sites and Other Recommendations
9. Implementation and Comparison to the Previous Regional Water Plan
10. Adoption of Plan and Public Participation

Table ES-1 below list the 19 members of the Region B RWPG, their organization, the interest they represent, and their counties.

Table ES-1: Regional Water Planning Group - Area B

NAME	ORGANIZATION	INTEREST	COUNTY
Risa Tole	W.T. Waggoner Estate	Agricultural	Wilbarger
Keith Teichman	Teichman Dairy	Agricultural	Archer
Judge Mark Christopher	Foard County	Counties	Foard
Judge Jim Johnson	Wichita County	Counties	Wichita
Robert Zuchlewski	Oklaunion Industrial Park LLC	Electric Generating Utility	Wilbarger
J. K. (Rooter) Brite	J. A. Ranch	Environmental	Montague/All
Jerry Payne	Natural Resources Conservation Service (Retired)	Environmental	Clay
Jimmy Banks	Public	General Public	Wichita
Carrie Dodson	Gateway Groundwater Conservation District	Groundwater Management Area 6	Hardeman
Tracy Mesler – Vice Chair	Upper Trinity Groundwater Conservation District	Groundwater Management Area 8	Montague
Tamela Armstrong	Alliance Power Company	Industries	Wichita
Darell Kennon	City of Vernon	Municipalities	Wilbarger
Russell Schreiber	City of Wichita Falls	Municipalities	Wichita
Mayor Pro Tem Gayle Simpson	City of Crowell	Municipalities	Foard
Fabian Heaney	Red River Authority of Texas	River Authorities	All
Dean Myers	Bowie Industries, Inc.	Small Business	Montague
Kyle Miller - Chair	Wichita County Water Improvement District No. 2	Water Districts	Wichita
Lynn Smith	Rolling Plains Groundwater Conservation District	Water Districts	Baylor
Tom Parker	Olney Economic Development	Water Utilities	Young

ES.2 Planning Area Description

Region B lies mainly in the Red River Basin, however, southern portions of Archer, Clay, and Montague Counties lie in the Trinity River Basin, and southern portions of Archer, Baylor, and King Counties lie in the Brazos River Basin. Figure ES-1 shows the designated Region B Planning Area and the cities, towns, and counties that are included in Region B.

Based on the latest 2023 estimates, the total population of the region was reported to be 209,720, with the largest population center, the City of Wichita Falls, being 102,691 or 49 percent of the total. The second largest city was Burkburnett with a population of 11,089.

In general, most of the population is concentrated in eastern portions of the region with over half located in and around Wichita Falls. The 2023 estimated population density of the region ranged from a high of 206 persons per square mile (Wichita County) to a low of less than one person per square mile (King County). Regional population is forecasted to increase by approximately 11 percent over the study period. While the population of Region B is only expected to reach near 228,000 by 2080, the Dallas-Fort Worth Metroplex, located just east of the region, is expected to top 10 million. This population could likely impose increasing pressures on the water base recreational resources of the Region, as the number of people willing to travel into Region B for recreational purposes increases.

The City of Wichita Falls is the largest water demand center in the region, with other notable water demand centers being Vernon, Burkburnett, Iowa Park, Bowie, Olney, Henrietta, Nocona, Seymour, Electra, Quanah and Archer City.

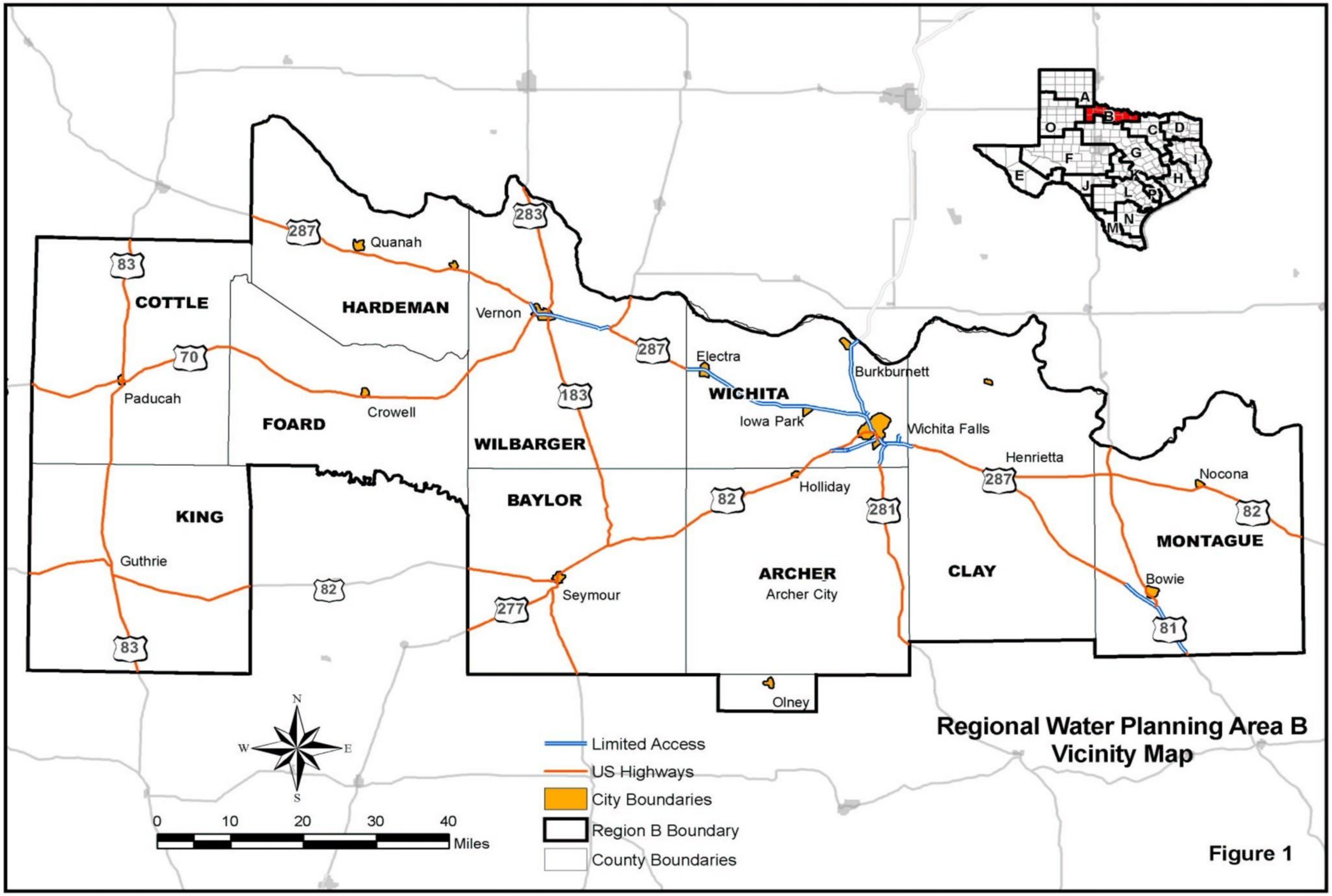


Figure ES-1: Region B Water Planning Area B Vicinity Map

ES.3 Population and Water Demand Projections

Previous regional and state water plans were aligned with political boundaries, such as city limits, rather than water utility service areas. In accordance with Texas Water Development Board (TWDB) rule changes, Water User Group (WUG) planning is now defined as utility-based and the population projections and associated water demand projections will be for the utility service area boundaries as opposed to the political boundaries.

Municipal WUGs in the 2026 Plan are defined as:

- Privately-owned utilities that provide an average of more than 100 acre-feet per year (ac-ft/yr) for municipal use for all owned water systems;
- Water systems serving institutions or facilities owned by the state or federal government that provide more than 100 ac-ft/yr for municipal use;
- All other Retail Public Utilities not covered in the above that provide more than 100 ac-ft/yr for municipal use;
- Collective Reporting Units, or groups of Retail Public Utilities that have a common association and are requested for inclusion by the Regional Water Planning Group (RWPG);
- Municipal and domestic water use, referred to as County-Other, not included in the above;

Region B has thirty-nine (39) WUGs throughout its eleven-county area, and population projections along with the associated water demands were determined for each WUG by decade from 2030 through 2080. The RWPG approved projections are provided in Table ES-2.

Table ES-2: Region B Population and Water Demand Projections

County	WUG Name	Population						Municipal Demands (ac ft/yr)					
		2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
ARCHER	ARCHER CITY	1,683	1,668	1,654	1,625	1,597	1,570	286	283	280	275	271	266
ARCHER	ARCHER COUNTY MUD 1	1,179	1,170	1,160	1,150	1,140	1,130	243	240	238	236	234	232
ARCHER	BAYLOR SUD	180	175	170	165	160	155	45	43	42	41	39	38
ARCHER	COUNTY-OTHER, ARCHER	262	260	257	252	247	243	51	50	50	49	48	47
ARCHER	HOLLIDAY	1,595	1,593	1,589	1,561	1,535	1,508	255	254	253	249	245	240
ARCHER	LAKESIDE CITY	1,088	1,080	1,070	1,052	1,034	1,016	162	160	159	156	153	151
ARCHER	SCOTLAND	375	370	365	360	355	350	150	148	146	144	142	140
ARCHER	WICHITA VALLEY WSC	1,650	1,636	1,622	1,622	1,594	1,594	216	212	211	211	207	207
ARCHER	WINDTHORST WSC	686	680	675	664	653	642	232	229	228	224	220	217
ARCHER COUNTY TOTAL		**8,698**	**8,632**	**8,562**	**8,451**	**8,315**	**8,208**	**1,640**	**1,620**	**1,606**	**1,584**	**1,559**	**1,538**
BAYLOR	BAYLOR SUD	1,019	1,029	1,076	1,099	1,121	1,145	252	254	265	271	276	282
BAYLOR	COUNTY-OTHER, BAYLOR	13	13	12	11	11	11	2	2	1	1	1	1
BAYLOR	SEYMOUR	2,502	2,450	2,403	2,303	2,203	2,203	506	494	484	464	444	444
BAYLOR COUNTY TOTAL		**3,534**	**3,492**	**3,491**	**3,413**	**3,335**	**3,359**	**760**	**749**	**751**	**736**	**722**	**727**
CLAY	COUNTY-OTHER, CLAY	3,307	3,257	3,204	3,104	3,008	2,914	452	443	436	422	409	396
CLAY	DEAN DALE SUD	1,743	1,800	1,861	1,930	1,996	2,060	145	148	153	159	164	170
CLAY	HENRIETTA	3,317	3,332	3,350	3,350	3,350	3,350	744	745	749	749	749	749
CLAY	RED RIVER AUTHORITY OF TEXAS	1,770	1,765	1,760	1,755	1,750	1,745	491	488	486	485	484	482
CLAY	WINDTHORST WSC	325	320	310	305	300	300	110	108	105	103	101	101
CLAY COUNTY TOTAL		**10,462**	**10,474**	**10,485**	**10,444**	**10,404**	**10,369**	**1,941**	**1,932**	**1,929**	**1,918**	**1,908**	**1,899**
COTTLE	COUNTY-OTHER, COTTLE	215	210	205	200	195	190	33	32	31	30	30	29
COTTLE	PADUCAH	1,090	1,065	1,030	1,004	981	981	298	290	281	274	268	268
COTTLE	RED RIVER AUTHORITY OF TEXAS	103	104	105	107	110	110	29	29	29	30	30	30
COTTLE COUNTY TOTAL		**1,408**	**1,379**	**1,340**	**1,311**	**1,286**	**1,281**	**359**	**351**	**341**	**334**	**328**	**327**
FOARD	COUNTY-OTHER, FOARD	84	83	82	80	78	76	17	17	17	17	16	16

County	WUG Name	Population						Municipal Demands (ac ft/yr)					
		2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
FOARD	CROWELL	771	764	756	741	726	711	120	119	117	115	113	110
FOARD	RED RIVER AUTHORITY OF TEXAS	262	264	267	272	277	282	73	73	74	75	77	78
FOARD COUNTY TOTAL		**1,117**	**1,111**	**1,105**	**1,093**	**1,081**	**1,069**	**210**	**209**	**208**	**207**	**205**	**204**
HARDEMAN	COUNTY-OTHER, HARDEMAN	273	271	269	269	257	244	49	48	48	48	46	43
HARDEMAN	CHILLICOTHE	508	505	500	493	486	479	72	71	71	70	69	68
HARDEMAN	QUANAH	2,135	2,121	2,106	2,078	2,050	2,022	347	343	340	336	331	327
HARDEMAN	RED RIVER AUTHORITY OF TEXAS	704	700	694	684	674	664	195	193	192	189	186	184
HARDEMAN COUNTY TOTAL		**3,620**	**3,597**	**3,569**	**3,524**	**3,467**	**3,409**	**663**	**656**	**651**	**642**	**632**	**621**
KING	COUNTY-OTHER, KING	49	49	50	52	52	52	15	15	15	15	15	15
KING	RED RIVER AUTHORITY OF TEXAS	221	223	226	231	236	240	61	62	62	64	65	66
KING COUNTY TOTAL		**270**	**272**	**276**	**283**	**288**	**292**	**76**	**76**	**77**	**79**	**81**	**82**
MONTAGUE	BOWIE	6,735	7,220	7,705	8,190	8,675	9,160	1,286	1,373	1,465	1,558	1,650	1,742
MONTAGUE	COUNTY-OTHER, MONTAGUE	11,678	13,528	15,378	17,228	19,078	20,928	1,568	1,806	2,053	2,300	2,547	2,793
MONTAGUE	NOCONA	4,126	4,662	5,198	5,734	6,270	6,806	1,091	1,230	1,371	1,512	1,654	1,795
MONTAGUE	NOCONA HILLS WSC	912	1,037	1,162	1,287	1,412	1,537	201	228	255	283	310	338
MONTAGUE	RED RIVER AUTHORITY OF TEXAS	160	163	166	175	180	180	44	45	46	48	50	50
MONTAGUE	SAINT JO	1,630	1,965	2,300	2,635	2,970	3,305	269	323	378	433	488	544
MONTAGUE COUNTY TOTAL		**25,241**	**28,575**	**31,909**	**35,249**	**38,585**	**41,916**	**4,459**	**5,005**	**5,569**	**6,134**	**6,699**	**7,262**
WICHITA	BURKBURNETT	11,270	11,285	11,303	11,336	11,370	11,403	1,673	1,667	1,670	1,675	1,680	1,685
WICHITA	COUNTY-OTHER, WICHITA	1,226	1,226	1,230	1,234	1,238	1,242	169	168	168	169	169	170
WICHITA	DEAN DALE SUD	838	838	854	896	941	988	70	69	70	74	77	81
WICHITA	ELECTRA	2,348	2,350	2,355	2,362	2,369	2,376	874	873	874	877	880	882
WICHITA	HARROLD WSC	66	66	66	66	66	66	21	21	21	21	21	21
WICHITA	HOLLIDAY	33	33	32	32	31	31	5	5	5	5	5	5
WICHITA	IOWA PARK	6,759	6,769	6,779	6,799	6,819	6,839	1,020	1,017	1,018	1,021	1,024	1,027

County	WUG Name	Population						Municipal Demands (ac ft/yr)					
		2030	2040	2050	2060	2070	2080	2030	2040	2050	2060	2070	2080
WICHITA	SHEPPARD AIR FORCE BASE	5,905	5,905	5,905	5,905	5,905	5,905	1,075	1,069	1,069	1,069	1,069	1,069
WICHITA	WICHITA FALLS	102,308	104,299	106,290	107,285	108,280	109,275	18,455	18,726	19,084	19,262	19,441	19,620
WICHITA	WICHITA VALLEY WSC	3,330	3,340	3,350	3,360	3,370	3,380	435	434	435	436	438	439
WICHITA COUNTY TOTAL		**134,083**	**136,111**	**138,164**	**139,275**	**140,389**	**141,505**	**23,797**	**24,048**	**24,415**	**24,609**	**24,804**	**24,999**
WILBARGER	COUNTY-OTHER, WILBARGER	1,139	1,124	1,106	1,074	1,042	1,010	203	199	196	190	184	179
WILBARGER	HARROLD WSC	123	121	119	115	111	107	39	39	38	37	35	34
WILBARGER	RED RIVER AUTHORITY OF TEXAS	1,140	1,145	1,150	1,150	1,150	1,150	316	316	318	318	318	318
WILBARGER	VERNON	10,746	10,775	10,804	10,833	10,848	10,863	1,926	1,922	1,927	1,932	1,935	1,938
WILBARGER COUNTY TOTAL		**13,148**	**13,165**	**13,179**	**13,172**	**13,151**	**13,130**	**2,484**	**2,476**	**2,479**	**2,477**	**2,473**	**2,468**
YOUNG	BAYLOR SUD	239	242	245	252	259	266	59	60	60	62	64	66
YOUNG	COUNTY-OTHER, YOUNG	626	626	626	624	621	618	85	84	84	84	83	83
YOUNG	OLNEY	2,714	2,694	2,674	2,646	2,646	2,646	499	493	490	485	485	485
YOUNG COUNTY TOTAL		**3,579**	**3,562**	**3,545**	**3,522**	**3,526**	**3,530**	**643**	**637**	**634**	**631**	**632**	**633**
REGION B TOTALS		**205,160**	**210,369**	**215,625**	**219,737**	**223,827**	**228,068**	**37,032**	**37,759**	**38,660**	**39,352**	**40,041**	**40,760**

In addition, water demands for Region B have been divided into several categories for analysis purposes. The various uses analyzed include water for municipal use (MUN), industrial or manufacturing (MFG), steam-electric power (SEP), mining (MIN), agricultural irrigation (IRR), and livestock watering (STK). A safety factor of 15 percent was added to the municipal water demand projections for Region B to account for potentially higher than expected growth and provide a more conservative supply planning approach. Table ES-3 shows the amounts of water predicted to be required for these categories through the year 2080. The water demand is shown in ac-ft/yr units with one acre-foot being equivalent to 325,851 gallons of water.

Table ES-3: Projected Water Demands
-Values are in ac-ft/yr-

Use Type	2030	2040	2050	2060	2070	2080
MFG	2,216	2,298	2,384	2,472	2,563	2,659
SEP	5,898	5,898	5,898	5,898	5,898	5,898
MIN	141	141	141	141	141	141
IRR	85,595	85,595	85,595	85,595	85,595	85,595
STK	8,708	8,708	8,708	8,708	8,708	8,708
MUN	37,032	37,759	38,660	39,352	40,041	40,760
TOTAL	**139,590**	**140,399**	**141,386**	**142,166**	**142,946**	**143,761**

ES.4 Water Availability and Existing Water Supplies

Water users in the Region B planning area receive surface water from sources in the Brazos, Trinity, and Red River Basins. There are six major reservoirs in Region B that are used for water supply and several smaller reservoirs that were previously used for water supply or supply very small amounts of water. Other surface water sources include run-of-the-river diversion and local supplies used for livestock.

Groundwater also provides a valuable resource for parts of the region. There are two major aquifers and two minor aquifers within the Region B planning area. The central and western part of the region is primarily supplied by two aquifers, the Seymour and the Blaine. The Seymour is designated as a major aquifer and is currently used in Hardeman, Wilbarger, Wichita, Clay, Baylor, and Foard Counties. The Blaine is considered a minor aquifer and useable groundwater is limited to the westernmost portion of the region. The eastern part of the region relies on the Trinity Aquifer, a major aquifer that extends from Montague County south to Bandera County in Region J and east to Red River County in Region D. The Cross Timbers Aquifer is a newly designated minor aquifer that occurs in Archer, Clay, Baylor, Montague, Wichita, Wilbarger and Young Counties. Supplies from this formation are limited, especially in the western part of the region.

In addition to surface water and groundwater supplies, Region B has available supplies from reuse and local supplies. The available supply from reuse is based on permitted authorizations and facilities.

Currently, the majority of reuse in Region B is through the City of Wichita Falls indirect potable reuse project utilizing the bed and banks of Lake Arrowhead, which can supply up to 8 million gallons per day (MGD). The remaining reuse supplies are limited to municipal irrigation and/or use at the wastewater treatment facilities; however, the City of Bowie has sold nearly all of its wastewater effluent for mining purposes in the recent past.

The total amount of water supply currently available to Region B is approximately 183,000 ac-ft/yr, as shown in Table ES-4. This includes all groundwater in place and reliable supplies from surface water and reuse. By 2080, the supply to Region B decreases slightly by about 7,500 ac-ft/yr, which is mostly due to the reduced storage capacity of existing reservoirs from sediment accumulation.

The supply allocated to water users totals approximately 137,000 ac-ft/yr in 2030, decreasing to approximately 128,000 ac-ft/yr in 2080. This is less than the total available regional supply due to operational and contractual constraints, infrastructure limitations and water treatment capacities. Table ES-5 shows the source water supplies remaining as unused water.

Table ES-4: Summary of Reliable Supplies in Region B
-Values are in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Reservoirs in Region B	53,625	50,111	46,597	43,083	39,569	36,055
Reservoirs outside Region B[1]	3,140	2,970	2,800	2,592	2,383	2,175
Run-of-the-River Supplies	4,738	4,738	4,738	4,738	4,738	4,738
Local Livestock Supplies	6,878	6,878	6,878	6,878	6,878	6,878
Groundwater Supplies	105,214	111,069	112,209	114,229	123,636	116,240
Reuse	9,427	9,427	9,427	9,427	9,427	9,427
Total	**183,022**	**185,193**	**182,649**	**180,947**	**186,631**	**175,512**

[1] The supply reported for reservoirs outside of Region B is the safe yield of Greenbelt Reservoir

Table ES-5: Source Water Supply Remaining
-Values are in ac-ft/yr-

Source Type	2030	2040	2050	2060	2070	2080
Groundwater	34,881	37,919	41,771	43,738	53,313	45,909
Reuse	0	0	0	0	0	0
Surface Water	4,117	4,045	3,969	3,898	3,823	3,751
Total	**38,998**	**41,964**	**45,740**	**47,636**	**57,136**	**49,660**

ES.4.1 Identification of Water Needs

A comparison of current supply to demand was performed using the projected demands and the allocation of existing supplies as evaluated under drought of record conditions. Allocations of existing supplies to water users and providers were based on the most restrictive of current water rights, contracts, available yields for surface water and modeled available groundwater (MAG) for groundwater. For some aggregated water users (e.g., irrigation), reported historical use was also considered during the allocation process. Water quality was addressed only to the extent that supplies with known impaired water quality (e.g., nitrates and high salinity) were not allocated for municipal use.

On a regional basis, there is a projected surplus of 1,497 ac-ft/yr in 2030, with projected shortages beginning in 2040 through 2080, with a projected shortage of 19,368 ac-ft/yr, as shown in Table ES-6. These needs are calculated by subtracting the regional demand from the total regional water supply. It includes both shortages for some water users and surpluses for others. Considering only the shortages, a summary of the need by county is presented in Table ES-7.

Table ES-6: Comparison of Currently Connected Supplies and Demands for Region B
-Values are in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Supply	141,087	137,915	134,616	131,305	127,753	124,393
Demand	139,590	140,399	141,386	142,166	142,946	143,761
Surplus/Storage	**1,497**	**-2,484**	**-6,770**	**-10,861**	**-15,193**	**-19,368**

Table ES-7: Comparison of Water Supply Needs by County
-Values are in ac-ft/yr-

County	2030	2040	2050	2060	2070	2080
Archer	34	44	62	73	83	92
Baylor	0	0	0	0	0	308
Clay	108	125	142	159	175	189
Cottle	0	0	0	0	0	0
Foard	0	0	0	0	0	0
Hardeman	0	0	0	0	0	0
King	0	0	0	0	0	0
Montague	874	1,334	1,931	2,529	3,127	3,723
Wichita	6,781	9,318	11,974	14,564	17,168	19,773
Wilbarger	6	9	72	575	1,077	1,580
Young	0	0	0	0	0	0
Total	**7,803**	**10,830**	**14,181**	**17,900**	**21,630**	**25,665**

A shortage occurs when developed supplies are not sufficient to meet projected demands. In Region B, there are 17 water user groups with identified water quantity shortages during the planning period. Table ES-8 lists the water user groups with projected water shortages. Total region-wide water supply needs range from 7,803 ac-ft/yr in 2030 to 25,665 ac-ft/yr in 2080.

Table ES-8: Water User Groups with Projected Shortages
-Values are in ac-ft/yr-

Water User Group	County	2030	2040	2050	2060	2070	2080
Holliday	Archer, Wichita	34	45	56	61	68	72
Lakeside City	Archer	0	0	7	13	16	22
Irrigation	Baylor	0	0	0	0	0	308
Red River Authority	Clay	108	125	142	159	175	189
Bowie	Montague	363	536	714	894	1,073	1,251
County-Other	Montague	511	725	948	1,170	1,392	1,614
Nocona	Montague	0	58	199	340	482	623
Saint Jo	Montague	0	15	70	125	180	235
Electra	Wichita	152	187	224	260	294	327
Harrold WSC	Wichita, Wilbarger	10	13	15	17	18	21
Iowa Park	Wichita	0	0	42	99	154	209
Sheppard Air Force Base	Wichita	89	137	188	232	277	321
Wichita Falls	Wichita	1,528	2,495	3,532	4,454	5,393	6,328
Irrigation	Wichita	5,007	6,491	7,974	9,458	10,942	12,426
Manufacturing	Wichita	0	0	4	49	95	146
Steam Electric Power	Wichita	1	3	4	5	5	6
Steam Electric Power	Wilbarger	0	0	62	564	1,066	1,567
TOTAL		**7,803**	**10,830**	**14,181**	**17,900**	**21,630**	**25,665**

Region B has two major water providers: City of Wichita Falls and Wichita County Water Improvement District #2 (WCWID#2). The City of Wichita Falls is a regional provider for much of the water in Wichita, Archer, and Clay Counties. The City also provides water to customers as far away as the City of Olney in Young County. The City of Wichita Falls and WCWID#2 jointly provide water from the Lake Kemp/Diversion system to industrial customers in Wilbarger County. For simplicity, the contracts for these customers and associated supplies are shown only on Wichita Falls. Considering current customer contracts and the City's municipal demands, Wichita Falls has 1,642 ac-ft/yr of needs in 2030 that increases to 19,745 ac-ft/yr in 2080. A summary of the supply and demand comparison for Wichita Falls is shown in Table ES-9.

Table ES-9: Projected Water Shortages for the City of Wichita Falls
-Values are in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Demands[1]	37,073	45,358	45,736	45,936	46,136	46,338
Supplies	35,431	33,663	31,896	30,128	28,360	26,593
Shortages	**-1,642[2]**	**-11,695**	**-13,840**	**-15,808**	**-17,776**	**-19,745**

[1]Includes demands for OPS and future green hydrogen facility.

[2]Includes surplus of 941 ac-ft/yr from Kemp industrial supply before green hydrogen facility is assumed to be online in 2040.

WCWID#2 provides irrigation water from the Lake Kemp/Diversion system to users in Archer, Clay, and Wichita Counties and the Dundee Fish Hatchery near Lake Diversion. Based on this analysis, the needs for WCWID#2 are 6,181 ac-ft/yr in 2030 and increase to 13,767 ac-ft/yr by 2080. A summary of the supply and demand comparison for WCWID#2 is shown in Table ES-10.

Table ES-10: Projected Water Shortages for WCWID#2
-Values are in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Demands	26,808	26,808	26,808	26,808	26,808	26,808
Supplies	20,627	19,109	17,593	16,075	14,559	13,041
Shortages	**-6,181**	**-7,699**	**-9,215**	**-10,733**	**-12,249**	**-13,767**

In summary, a total of 20 WUGs were identified with one or more of a quantity or quality need. Seventeen WUGs were identified with quantity needs, while an additional municipal supplier in Wilbarger County and two irrigation users were found to have water quality concerns.

ES.5 Water Management Strategies

Water management strategies were developed for water user groups to meet projected needs in the context of their current supply sources, previous supply studies and available supply within the region. Where site-specific data were available, this information was used. When specific well fields could not be identified, assumptions regarding well capacity, depth of well and associated costs were developed based on county and aquifer. The primary new surface water supplies are associated with the use of unappropriated water in the Wichita River Basin. Municipal and manufacturing strategies were developed to provide water of sufficient quantity and quality that is acceptable for its end use. Water quality issues affect water use options and treatment requirements. For the evaluations of the strategies, it was assumed that the final water product would meet existing state water quality requirements for the specified use. For example, a strategy that provided water for municipal supply would meet existing drinking water standards, while water used for mining may have a lower quality.

The consideration and selection of water management strategies for water user groups with needs followed TWDB guidelines and were conducted in open meetings with the Region B RWPG. In accordance with state guidance, the potentially feasible strategies were evaluated with respect to:

- Quantity, reliability and cost;
- Environmental factors, including effects on environmental water shortages, wildlife habitat and cultural resources;
- Impacts on water resources, such as playas and other water management strategies;
- Impacts on agriculture and natural resources; and
- Other relevant factors.

ES.5.1 Water Conservation

Water conservation strategies must be considered for all water users with a need. In Region B, this includes municipal, manufacturing, mining, agricultural water, and SEP users. Water conservation strategies will help address the needs through adoption of Advanced Conservation strategies.

Water conservation is a demand management strategy that can reduce projected demands and extend the availability of existing supplies. Water conservation strategies have been specifically identified for municipal, irrigation, mining, and SEP demands. It is expected that conservation strategies will also be adopted for manufacturing and livestock demands, but these have not been quantified. Table ES-11 provides a summary of the conservation savings by decade.

Table ES-11: Summary of Conservation Savings by Water Use Type
-Values are in ac-ft/yr-

Use	2030	2040	2050	2060	2070	2080
Municipal	496	994	1,468	2,053	2,661	3,276
Irrigation	6,443	8,606	10,769	12,905	15,096	15,096
Mining	35	35	35	35	35	35
SEP	0	0	3,000	3,000	3,000	3,000
Total	**6,974**	**9,635**	**15,272**	**17,993**	**20,792**	**21,407**

ES.5.2 Major Water Providers

As a major water provider, the City of Wichita Falls service area accounts for approximately 70 percent of the total Region B municipal water demand. Wichita Falls has developed strategies to meet the needs of their municipal and wholesale customers. The recommended strategies shown in Table ES-12 could provide 190 acre-feet by the year 2030, with an additional 22,300 acre-feet of supply in 2040 when Lake Ringgold is completed. Table ES-13 also shows the capital and annual costs associated with the recommended strategies.

Table ES-12: Recommended Water Management Strategies for Wichita Falls
-Values are in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Wichita Falls Supply Needs	1,528	2,495	3,532	4,454	5,393	6,328
Wichita Falls Wholesale Customer Supply Needs	1,055	1,639	2,246	2,789	3,317	3,850
Total Wichita Falls and Wholesale Customers Supply Need	*2,583*	*4,134*	*5,778*	*7,244*	*8,710*	*10,178*
Wilbarger County Industrial Needs[1]	0	7,561	8,062	8,564	9,066	9,567
Total Wichita Falls Supply Needs	**2,583**	**11,695**	**13,840**	**15,808**	**17,776**	**19,745**
Recommended Strategies						
Water Conservation	190	471	760	1,127	1,502	1,883
Lake Ringgold		22,300	21,613	20,925	20,238	19,550
Total	**190**	**22,771**	**22,373**	**22,052**	**21,740**	**21,433**
Unmet Needs for Wichita Falls Municipal Only	*1,338*	*0*	*0*	*0*	*0*	*0*
Unmet Needs For all Wichita Falls Customers	*2,393*	*0*	*0*	*0*	*0*	*0*

Table ES-13: Cost of Recommended Water Management Strategies for Wichita Falls

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$76,000	$188,400	$304,000	$450,800	$600,800	$753,200
Lake Ringgold	$560 M		$38.3 M	$38.3 M	$17.2 M	$17.2 M	$5.1 M
Total	**$560 M**	**$76,000**	**$38.5 M**	**$38.6 M**	**$17.7 M**	**$17.8 M**	**$5.9 M**

As the other major water provider, WCWID#2 operates a canal system that distributes water to farmers from Lake Diversion in Wichita County, Archer County, and extends slightly into Clay County. To help meet the projected shortages, WCWID#2 plans to convert certain canal segments to pipelines to reduce water losses through the canal system. Based on a study completed in 2009, nine canal segments, divided into three priority groups, have been considered for conversion to pipelines, with one segment having already been converted to pipeline. The estimated water savings for the canal to pipeline conversion strategy are presented in Table ES-14, and the capital and annual costs are presented in Table ES-15.

Table ES-14: Recommended Water Management Strategies for WCWID#2
-Values in Ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Supply Needs	6,181	7,699	9,215	10,733	12,249	13,767
Recommended Strategies						
Canal Conversion to	2,163	4,326	6,489	8,625	10,816	10,816

Table ES-15: Cost of Recommended Water Management Strategies for WCWID#2

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Canal Conversion to Pipeline	$7,975,000	$593,000	$593,000	$5,900	$5,900	$5,900	$5,900

ES.5.3 County Summaries

There are ten full counties and one partial county (Young County) in Region B, of which five (Cottle, Foard, Hardeman, King, and the Region B portion of Young County) show no projected water needs. The remaining six counties have one or more WUGs that have projected water needs. The proposed water management strategies to meet the identified needs in each county are provided below. For some counties, there are projected shortages that cannot be met through an economically viable project, and these “unmet needs” have also been identified, if present, by county.

Archer County

The maximum projected water need for Archer County is 92 ac-ft/yr in 2080. There are two WUGs with projected needs in Archer County, Holliday and Lakeside City. Both Holliday and Lakeside City are wholesale customers of Wichita Falls, and the needs of both WUGs are associated with insufficient water supplies from Wichita Falls. As Wichita Falls develops its strategies to meet its contractual demands, the municipal water needs will be met. A summary of the recommended strategies for Archer County is shown in Table ES-16.

Table ES-16: Archer County Recommended Strategies Summary

Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Holliday	Water Conservation	29	$1.23	2030
	By Contract	73	NA	2040
	Voluntary Transfer	23	$4.23	2030
Lakeside City	Water Conservation	18	$1.23	2030
	By Contract	55	NA	2040
TOTAL		**198**		

Baylor County

Water supply needs for Baylor County begin in 2080 when there is a 308 ac-ft/yr need for irrigation. This need is associated with limited MAG availability in the Seymour Aquifer in 2080. The recommended strategies to meet this need include conservation and Managed Aquifer Recharge. A summary of the recommended strategies for Baylor County is shown in Table ES-17.

Table ES-17: Baylor County Recommended Strategies Summary

Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Irrigation	Water Conservation	254	$0.03	2030
	Managed Aquifer Recharge	4,500	$0.14	2040
TOTAL		**4,754**		

Clay County

The maximum projected water need for Clay County is 189 ac-ft/yr in 2080 and is associated with Red River Authority. These needs are associated with insufficient water supplies from Wichita Falls, and will be met through water conservation, and fulfillment of the existing contract from Wichita Falls. A summary of the recommended strategies for Clay County is shown in Table ES-18.

Table ES-18: Clay County Recommended Strategies Summary

Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Red River Authority	Water Conservation	91	$2.15	2030
	Water Loss Reduction	103	$0.99	2030
	By Contract	124	#N/A	2040
TOTAL		**318**		

Montague County

The maximum projected water need for Montague County is 3,723 ac-ft/yr in 2080. Due to projected population growth, several WUGs in the county have projected demands that exceed available supplies. Most of these needs will be met through new groundwater development, while the City of Bowie is pursuing a reuse strategy. A summary of the recommended strategies for Montague County is shown in Table ES-19.

Table ES-19: Montague County Recommended Strategies Summary

Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Bowie	Water Conservation	263	$1.23	2030
	Indirect Potable Reuse	700	$8.85	2030
County Other	Water Conservation	319	$1.23	2030
	Additional Groundwater Development	1,305		2030
Nocona	Water Conservation	257	$1.23	2030
	Additional Groundwater Development	436	$1.50	2050
Saint Jo	Water Conservation	80	$1.23	2030
	Additional Groundwater Development	290	$4.16	2050
TOTAL		**3,650**		
Max unmet need of 288 ac-ft/yr in 2080 for Bowie				

Wichita County

The maximum projected water need for Wichita County is 19,773 ac-ft/yr in 2080. Most of the needs in the county will be met through strategies developed by Wichita Falls and WCWID#2. A summary of the recommended strategies for Wichita County is shown in Table ES-20.

Table ES-20: Wichita County Recommended Strategies Summary

Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Electra	Water Conservation	86	$1.23	2030
	By Contract	252	NA	2040
	Voluntary Transfer from Iowa Park	136	$4.23	2030
Iowa Park	Water Conservation	135	$1.23	2030
	By Contract	420	NA	2040
Sheppard AFB	Water Conservation	110	$1.23	2030
	Additional Supply from Wichita Falls	211	NA	2030
Wichita Falls	Water Conservation	1,883	$1.23	2030
	Lake Ringgold	22,300	$5.27	2040
Irrigation	Water Conservation	12,149	$0.17	2030
	Chloride Control Project	6,580	N/A	2030
Manufacturing	Voluntary Transfer from Wichita Falls	146	$4.23	2030
Steam Electric Power	Additional Supply from Wichita Falls	6	NA	2030
TOTAL		**44,414**		

Wilbarger County

The maximum projected water need for Wilbarger County is 1,580 ac-ft/yr in 2080. Most of this need is associated with SEP water demand on the Lake Kemp/Diversion system. Although they do not have projected water needs out to 2080, the City of Vernon is pursuing a strategy to develop additional groundwater supplies to increase their existing water supply. A summary of the recommended strategies for Wilbarger County is shown in Table ES-21.

Table ES-21: Wilbarger County Recommended Strategies Summary

Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Harrold WSC	Conservation	5	$1.23	2030
	Voluntary Transfer (Electra)	16	$4.23	2030
Steam Electric	Alternative Cooling	3,000	$5.97	2050
Vernon	Additional Groundwater	730	$0.24	2030
TOTAL		**3,751**		

ES.6 Unique Stream Segments and Reservoir Sites and Other Recommendations

The Region B Water Planning Group is committed to the protection and conservation of unique and sensitive areas within the region. To that end, the consensus of the planning group is that a more comprehensive study with supporting data is necessary to accurately characterize and evaluate the listed stream/river segments or other stream segments in order to determine whether it is appropriate to recommend a segment for designation as being unique.

The RWPG did recommend that the Lake Ringgold Reservoir Site be recognized and designated as a site of unique value. Lake Ringgold is a recommended water management strategy for the City of Wichita Falls, and it is important that this site be protected under the Texas Water Code until the required applications and permits for the site are filed.

In addition, the RWPG recommended that the Chloride Control Project on the Wichita River and the Pease River be made a regional priority in order to enhance the water quality of Lake Kemp and Lake Diversion and reclaim those lakes as a viable cost-effective short term and long term regional water supply.

DRAFT

CHAPTER 1 DESCRIPTION OF REGION

1.1 Region B Overview

Senate Bill 1 of the 75th Texas Legislature was passed in 1997 to set the process of developing a comprehensive state water plan. To accomplish this task, the state was divided into 16 regional water planning groups. This report describes Region B as designated by Senate Bill 1. Region B is comprised of ten entire counties and a portion of one county in north central Texas. Specifically, those counties are Archer, Baylor, Clay, Cottle, Foard, Hardeman, King, Montague, Wichita, Wilbarger, and the City of Olney in Young County. Figure 1-1 shows the region, cities, towns, and the counties it encompasses.

Region B lies mainly in the Red River Basin, however, southern portions of Archer, Clay, and Montague Counties lie in the Trinity River Basin, and southern portions of Archer, Baylor, and King Counties lie in the Brazos River Basin, as shown on the Surface Water Map in Figure 1-2.

Based on the Regional Water Planning Group (RWPG) adopted population numbers, the population in 2030 is projected to be 205,160 with the largest population center, the City of Wichita Falls, being 102,308 or approximately 50 percent of the total. The second largest city is Burkburnett with a population of 11,270

1.2 Population And Demographic Data

In general, most of the population is concentrated in eastern portions of the region with over one-half located in and around Wichita Falls. The 2023 estimated population density of the region ranged from a high of 206 persons per square mile (Wichita County) to a low of less than one person per square mile (King County). Regional population is forecasted to increase by approximately 11 percent over the study period. The forecasts of projected populations will be examined in more detail in Chapter 2 of this report. Table 1-1 shows the 2020 census population by county and the 2023 estimated population. Table 1-2 through Table 1-5 give a more in-depth estimated breakdown of the regional demographics as of 2023.

Figure 1-1: Vicinity Map

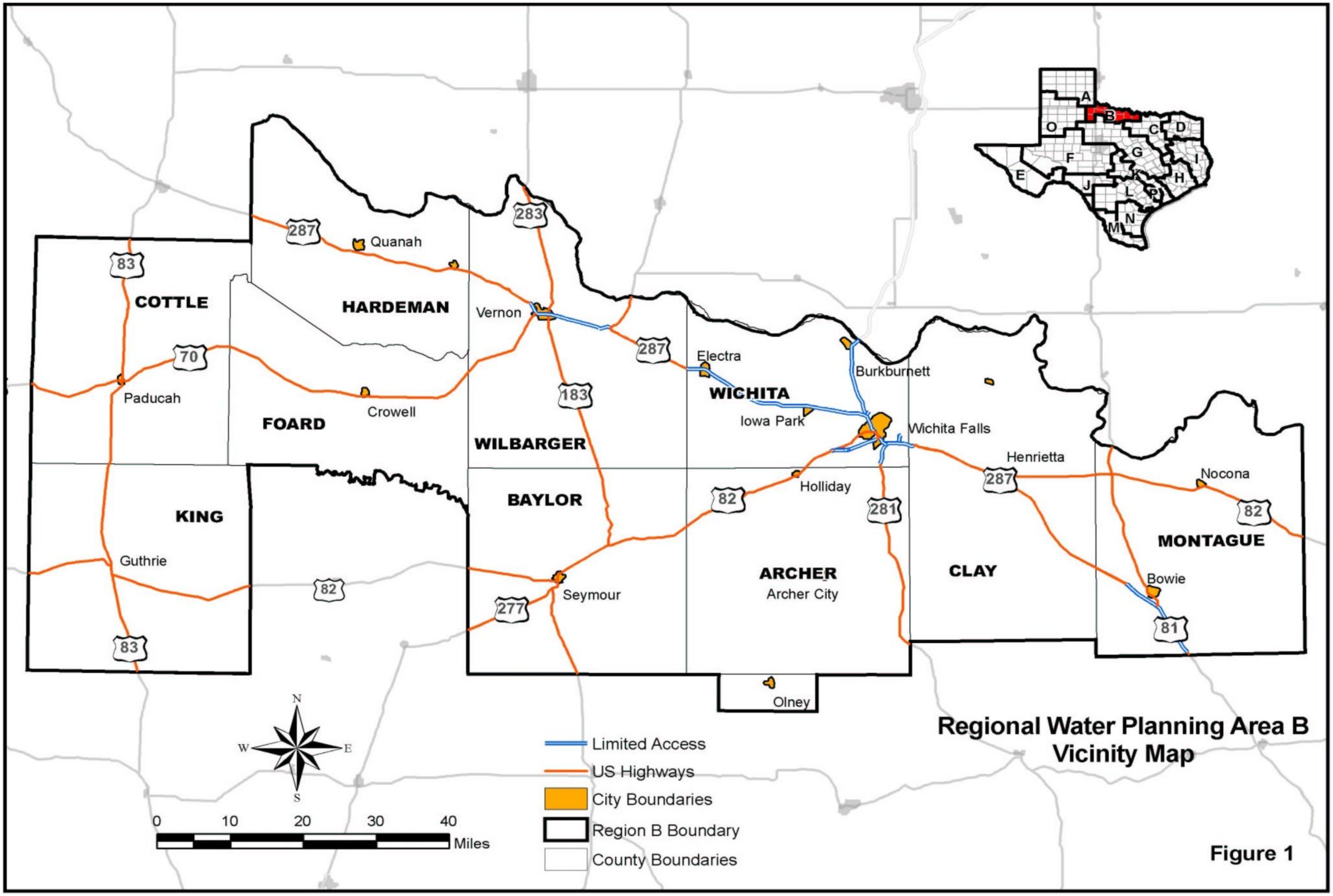


Table 1-1: County Populations

County	Area (sq. mi)	2020 Population	2023 (Est.) Population	% Change	2020 Density people/sq.mi.
Archer	904	8,560	8,712	1.8%	10
Baylor	868	3,465	3,489	0.7%	4
Clay	1,089	10,218	10,507	2.8%	10
Cottle	901	1,380	1,300	-5.8%	1
Foard	704	1,095	1,069	-2.4%	2
Hardeman	695	3,549	3,449	-2.8%	5
King	912	265	254	-4.2%	< 1
Montague	931	19,965	21,370	7.0%	23
Wichita	628	129,350	129,354	0.0%	206
Wilbarger	971	12,887	12,198	-5.3%	13
Young	914	17,867	18,018	0.8%	20

The following tables describe the demography of the region.

Table 1-2: 2020 Demographics – Breakdown by Race

	Percentage Of Population That Is…				
County	White	Black	Hispanic	Asian	Other
Archer	88.2%	0.4%	8.7%	0.1%	2.1%
Baylor	87.1%	0.1%	12.6%	0.0%	2.0%
Clay	89.8%	0.4%	6.3%	0.0%	2.5%
Cottle	74.4%	7.0%	23.7%	0.0%	0.7%
Foard	84.4%	1.7%	18.0%	0.5%	0.4%
Hardeman	77.4%	4.0%	23.0%	0.0%	1.8%
King	91.3%	0.0%	9.4%	0.0%	0.9%
Montague	85.5%	0.4%	11.0%	0.3%	1.8%
Wichita	67.0%	10.7%	19.9%	0.1%	3.0%
Wilbarger	62.8%	8.2%	29.0%	0.5%	2.7%
Young	80.6%	1.0%	19.5%	0.5%	1.7%
Average	*80.8%*	*3.1%*	*16.5%*	*0.2%*	*1.8%*

Table 1-3: 2023 (Est.) Demographics – Breakdown by Age

County	Percentage of Population That is Age…							
	<5	5 17	18 24	25 44	45 64	65 74	75 84	85
Archer	4.9	16.8	8.5	21.7	27.5	12.1	6.0	2.5
Baylor	4.7	16.9	6.9	19.7	27.5	12.7	8.5	2.6
Clay	4.5	15.3	6.8	26.4	25.9	13.2	6.5	2.6
Cottle	6.1	17.9	7.4	27.2	24.2	13.9	5.4	2.6
Foard	4.9	11.7	12.1	11.5	23.2	10.6	14.5	5.2
Hardeman	7.9	18.1	7.5	23.1	27.5	14.0	4.4	1.6
King	6.5	17.0	2.1	33.3	27.8	12.0	0.9	0.5
Montague	5.2	16.2	7.1	21.5	27.2	12.1	7.3	2.2
Wichita	6.2	17.1	12.8	27.7	20.9	9.2	5.0	1.3
Wilbarger	6.8	19.2	7.9	25.6	25.2	10.4	5.4	2.0
Young	5.5	18.6	10.1	23.9	24.7	12.1	5.9	2.9

Table 1-4: 2023 (Est.) Demographics – Breakdown by Income and Education

County	Median Family Income	High School Diploma or Better	Bachelor s Degree or Better	Family Income Below Poverty Level
Archer	$72,062.00	91.2%	25.2%	9.0%
Baylor	$49,059.00	87.0%	23.3%	13.9%
Clay	$66,085.00	92.9%	23.2%	10.7%
Cottle	$45,351.00	81.9%	18.3%	20.2%
Foard	$47,657.00	80.4%	16.0%	17.0%
Hardeman	$49,539.00	85.0%	17.4%	16.3%
King	$87,856.00	78.8%	30.6%	10.3%
Montague	$57,076.00	88.0%	16.7%	14.8%
Wichita	$56,334.00	87.5%	23.9%	15.5%
Wilbarger	$52,983.00	78.4%	16.6%	16.6%
Young	$58,297.00	88.1%	22.2%	15.7%
Average	**$58,390.00**	**85.4%**	**21.2%**	**14.5%**

Table 1-5: 2023 (Est.) Demographics – Breakdown by Occupation

County	Percentage of Population That Work In…						
	Management	Service	Sales	Farming	Construction	Production	Unemployed
Archer	9.2%	15.2%	7.8%	2.7%	6.7%	5.6%	3.5%
Baylor	22.6%	9.5%	6.3%	12.6%	11.0%	10.4%	2.5%
Clay	13.8%	5.2%	11.6%	4.7%	7.5%	7.9%	3.7%
Cottle	16.0%	12.5%	7.8%	14.6%	13.2%	4.9%	2.6%
Foard	24.6%	9.6%	6.3%	19.1%	8.7%	8.3%	3.3%
Hardeman	10.7%	5.3%	5.6%	8.5%	7.0%	10.5%	4.8%
King	16.5%	7.1%	2.4%	44.0%	8.3%	6.0%	1.0%
Montague	9.1%	5.4%	12.5%	3.8%	6.3%	6.7%	3.5%
Wichita	8.7%	7.6%	13.2%	2.5%	6.2%	8.2%	3.9%
Wilbarger	10.1%	8.1%	7.6%	4.5%	3.9%	10.3%	5.0%
Young	24.4%	6.1%	11.3%	3.2%	9.7%	10.5%	3.4%
Average	**15.1%**	**8.3%**	**8.4%**	**10.9%**	**8.0%**	**8.1%**	**3.4%**

1.3 Water Use Demand Centers

The City of Wichita Falls is the largest demand center in the region. Other demand centers include Vernon, Burkburnett, Iowa Park, Bowie, Olney, Henrietta, Nocona, Seymour, Electra, Quanah and Archer City. Table 1-6 below shows the population and water usage of these demand centers and also the gallons per capita per day (GPCD) usage for each center.

Table 1-6: Regional Demand Centers

County	City	2030 (Est.) Population	2030 (Est.) Municipal Water Use (ac ft/yr)	Water Use (GCPD)
Archer	Archer City	1,683	248	131
Baylor	Seymour	2,502	439	157
Clay	Henrietta	3,317	647	174
Hardeman	Quanah	2,135	301	126
Montague	Bowie	6,735	1,118	148
Montague	Nocona	4,126	948	205
Wichita	Burkburnett	11,270	1,455	115
Wichita	Electra	2,348	760	289
Wichita	Iowa Park	6,759	887	117
Wichita	Wichita Falls	102,308	16,055	140
Wilbarger	Vernon	10,746	1,674	139
Young	Olney	2,714	434	143

While the population of Region B is only expected to reach near 228,000 by 2080, the Dallas-Fort Worth Metroplex, located just east of the region, is expected to top 10 million. This population could likely impose increasing pressures on the water base recreational resources of the Region, as the number of people willing to travel into Region B for recreational purposes increase.

1.4 Water Supply and Use

Water providers have continuously strived to develop the water resources in Region B so that they can deliver potable water to the people, irrigation water to the farmers and ranchers, and water to promote industrial and economic growth. In 1901, the dam at Lake Wichita in Wichita County was completed, signifying the beginning of 90 years of water management for recreation, irrigation, and human consumption for north central Texas. In 1924, the dam at Lake Kemp was completed, making it one of the largest man-made lakes in the world. The lake was originally designed for flood prevention and water supply, however, soon after construction, it was determined that its water was too saline to drink. This led to the discovery of natural salt-water springs in Foard, King, and Knox Counties which have caused the water in the Big Wichita and Pease Rivers to be very difficult to treat for human consumption, consequently it has been only used for irrigation and steam electric power purposes until recently. This natural phenomenon has prompted the Red River Authority to initiate the Red River Chloride Control Project on the Big Wichita River. By building brine lakes and low-flow dams, the amount of dissolved solids and chlorides in the water has been reduced. As a result, water from Lake Kemp may be utilized for other uses. In fact, in May 2009 the City of Wichita Falls completed a 10 MGD reverse osmosis plant to treat Lake Kemp water and supplement their current water supply.

There are 10 significant lakes and 4 major streams that are used for water supply in the region. Figure 1-2 shows the location of the major surface water sources in Region B. Figure 1-3 through Figure 1-14 depict the average monthly and average annual stream flows in cubic feet per second at various USGS gauging stations which are shown on Figure 1-2 (NOTE: The site number shown for each chart represents the USGS gauging station shown on Figure 1-2). Table 1-7 shows the Year 2030 firm yield for each significant lake in Region B.

Table 1-7: Year 2030 Firm Yields for Lakes in Region B

Water Source	Basin	Lake Firm Yield (ac ft)	Conservation Capacity (ac ft)
Lake Kemp/Diversion	Red River	46,500	235,356
Lake Kickapoo	Red River	11,800	81,364
Lake Arrowhead	Red River	21,500	218,102
Amon Carter Lake	Trinity/Red River	1,400	25,670
Lake Electra	Red River	310	5,606
Lake Nocona	Red River	1,260	18,696
Olney Lake	Red River	247	4,046
Santa Rosa Lake	Red River	2,200	8,245
North Fork Buffalo Cr.	Red River	840	14,378

In addition to the lakes listed in the previous table, some municipalities and water supply corporations obtain their raw water from wells.

Figure 1-2:Surface Water Map

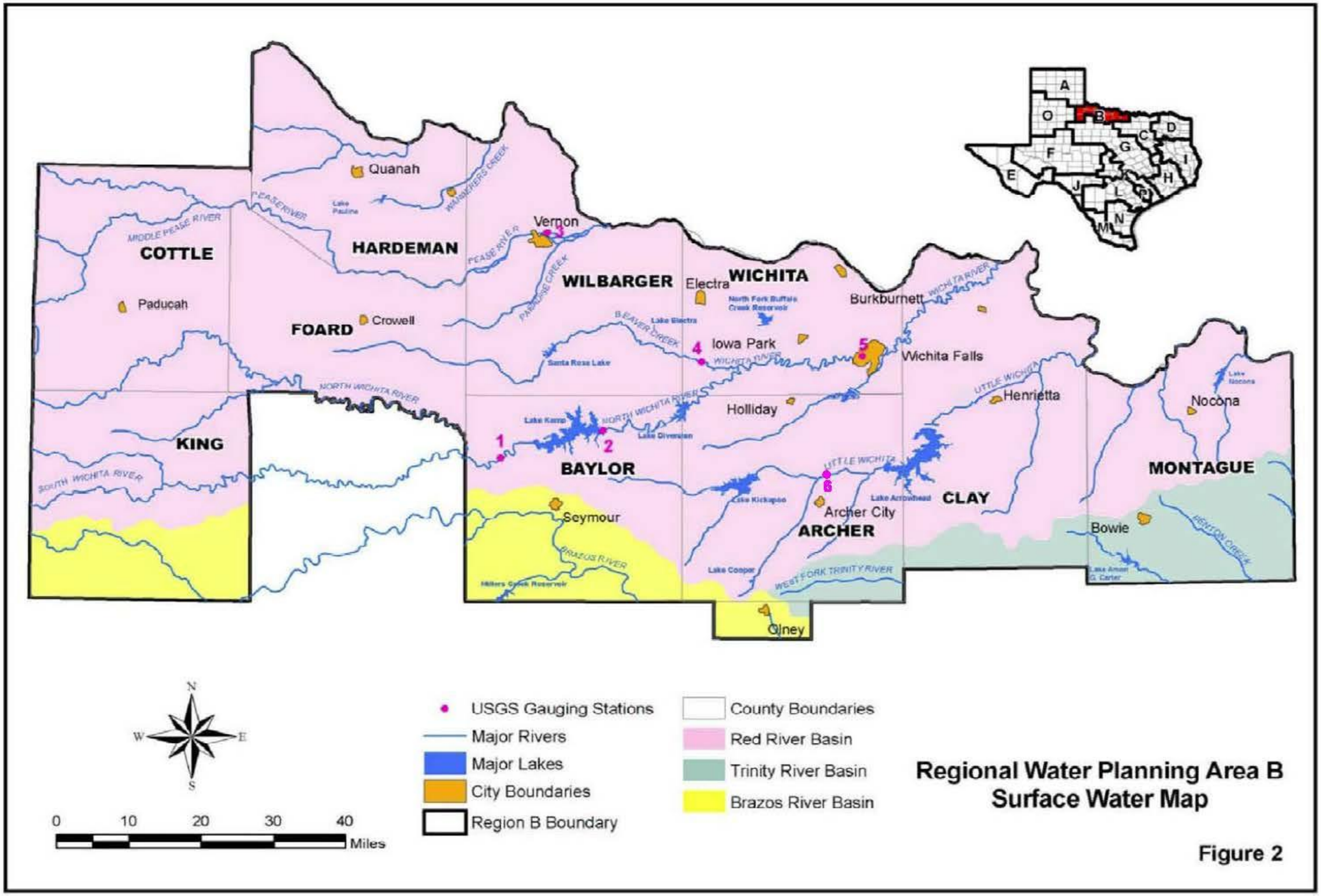


Figure 1-3: Streamflow Data – Site 1

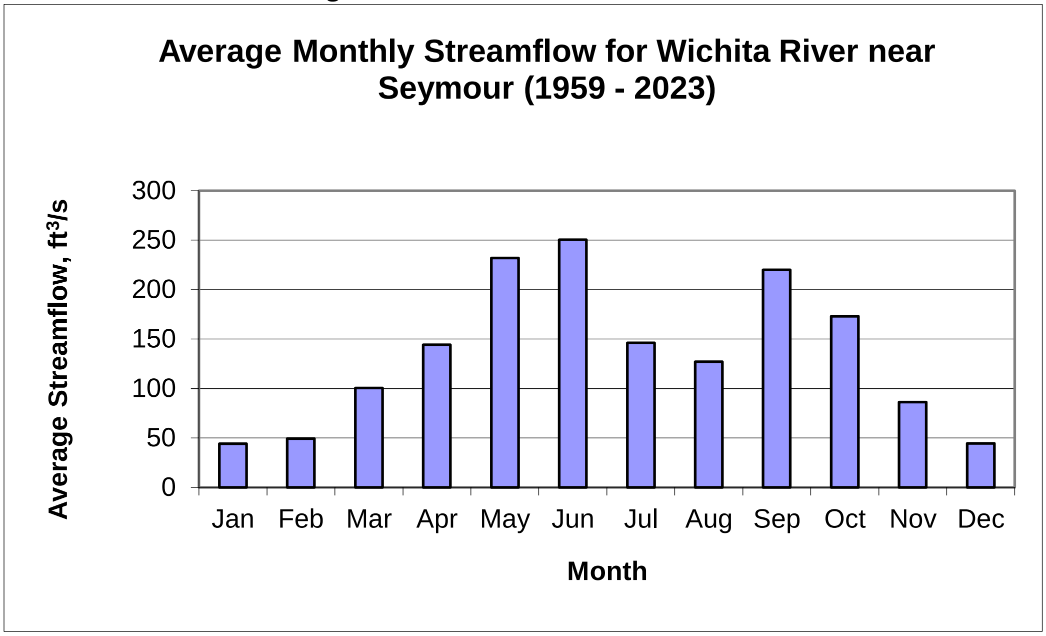
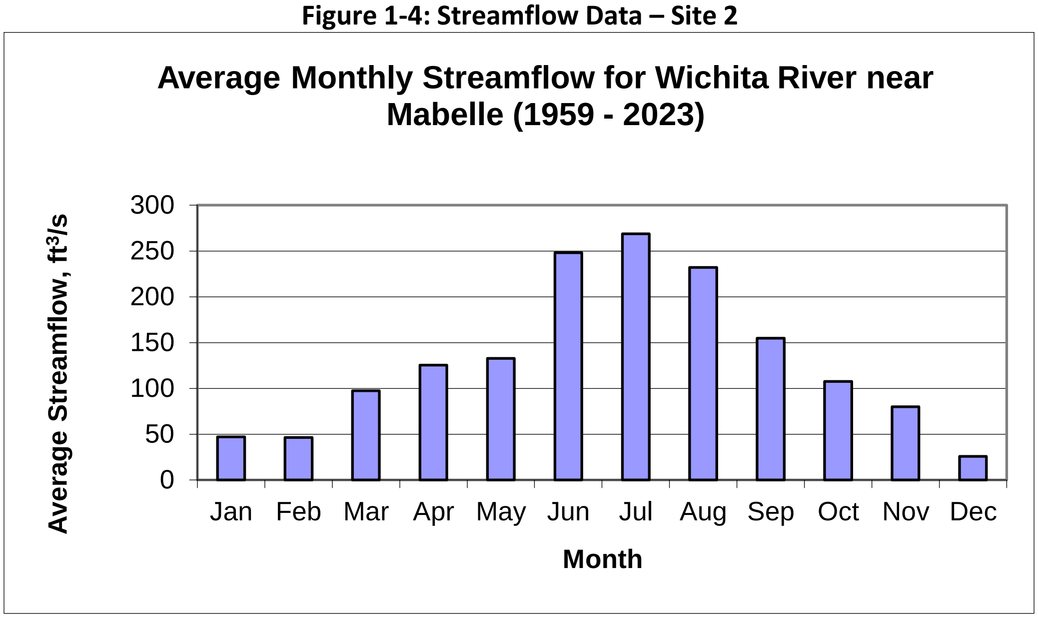


Figure 1-4: Streamflow Data – Site 2



Note: Streamflows at this site are influenced by releases from Lake Kemp for irrigation and industrial diversions.

Figure 1-5: Streamflow Data – Site 3

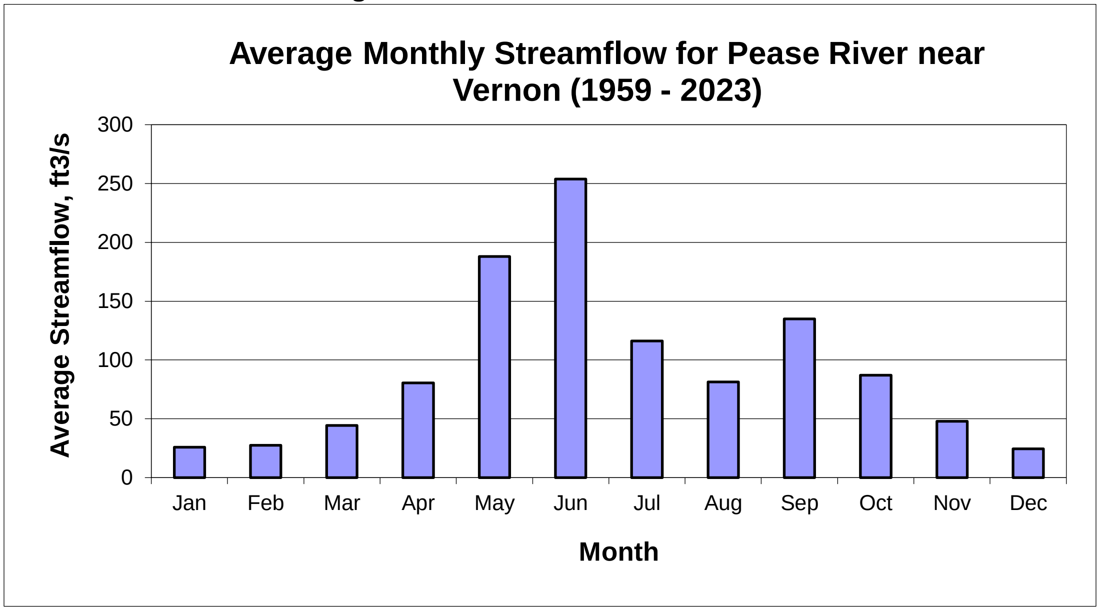


Figure 1-6: Streamflow Data – Site 4

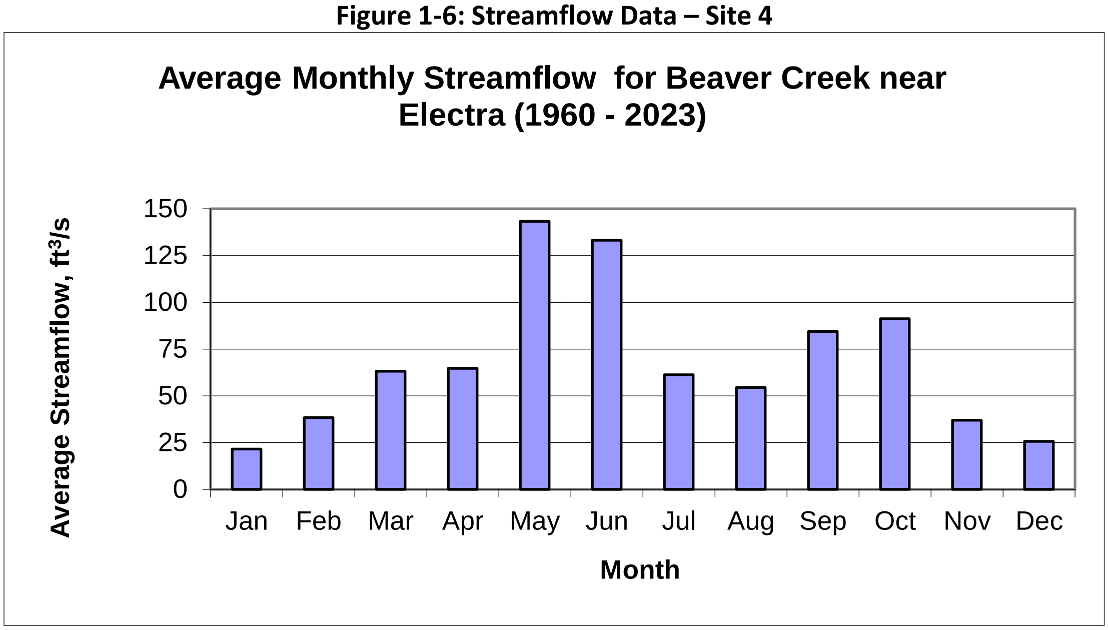


Figure 1-7: Streamflow Data – Site 5

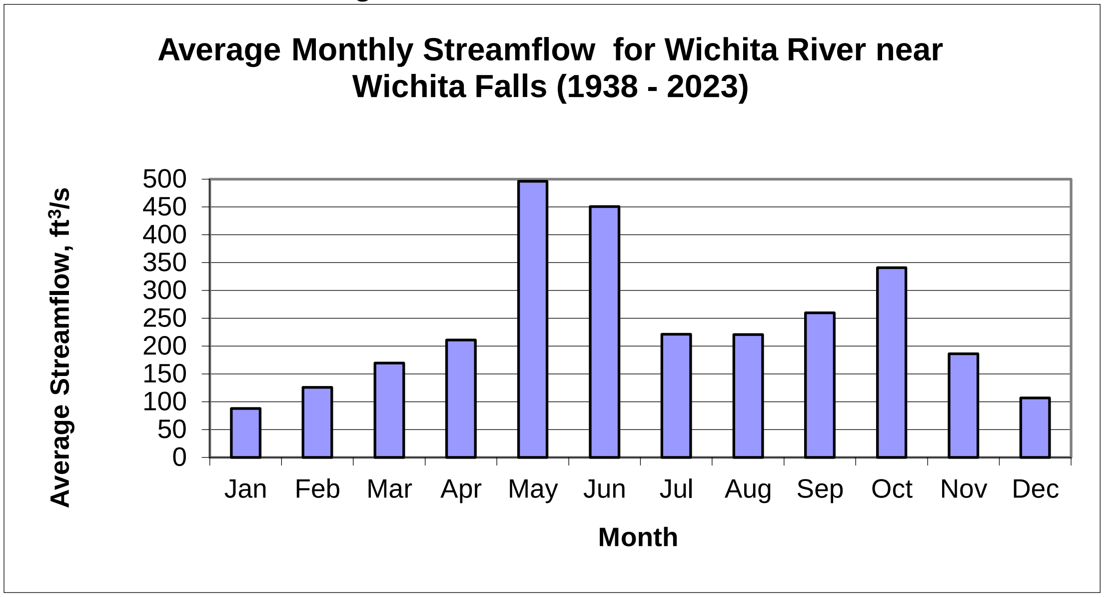


Figure 1-8: Streamflow Data – Site 6

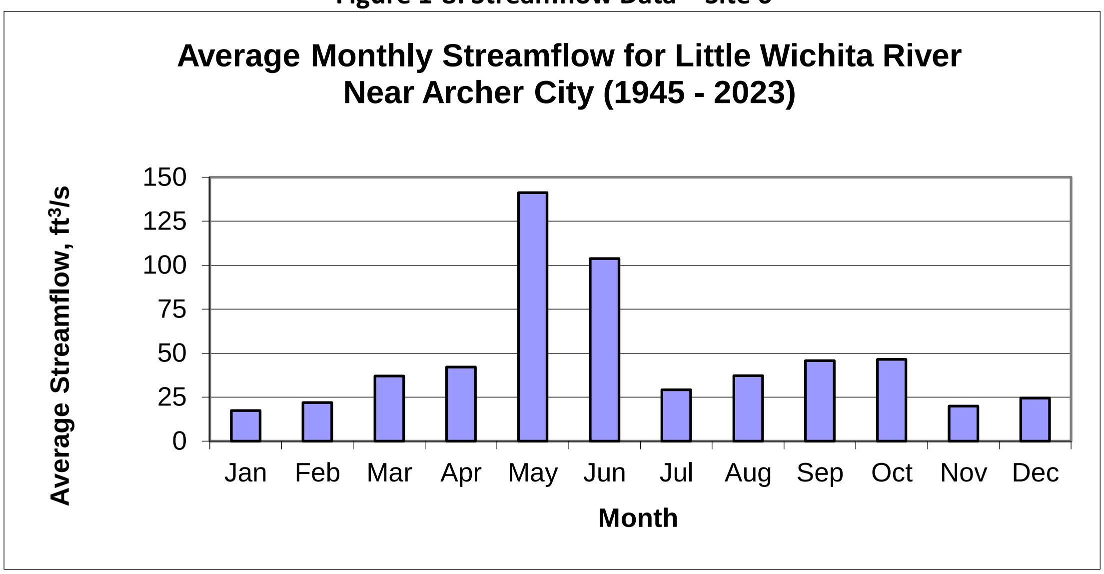


Figure 1-9: Streamflow Data – Site 1

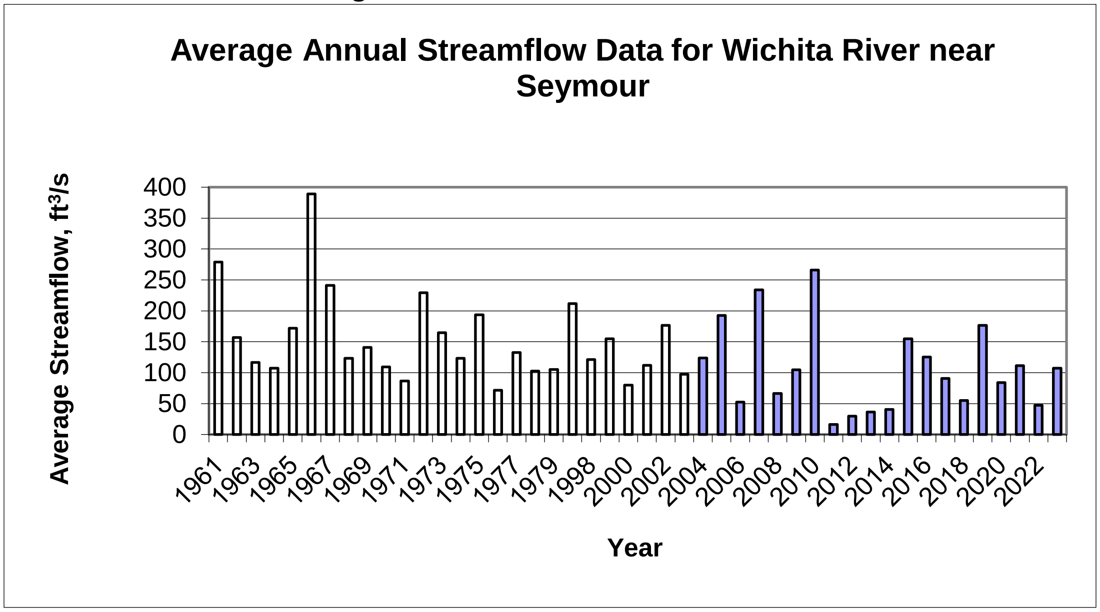


Figure 1-10: Streamflow Data – Site 2

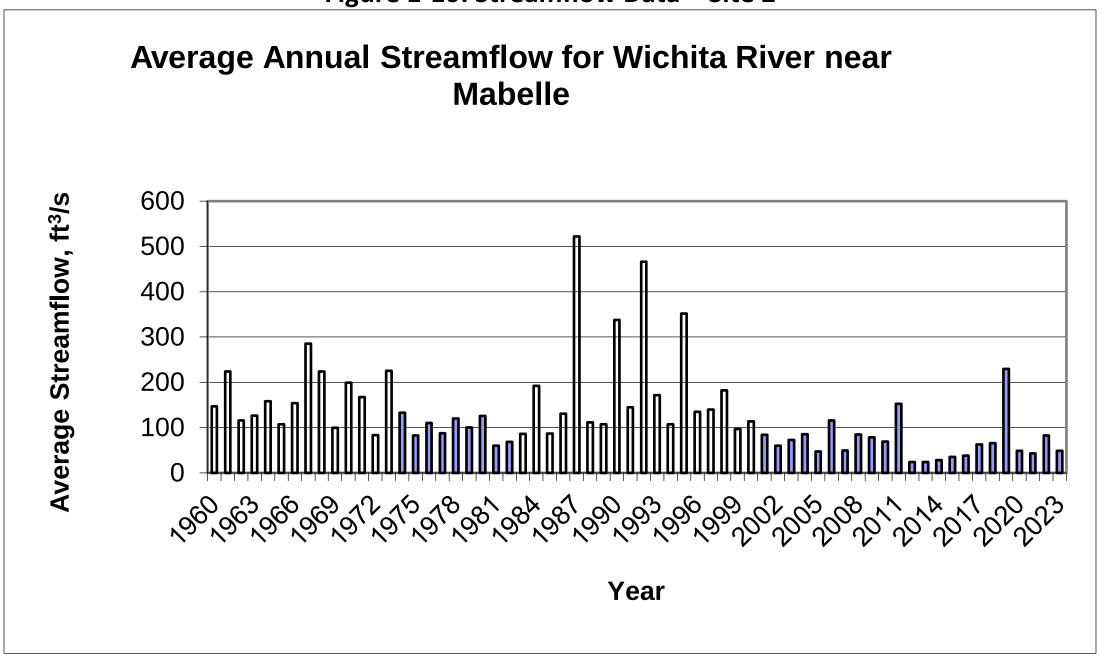


Figure 1-11: Streamflow Data – Site 3

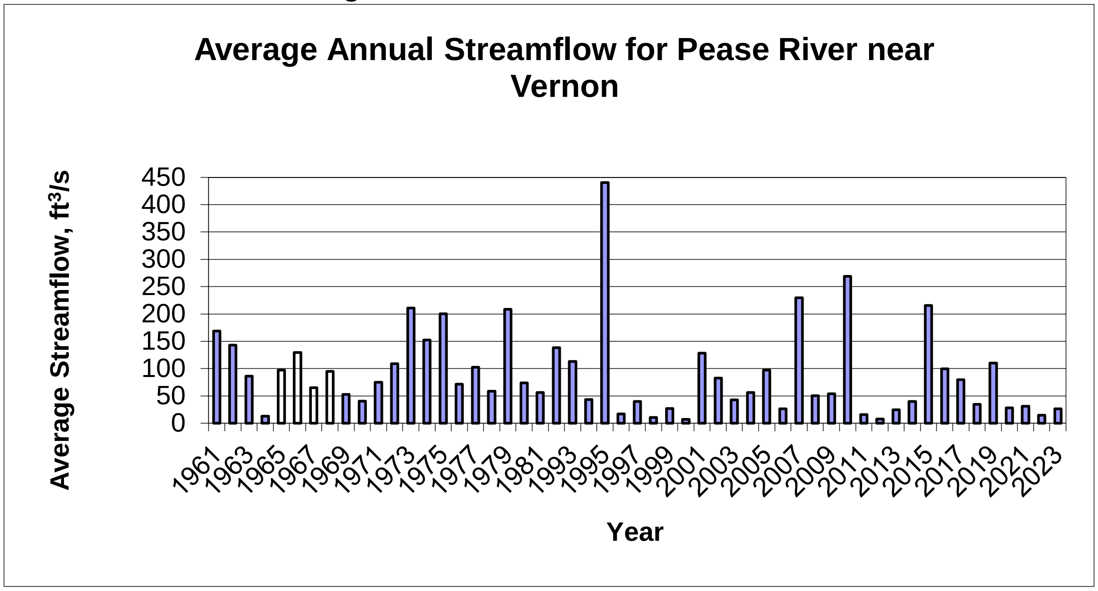


Figure 1-12: Streamflow Data – Site 4

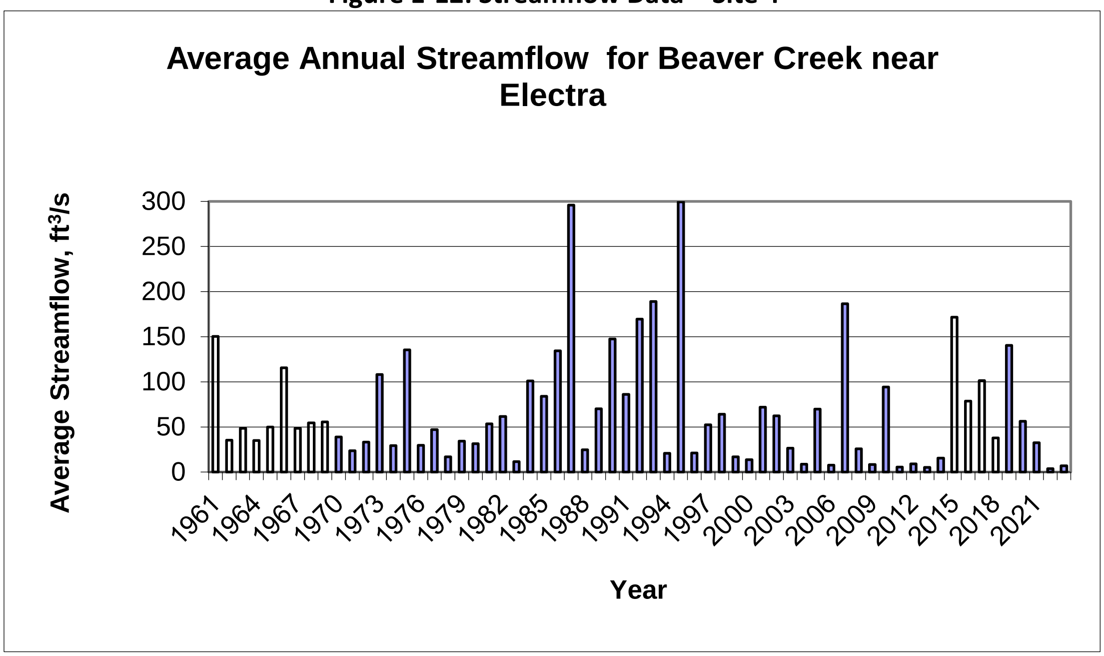


Figure 1-13: Streamflow Data – Site 5

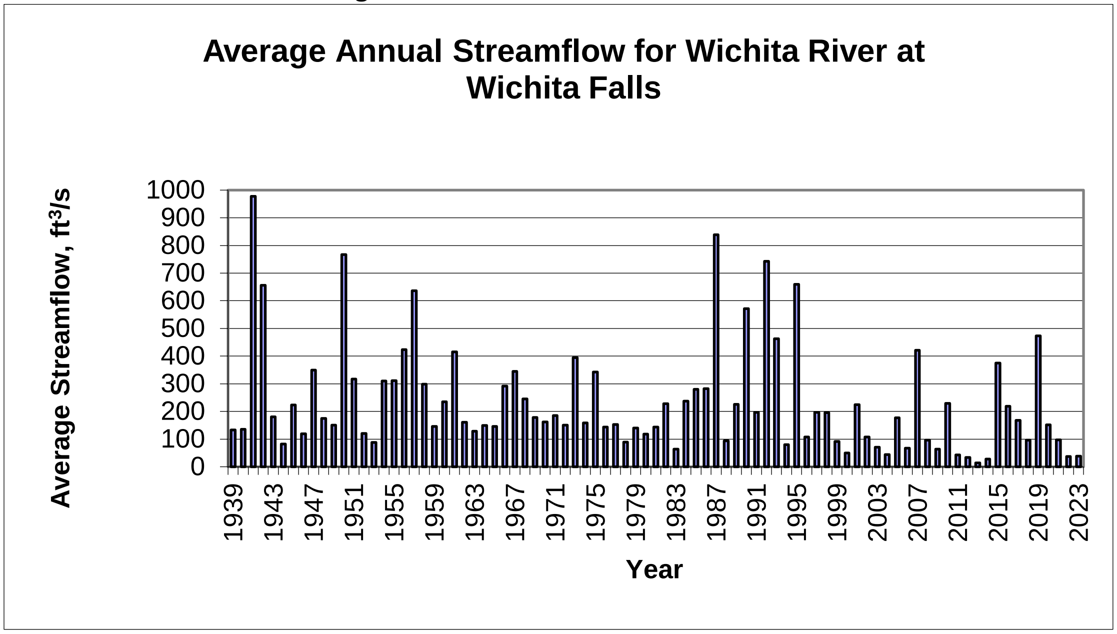
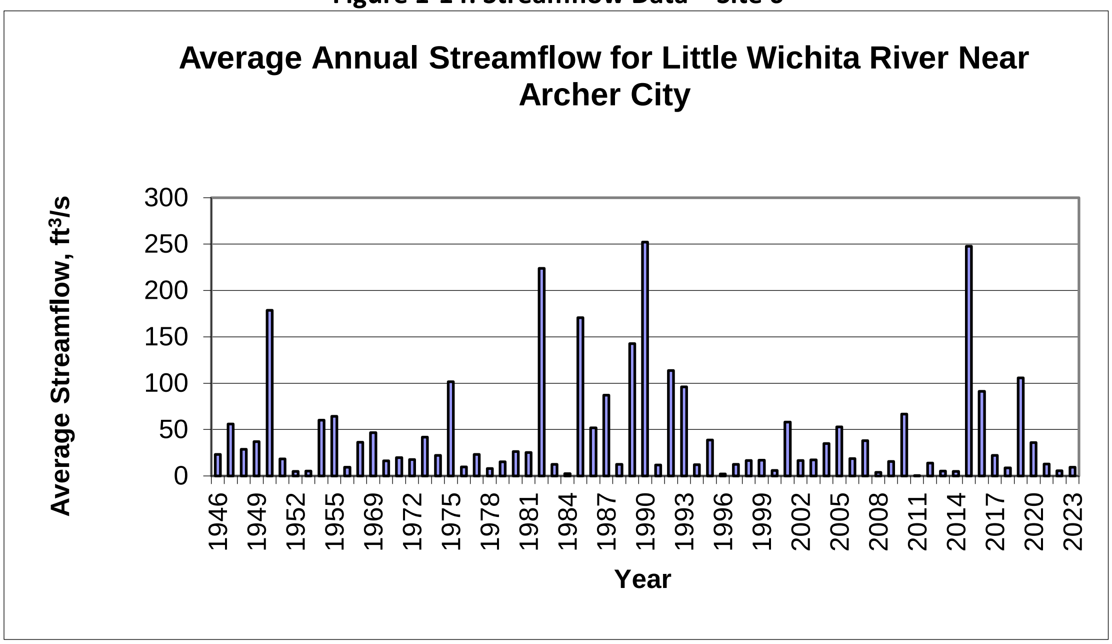


Figure 1-14: Streamflow Data – Site 6



There are two major aquifers (Seymour and Trinity) and two minor aquifers (Blaine and Cross Timbers) in Region B. The Seymour Aquifer, found in the western portions of the region, is utilized for irrigation purposes in addition to being pumped for municipal use by the cities of Vernon, Burkburnett, and Seymour as well as rural water supply corporations and rural communities.

Extreme northern reaches of one of the state's most expansive aquifers, the Trinity Aquifer, lies in southeastern Montague County, the easternmost county in Region B. Water from this area of the aquifer is used for irrigation and domestic water supply purposes. Figure 1-15 shows the location of the major aquifers within Region B.

Figure 1-16 shows the location of the two minor aquifers in Region B, known as the Blaine Aquifer and the Cross Timbers Aquifer. The Blaine Aquifer is found only in Cottle, Foard, Hardeman, Knox, and King Counties of Region B, and the large majority of the water pumped from this aquifer is used for agricultural purposes. The water pumped from this aquifer is high in dissolved solids from natural halite dissolution. In addition to the natural contamination, significant pollutants are also present in the aquifer as a result of human activities such as oil and gas production and agriculture. The Cross Timbers (formerly known as the Paleozoic Aquifer) is found in portions of Wilbarger, Baylor, Wichita , Archer, Clay and Montague Counties and was recently designated a minor aquifer by TWDB. This formation has considerable extent through Region B, but production is limited and TWDB has not developed a groundwater availability model for the Cross Timbers.

At one time, nearly 150 natural springs and seeps across the area were known to exist within Region B. While some continue to produce water today, many of these springs have dried up over time due to over-pumping of the groundwater for municipal, agriculture, industrial, and mining use. A few small producing springs feed natural ponds and creeks that are habitat for many plants and animals. It should be recognized that any future development of underground sources of water, as well as the overuse of existing surface water supplies, may cause a decline in the viability of existing springs.

Agriculture irrigation is the main component of regional water use, accounting for approximately 60 percent of all water used. Irrigation water is currently provided from Lakes Kemp and Diversion through a distribution system of canals and pipe by the Wichita County Water Improvement District, the major irrigation provider in the region. A significant amount of irrigation is also provided from groundwater. Irrigation use in the region is expected to remain constant throughout the planning period at approximately 85,595 acre-feet per year (ac-ft/yr) as more efficient pumping and irrigation techniques are implemented across the region. Municipal use is expected to increase from approximately 37,032 ac-ft/yr to 40,760 ac-ft/yr due mainly to the increase in population. In addition, manufacturing water use is expected to increase from 2,216 to 2,659 ac-ft/yr. Finally, steam electric power water use at 5,898 ac-ft/yr, livestock water use at 8,708 ac-ft/yr, and mining water use at 141 ac-ft/yr, are expected to remain constant throughout the planning period.

The overall water use in the region is projected to increase from approximately 139,590 ac-ft/yr to 143,761 ac-ft/yr throughout the planning period and Figure 1-17 shows the actual water use by category for Region B in the years 2020, 2030 and 2080. The 2030 and 2080 projections are taken from Chapter 2 of this report.

Figure 1-15:Major Aquifers Map

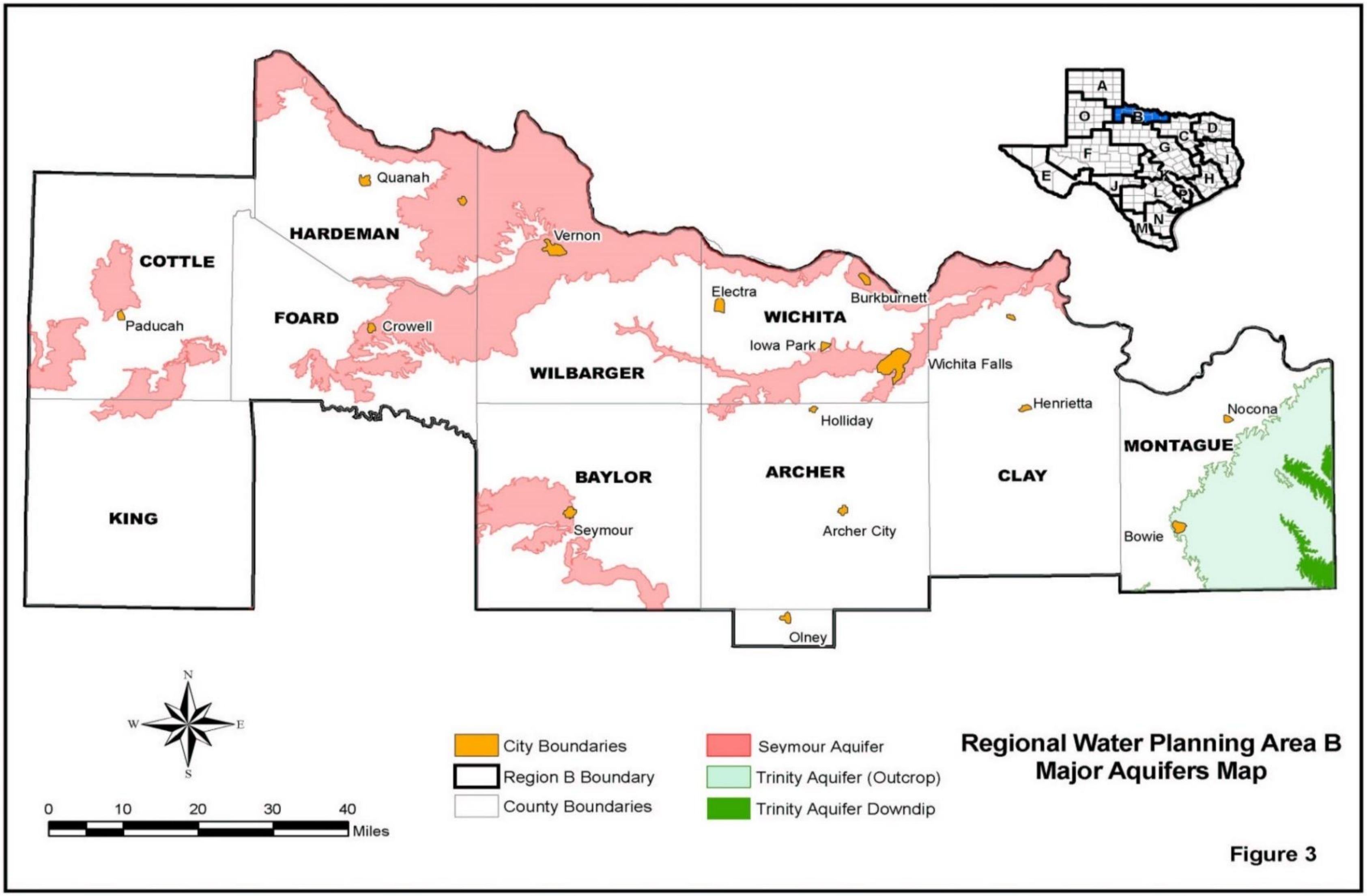


Figure 1-16: Minor Aquifer Map

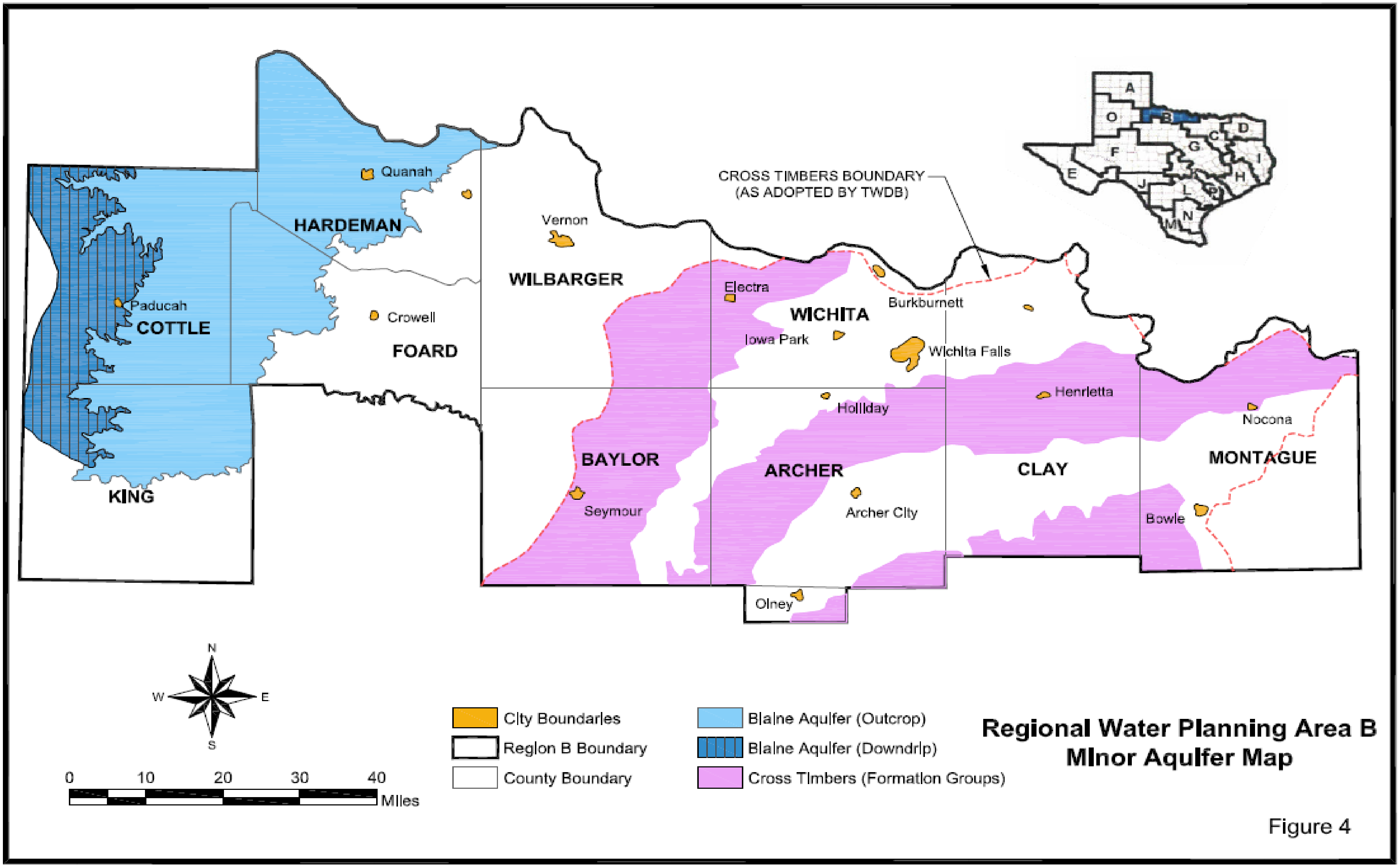
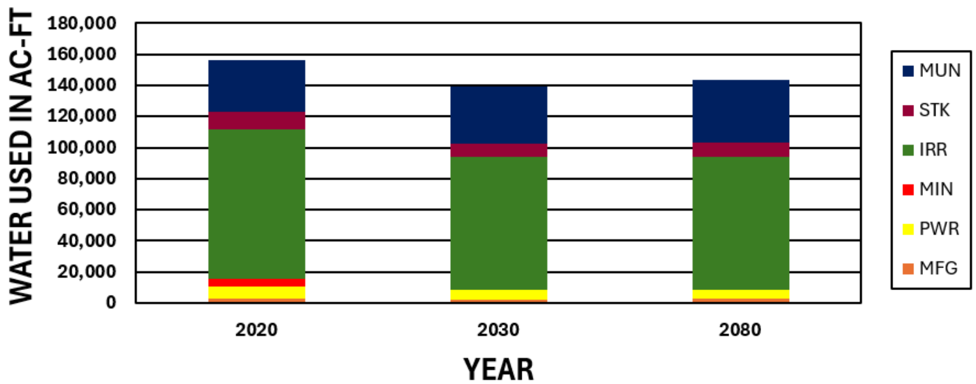


Figure 1-17: Region B Water Use



YEAR	MFG	PWR	MIN	IRR	STK	MUN	TOTAL
2020	2,427	7,742	5,203	96,498	11,239	33,380	156,489
2030	2,216	5,898	141	85,595	8,708	37,032	139,590
2080	2,659	5,898	141	85,595	8,708	40,760	143,761

Table 1-8 shows the water rights holders of Region B and their permitted usage.

Table 1-8: Surface Water Rights Holders

Rights Holder	Water Supply	Permitted Use (ac ft)
A.L. Rhodes	Little Wichita River	3,600
City of Bowie	Amon G. Carter	5,000
City of Nocona	Lake Nocona	1,260
Red River Authority	South Wichita River	8,780
Lonnie D. Allsup	Trib. Of Wichita River	2,150
City of Wichita Falls	Lake Wichita	7,961
Wichita County WID #2	Ls. Kemp & Diversion	193,000
W.T. Waggoner Estate	Ls. Santa Rosa & Wharton	3,070
City of Electra	Lake Electra	1,400
City of Wichita Falls	Lake Kickapoo	40,000
City of Olney	Ls. Olney & Cooper	1,260
City of Wichita Falls	Lake Arrowhead	45,000
City of Wichita Falls	Little Wichita River	2,352
City of Henrietta	Little Wichita River	1,560

A more detailed analysis of water use and water use projections is presented in Chapters 2 and 3 of this report.

1.5 Climate Data

The best way to describe the weather of Region B is volatile. It has the ability to change from one extreme to another in a short period of time. Annual precipitation can also vary greatly from year to year. The average annual rainfall for the region is 27.4 inches; however, the extremes range from 47 inches in 1915 to 13 inches in 2011. Table 1-9 shows monthly averages and records for the Wichita Falls area and Table 1-10 lists temperatures and rainfall for each county in the region.

Table 1-9: Monthly Averages and Records for Wichita Falls

Monthly Avg s	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
High Temp.	54	58	67	76	84	91	97	97	88	77	65	55
Low Temp.	30	34	41	49	60	68	72	71	63	52	40	31
Precipitation	1.14	1.75	2.20	2.61	3.92	4.15	1.59	2.50	2.81	3.11	1.65	1.62
Monthly Rec s	**Jan**	**Feb**	**Mar**	**Apr**	**May**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
High Temp.	87	93	100	103	110	117	114	113	111	102	89	86
Low Temp.	-12	-8	6	24	35	50	54	53	38	21	14	-8
Snowfall	9.8	9.0	9.7	1.0	0.0	0.0	0.0	0.0	0.0	1.0	6.3	7.8
Rainfall	2.25	2.97	3.60	5.20	5.12	5.36	3.10	4.52	6.19	4.34	3.15	3.12

Table 1-10: Temperature Extremes and Average Rainfall

	Temperature (F°)		Annual Rainfall (in)
	Jan. Mean Min.	July Mean Max.	
Archer	27	98	29
Baylor	28	97	28
Clay	27	95	32
Cottle	26	97	24
Young	27	97	31
Foard	24	97	26
Hardeman	24	97	27
King	24	97	25
Montague	28	95	34
Wichita	29	97	29
Wilbarger	26	97	28

The region is drier in the western areas and has more rainfall in eastern and southern counties.

Since 1930, the entire state has experienced 8 major droughts. Three of these droughts have occurred in the past 18 years, in 2002, 2006 and 2010, and Region B was significantly impacted by the drought during 2010 – 2015. Based on generally accepted drought indicators, over 95 percent of Region B, experienced "Exceptional Drought" conditions from late in July 2011 through early October 2011 with about 25 percent of the region being in an "Extreme" or "Exceptional" drought conditions continuously from July 2011 through May 2015. A new drought of record was established for the Region B area during the period of July 2011 through May 2015.

Water providers, including wholesale water providers and larger retail municipalities in Region B have taken steps to prepare for and respond adequately to drought conditions through the preparation of individual Drought Contingency Plans and by taking the necessary steps to implement those prepared plans, which require specified quantifiable targets for water use reductions and a means and method for plan enforcement.

1.6 Economic Aspects of Region B

The three main components of the region's economy are farming, ranching, and mineral production.

The Texas Railroad Commission reports that Region B has approximately 12,673 regular producing oil wells and 1,186 regular producing gas wells. Table 1-11 provides a tabulation by county of the current oil and gas wells, as of February 2024.

Table 1-11: Number of Oil and Gas Wells

County	Oil Wells	Gas Wells
Archer	1,977	3
Baylor	118	0
Clay	917	22
Cottle	39	65
Foard	61	130
Hardeman	200	0
King	393	5
Montague	2,023	796
Wichita	4,315	0
Wilbarger	784	0
Young	1,846	165
Total	**12,673**	**1,186**

The service infrastructure is also strong. Some of the services offered throughout Region B include agribusiness, oilfield service, grain, fiber, and food processing. Wichita County, the most populous county in the region, is the retail trade center for a large area. Sheppard Air Force Base and medical services also are big contributors to the economy of Wichita County. The region boasts a variety of manufacturing. Some areas of manufacturing include oilfield equipment, clothing, building products, plastics, electronics, wood products, and aircraft equipment.

1.7 Land Use

Region B includes some of the largest ranches in the state, including the Waggoner Ranch in Wilbarger County and the Four Sixes Ranch in King County. It has over 1 million acres of croplands and over 3 million acres of open range. Table 1-12 shows land use percentages for each county in the region. Percentages under the heading of “Conservation” represent lands that had previously been croplands, but have been converted to the Conservation Reserve Program. The Conservation Reserve Program, or CRP, subsidizes farmers and landowners to convert highly erodible farmland to permanent grassland for a period of ten years.

Table 1-12: Percentage of Land Use by County

County	Crops	Federal	Conservation	Pasture	Range	Urban	Water	Transportation
Archer	21.4%	<0.1%	0.3%	1.1%	73.1%	0.9%	2.1%	1.1%
Baylor	27.1%	-	0.1%	0.1%	71.9%	0.2%	0.3%	0.3%
Clay	15.7%	-	0.6%	3.0%	77.5%	1.6%	1.1%	0.5%
Cottle	17.4%	-	0.1%	0.4%	81.0%	0.3%	0.2%	0.6%
Foard	26.7%	-	2.5%	-	69.9%	-	0.6%	0.3%
Hardeman	36.9%	-	1.5%	0.4%	59.0%	0.8%	0.9%	0.5%
King	9.7%	-	2.3%	0.4%	86.4%	0.0%	0.6%	0.6%
Montague	15.1%	n/a	n/a	n/a	67.8%	n/a	n/a	n/a
Wichita	31.9%	0.8%	1.0%	1.3%	60.0%	2.3%	1.5%	1.2%
Wilbarger	33.5%	-	0.2%	1.1%	64.3%	<0.1%	0.1%	0.7%
Young	18.7%	-	1.1%	1.5%	74.2%	1.6%	1.6%	1.3%

Typical crops in Region B include cotton, coastal bermuda, wheat, alfalfa, peanuts, grain sorghum, watermelons, pecans, peaches, and other various fruits. Cattle for beef and dairy production is the major component of the livestock industry, with sheep, swine, and equine also present.

1.8 Navigable Waterways

Navigable waters of the United States are those waters that are subject to the ebb and flow of the tide and/or presently being used, or have been used in the past, or may be susceptible for use to transport interstate or foreign commerce. Based on information from the U.S. Army Corps of Engineers, there are no navigable waters within Region B.

1.9 Ecology and Wildlife

Most of Region B lies in the area known as the “Rolling Plains” with the exception of Montague County, which lies in the "Oakwoods and Prairies" area. The Texas Parks and Wildlife Department describes the “Rolling Plains” region as a “gently rolling plain of mesquite and short grass savanna.” The open range is generally characterized by its mesquite brush, prairie grasses, and sandstone outcroppings and cottonwood, hackberry, and salt cedar brush can be found near most rivers and streams. This vegetation is important to the survival of both resident and migratory birds. It is evident by the widespread mesquite, however, that over-grazing, soil erosion, and the lowering of the groundwater table have all contributed to the decline of the native grasslands. The topography of the region gently slopes to the east and southeast. The Red River and its major tributaries drain most of the region; however, extreme southern reaches of the region are drained by tributaries of the Brazos and Trinity Rivers.

The Texas Parks and Wildlife Department uses freshwater mussels as water quality indicators because they are usually the first organisms to show their sensitivity to changes in aquatic quality. Recent surveys have determined that 52 separate species of mussels have declined[1]. Another organism used to indicate water quality is the minnow. Since 1950, minnows native to the Big Wichita River System have also shown serious declines. These native minnows include the plains minnow, the silver chub, and several varieties of shiner. The plains minnow is commonly used in support of a significant commercial baitfish industry. The decline of these organisms indicates poor water conservation and management. Runoff and scouring flows have increased with broad increases in over-grazing, highway development, and general land clearing. Scouring flows can cause excessive sedimentation, thus eliminating the natural habitats of these organisms.

The “Rolling Plains” region of Texas is not usually thought of as an area rich in wetland habitats. However, the region is actually very important to both migrating and wintering waterfowl. In fact many species of migrating shorebirds, raptors, and other birds stopover in the region to feed and rest on the available wetlands.

There are over 40 species of water-dependent reptiles, amphibians, and mammals that live in the study area. Some of these include minks, muskrats, beavers, snakes, turtles, salamanders, and frogs. Fish species present in the study area include drum, carp, buffalo, bluegill, sunfish, largemouth and white bass; white crappie; flathead, blue, and channel catfish. Some endangered species are also present across the region. Table 1-13 lists the endangered and threatened species present in the region.

Copper Breaks State Park located 12 miles south of Quanah in Hardeman County contains 1,889 acres, and a 70 acre lake. The park has abundant wildlife and is home for part of the official Texas Longhorn herd.

Table 1-13: Region B – Endangered/Threatened Species

Species	State Status	Federal Status
American Peregrine Falcon	Threatened	-
Peregrine Falcon	Threatened	-
Whooping Crane	Endangered	Endangered
Golden-Cheeked Warbler	Endangered	Endangered
White-Faced Ibis	Threatened	-
Interior least tern	Endangered	Endangered
Black-capped Vireo	Endangered	Endangered
Texas Fawnsfoot	Threatened	-
Texas Kangaroo Rat	Threatened	-
Black-footed Ferret	-	Endangered
Brazos Water Snake	Threatened	-
Texas Horned Lizard	Threatened	-
Piping Plover	Threatened	Threatened
Gray Wolf	Endangered	Endangered
Red Wolf	Endangered	Endangered
Timber Rattlesnake	Threatened	-
Lesser Prairie Chicken	-	Threatened
Small Eye Shiner	Threatened	Endangered
Sharp Nose Shiner	Threatened	Endangered
Brazos Heelsplitter	Threatened	-
Black Rail	Threatened	Proposed Threatened
Chub Shiner	Threatened	-
Prairie Chub	Threatened	-
Red River Pup Fish	Threatened	-

1.10 Summary of Existing Local or Regional Water Plans

In April 2009 a Water Conservation Implementation Plan was prepared for Wichita County Water Improvement District No. 2. This plan will be used to meet the irrigation needs in the region by replacing/enclosing selected portions of the canal laterals that have the largest quantities of water loss.

In addition, information was gathered from water providers of Region B to determine, among other things, if they possessed a water conservation plan or a local or regional water plan. Table 1-14 lists the results of those surveys and inquiries.

Table 1-14: Survey Results Regarding Water Plans (Municipal Providers)

Water Provider	Existing Drought Contingency Plan?	Existing Water Conservation Plan?	Existing Local or Regional Water Plan?	Special Concerns of the Provider
Archer County MUD	Y	Y	N	Supply
Arrowhead Lake Water System	Y	Y	N	
Arrowhead Ranch Estates Water System	Y	Y	N	
Baylor County WSC	Y	Y	N	Nitrates
Box Community Water System	Y	Y	N	
City of Archer City	Y	Y	N	
City of Bowie	Y	Y	N	
City of Burkburnett	Y	Y	N	Nitrates
City of Byers	N	N	N	Nitrates
City of Charlie	N	N	N	Nitrates
City of Crowell	Y	N	N	Nitrates
City of Dumont	N	N	N	
City of Electra	Y	Y	N	Nitrates
City of Henrietta	Y	Y	Y	
City of Holliday	Y	Y	N	
City of Iowa Park	Y	Y	N	
City of Lakeside City	Y	Y	N	Storage
City of Megargel	Y	N	N	
City of Nocona	Y	Y	N	
Nocona Hills WSC	Y	Y	Y	Nitrates
City of Olney	Y	Y	N	Storage
City of Paducah	N	N	N	
City of Petrolia	N	N	N	
City of Pleasant Valley	N	N	N	
City of Quanah	N	N	N	
City of Saint Jo	Y	Y	N	
City of Scotland	Y	N	N	
City of Seymour	Y	N	N	Nitrates
City of Sunset	N	N	N	Storage
City of Vernon	Y	Y	Y	Nitrates
City of Wichita Falls	Y	Y	Y	
Dean Dale WSC	Y	Y	N	
Farmers Valley Water System	Y	Y	N	
Foard County Water System	Y	Y	N	
Forestburg WSC	N	N	N	
Goodlett Water System	Y	Y	N	
Hinds Water System	Y	Y	N	

Water Provider	Existing Drought Contingency Plan?	Existing Water Conservation Plan?	Existing Local or Regional Water Plan?	Special Concerns of the Provider
Horseshoe Bend WSC	N	N	N	
Lockett Water System	Y	Y	N	
Medicine Mound Water System	Y	Y	N	
Northside WSC	Y	Y	Y	Nitrates
Quanah NE Water System	Y	Y	N	
Ringgold Water System	Y	Y	N	
South Quanah Water System	Y	Y	N	
Wichita Valley WSC	Y	Y	N	
Windthorst WSC	Y	Y	N	

1.11 Summary of Recommendations

It is anticipated that with the implementation of the recommended Water Management Strategies, Region B will have adequate water supplies throughout the planning period. The main recommendations of the Plan are to implement wastewater reuse projects, pursue a permit to construct Lake Ringgold, and to employ conservation measures to reduce water waste. Also, the heavy dissolved solid and chloride concentrations in the western portions of the region are preventing the full utilization of the available water resources. To reduce this, it is recommended that the Red River Chloride Control Project, sponsored by the Red River Authority of Texas, continue to be funded and operated.

1.12 Identification of Known Threats to Agriculture or Natural Resources

Excessive concentrations of total dissolved solids, sulfate, and chloride are a general problem in most streams of the Red River Basin under low flow conditions. The high salt concentrations are caused, in large part, by the presence of salt water springs, seeps, and gypsum outcrops. Salt water springs are generally located in the western portion of the (Red River) basin in the upper reaches of the Wichita River, the North and South Forks of the Pease River, and the Little Red, which is a tributary to the Prairie Dog Town Fork of the Red River. Gypsum outcrops are found in the area ranging westward from Wichita County to the High Plains Caprock Escarpment.

The excessive amounts of dissolved solids and chlorides in the water present problems to managers, planners, and others concerned with water treatment for municipal use. For this reason, the quality of the available water supply is as much an issue as the quantity for Region B. Water consumers of all kinds, whether municipal, industrial, or agricultural, desire water that is less saline; however, these conditions have existed for many years, and the plants and animals that live with them have adapted well. The Red River Authority of Texas is sponsoring a federal chloride control project to control the natural chloride level in the Red River Basin by impounding high chloride waters from the natural brine springs.

In addition, there are areas in Region B with highly erodible soils that contribute to an accumulation of sediment in the lakes and reservoirs. This sediment over time, can significantly reduce storage capacity and reliable water supplies.

There is limited recent information available with regards to groundwater levels and drawdown data within the region. However, historical use indicates that with the exception of Wilbarger County, much of the groundwater is not fully developed or not currently being used. Therefore, it is anticipated that additional groundwater can be developed to meet the projected water demands through the planning period with no known threats to Agriculture or Natural Resources.

1.13 Water Providers in Region B

Water is provided in Region B by a number of entities. The cities provide most of the municipal and manufacturing water in the region with the City of Wichita Falls providing the majority of the water. Other large providers include the Red River Authority of Texas and the Greenbelt Water Authority. The following Table 1-15 shows a comprehensive listing of the water providers and the municipal water demands for the projected years 2030 through 2080. A more detailed discussion of water use is presented in Chapter 2 of this report. It should be noted that these use figures do not include water for irrigation, manufacturing, electrical power, livestock, or mining.

Table 1-15: Municipal Water Demands of Water Providers and Users in Region B
-Values are in ac-ft/yr-

County	WUG Name	2030	2040	2050	2060	2070	2080
ARCHER	ARCHER CITY	286	283	280	275	271	266
ARCHER	ARCHER COUNTY MUD 1	243	240	238	236	234	232
ARCHER	BAYLOR SUD	45	43	42	41	39	38
ARCHER	COUNTY-OTHER, ARCHER	51	50	50	49	48	47
ARCHER	HOLLIDAY	255	254	253	249	245	240
ARCHER	LAKESIDE CITY	162	160	159	156	153	151
ARCHER	SCOTLAND	150	148	146	144	142	140
ARCHER	WICHITA VALLEY WSC	216	212	211	211	207	207
ARCHER	WINDTHORST WSC	232	229	228	224	220	217
ARCHER COUNTY TOTAL		**1,640**	**1,620**	**1,606**	**1,584**	**1,559**	**1,538**
BAYLOR	BAYLOR SUD	252	254	265	271	276	282
BAYLOR	COUNTY-OTHER, BAYLOR	2	2	1	1	1	1
BAYLOR	SEYMOUR	506	494	484	464	444	444
BAYLOR COUNTY TOTAL		**760**	**749**	**751**	**736**	**722**	**727**
CLAY	COUNTY-OTHER, CLAY	452	443	436	422	409	396
CLAY	DEAN DALE SUD	145	148	153	159	164	170
CLAY	HENRIETTA	744	745	749	749	749	749
CLAY	RED RIVER AUTHORITY OF TEXAS	491	488	486	485	484	482
CLAY	WINDTHORST WSC	110	108	105	103	101	101
CLAY COUNTY TOTAL		**1,941**	**1,932**	**1,929**	**1,918**	**1,908**	**1,899**

County	WUG Name	2030	2040	2050	2060	2070	2080
COTTLE	COUNTY-OTHER, COTTLE	33	32	31	30	30	29
COTTLE	PADUCAH	298	290	281	274	268	268
COTTLE	RED RIVER AUTHORITY OF TEXAS	29	29	29	30	30	30
COTTLE COUNTY TOTAL		**359**	**351**	**341**	**334**	**328**	**327**
FOARD	COUNTY-OTHER, FOARD	17	17	17	17	16	16
FOARD	CROWELL	120	119	117	115	113	110
FOARD	RED RIVER AUTHORITY OF TEXAS	73	73	74	75	77	78
FOARD COUNTY TOTAL		**210**	**209**	**208**	**207**	**205**	**204**
HARDEMAN	COUNTY-OTHER, HARDEMAN	49	48	48	48	46	43
HARDEMAN	CHILLICOTHE	72	71	71	70	69	68
HARDEMAN	QUANAH	347	343	340	336	331	327
HARDEMAN	RED RIVER AUTHORITY OF TEXAS	195	193	192	189	186	184
HARDEMAN COUNTY TOTAL		**663**	**656**	**651**	**642**	**632**	**621**
KING	COUNTY-OTHER, KING	15	15	15	15	15	15
KING	RED RIVER AUTHORITY OF TEXAS	61	62	62	64	65	66
KING COUNTY TOTAL		**76**	**76**	**77**	**79**	**81**	**82**
MONTAGUE	BOWIE	1,286	1,373	1,465	1,558	1,650	1,742
MONTAGUE	COUNTY-OTHER, MONTAGUE	1,568	1,806	2,053	2,300	2,547	2,793
MONTAGUE	NOCONA	1,091	1,230	1,371	1,512	1,654	1,795
MONTAGUE	NOCONA HILLS WSC	201	228	255	283	310	338
MONTAGUE	RED RIVER AUTHORITY OF TEXAS	44	45	46	48	50	50
MONTAGUE	SAINT JO	269	323	378	433	488	544
MONTAGUE COUNTY TOTAL		**4,459**	**5,005**	**5,569**	**6,134**	**6,699**	**7,262**
WICHITA	BURKBURNETT	1,673	1,667	1,670	1,675	1,680	1,685
WICHITA	COUNTY-OTHER, WICHITA	169	168	168	169	169	170
WICHITA	DEAN DALE SUD	70	69	70	74	77	81
WICHITA	ELECTRA	874	873	874	877	880	882
WICHITA	HARROLD WSC	21	21	21	21	21	21
WICHITA	HOLLIDAY	5	5	5	5	5	5
WICHITA	IOWA PARK	1,020	1,017	1,018	1,021	1,024	1,027
WICHITA	SHEPPARD AIR FORCE BASE	1,075	1,069	1,069	1,069	1,069	1,069
WICHITA	WICHITA FALLS	18,455	18,726	19,084	19,262	19,441	19,620
WICHITA	WICHITA VALLEY WSC	435	434	435	436	438	439
WICHITA COUNTY TOTAL		**23,797**	**24,048**	**24,415**	**24,609**	**24,804**	**24,999**
WILBARGER	COUNTY-OTHER, WILBARGER	203	199	196	190	184	179

County	WUG Name	2030	2040	2050	2060	2070	2080
WILBARGER	HARROLD WSC	39	39	38	37	35	34
WILBARGER	RED RIVER AUTHORITY OF TEXAS	316	316	318	318	318	318
WILBARGER	VERNON	1,926	1,922	1,927	1,932	1,935	1,938
WILBARGER COUNTY TOTAL		**2,484**	**2,476**	**2,479**	**2,477**	**2,473**	**2,468**
YOUNG	BAYLOR SUD	59	60	60	62	64	66
YOUNG	COUNTY-OTHER, YOUNG	85	84	84	84	83	83
YOUNG	OLNEY	499	493	490	485	485	485
YOUNG COUNTY TOTAL		**643**	**637**	**634**	**631**	**632**	**633**
REGION B TOTALS		**37,032**	**37,759**	**38,660**	**39,352**	**40,041**	**40,760**

1.14 Major Water Providers

A Major Water Provider (MWP) is Water User Group (WUG) or Wholesale Water Provider (WWP) of particular significance to the region's water supply as determined by the Regional Water Planning Group (RWPG). A WWP is any person or entity including river authorities and irrigation districts, that delivers or sells water wholesale (treated or raw) to WUGs or other WWPs.

The only two (2) RWPG designated "Major Water Providers" in Region B are the City of Wichita Falls and Wichita County Water Improvement District No. 2 (WCWID#2).

Table 1-16 and Table 1-17 list the Wholesale Water Demands and other additional information for the City of Wichita Falls and WCWID#2.

Table 1-16: Wholesale Water Demands for Wichita Falls Water System

Customers	Contract		Demands (ac ft/yr)					
	(MGD)	(ac ft/yr)	2030	2040	2050	2060	2070	2080
Wichita Falls	No contract amount use 20% increase of demands		18,455	18,726	19,084	19,262	19,441	19,620
Archer City	0.42	476	476	476	476	476	476	476
Archer Co. Mud #1	0.46	517	517	517	517	517	517	517
Holliday	0.22	246	246	246	246	246	246	246
Lakeside City	0.16	184	184	184	184	184	184	184
Scotland	0.18	206	206	206	206	206	206	206
Windthorst WSC	0.75	840	840	840	840	840	840	840
Dean Dale WSC (Clay County)	0.825	924	624	630	633	631	628	624
Red River Auth. (Clay County)	0.37	417	417	417	417	417	417	417
Red River Auth. (Lake Arrowhead)			see above					
Texas Parks & Wildlife (Lake Arrowhead)			see above					
Burkburnett	1.67	1,866	1,866	1,866	1,866	1,866	1,866	1,866
Dean Dale WSC (Wichita County)			300	294	291	293	296	300
Friberg Cooper WSC	0.15	169	169	169	169	169	169	169
Iowa Park	2.5	1,401	1,401	1,401	1,401	1,401	1,401	1,401
Electra	1.5	841	841	841	841	841	841	841
Wichita Valley WSC	1.21	675	675	675	675	675	675	675
Pleasant Valley	0.10	118	118	118	118	118	118	118
Sheppard A.F.B.	No contract amount use 20% increase of demands		1,075	1,069	1,069	1,069	1,069	1,069
Wichita Valley WSC	1.01	1132	1,132	1,132	1,132	1,132	1,132	1,132
Olney	0.99	1,105	1,105	1,105	1,105	1,105	1,105	1,105
Manufacturing	No contract amount assume 60% of Wichita County Demands		528	548	568	589	611	634
Signal Hill Generating (SEP)	360		20	20	20	20	20	20
Oklaunion Power Station (SEP)	Total Contract for Wilbarger County: 20,000 AF/YR		5,878	5,878	5,878	5,878	5,878	5,878
New Hydrogen Plant (MFG)			-	8,000	8,000	8,000	8,000	8,000
Total Demand			**37,073**	**45,358**	**45,736**	**45,936**	**46,136**	**46,338**

Table 1-17: Wholesale Water Demands for WCWID#2 System

Customers	Demands (ac ft/yr)					
	2030	2040	2050	2060	2070	2080
Clay County Irrigation	100	100	100	100	100	100
Wichita County Irrigation	25,179	25,179	25,179	25,179	25,179	25,179
TPWD Dundee Fish Hatchery	1,529	1,529	1,529	1,529	1,529	1,529
TOTAL	**26,808**	**26,808**	**26,808**	**26,808**	**26,808**	**26,808**

1.15 Water Loss Audits

Since 2003, retail public water utilities have been required to complete and submit a water loss audit form to the TWDB every five years, with the primary purpose being to account for all of the water being used and to identify potential areas where water can be saved. Real water loss is water loss that is physically lost from the system before it can be used, including main breaks and leaks, customer service line breaks and leaks and storage overflows. Thirty-nine (39) water providers in Region B have submitted water loss audits since 2015. Based on these reports, the six-year average (2017 to 2022) percentage of real water loss for Region B is approximately 18 percent.

1.16 List of References

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CHAPTER 2 POPULATION AND WATER DEMAND PROJECTIONS

2.1 Region B Overview

Previous regional and state water plans were aligned with political boundaries, such as city limits, rather than water utility service areas. In accordance with Texas Water Development Board (TWDB) rule changes, Water User Group (WUG) planning is now defined as utility-based and the population projections and associated water demand projections will be for the utility service area boundaries as opposed to the political boundaries.

Municipal WUGs in the 2026 Plan are defined as:

- Privately-owned utilities that provide an average of more than 100 ac-ft/yr (ac-ft/yr) for municipal use for all owned water systems;
- Water systems serving institutions or facilities owned by the state or federal government that provide more than 100 ac-ft/yr for municipal use;
- All other Retail Public Utilities not covered in the above that provide more than 100 ac-ft/yr for municipal use;
- Collective Reporting Units, or groups of Retail Public Utilities that have a common association and are requested for inclusion by the Regional Water Planning Group (RWPG);
- Municipal and domestic water use, referred to as County-Other, not included in the above;

Region B has thirty-eight (38) WUGs throughout its eleven-county area, and population projections along with the associated water demands were determined for each WUG by decade from 2030 through 2080. The RWPG approved projections are provided in Appendix B.

Region B contains only one city larger than 100,000, which is Wichita Falls. The other communities are smaller and more rural in nature with incomes that are dependent on agriculture and, to a lesser extent, the oil industry. Consequently, the population for the region is projected to have only a moderate increase for the next fifty years from 205,160 people in 2030 to 228,068 in 2080, or 11 percent.

Municipal water demands, which includes residential and commercial water use, are projected to increase from 37,032 ac-ft/yr in 2030 to 40,760 ac-ft/yr in 2080 or a 10% increase over the next fifty years. However, the per capita municipal water use is predicted to slightly decline over the fifty year planning period from 161 gallons per capita per day (gpcd) in 2030 to 159 gpcd in 2080.

Non-Municipal water demands including irrigation, manufacturing, power, mining, and livestock water use are projected to increase from 102,558 ac-ft/yr in 2030 to 103,001 ac-ft/yr in 2080 or a 0.4 percent increase over the next fifty years. Therefore, the total combined water demand for Region B is projected to increase by 4,171 ac-ft/yr or 3.0 percent over the next fifty years.

2.2 Population Growth

In early 2022, TWDB released their draft population and demand projections for all regions. Each Regional Water Planning Group (RWPG) was given the ability to request adjustments to the projections. In accordance with the bottom-up regional water planning approach established in Senate Bill 1, the Region B RWPG submitted requested revisions to the projections which were reviewed by TWDB staff. The revisions were based on the following supporting information:

- Documented 2020 Census under counts of approximately 2% for the State of Texas.
- Local well development data from Upper Trinity Groundwater Conservation District for Montague County.
- Local data from water providers on trends for new building permits, subdivision plats, and metered connections suggesting steady increases in population.

TWDB did not approve most of the of the RWPG municipal projections and therefore the RWPG group adopted their own set of population projections that they felt better represented the future water demands for the region. The projected total population growth for Region B is shown in Figure 2-1 and Table 2-1. The TWDB adopted population and demand projections are included in Section 2.4.

Figure 2-1: Projected Population for Region B

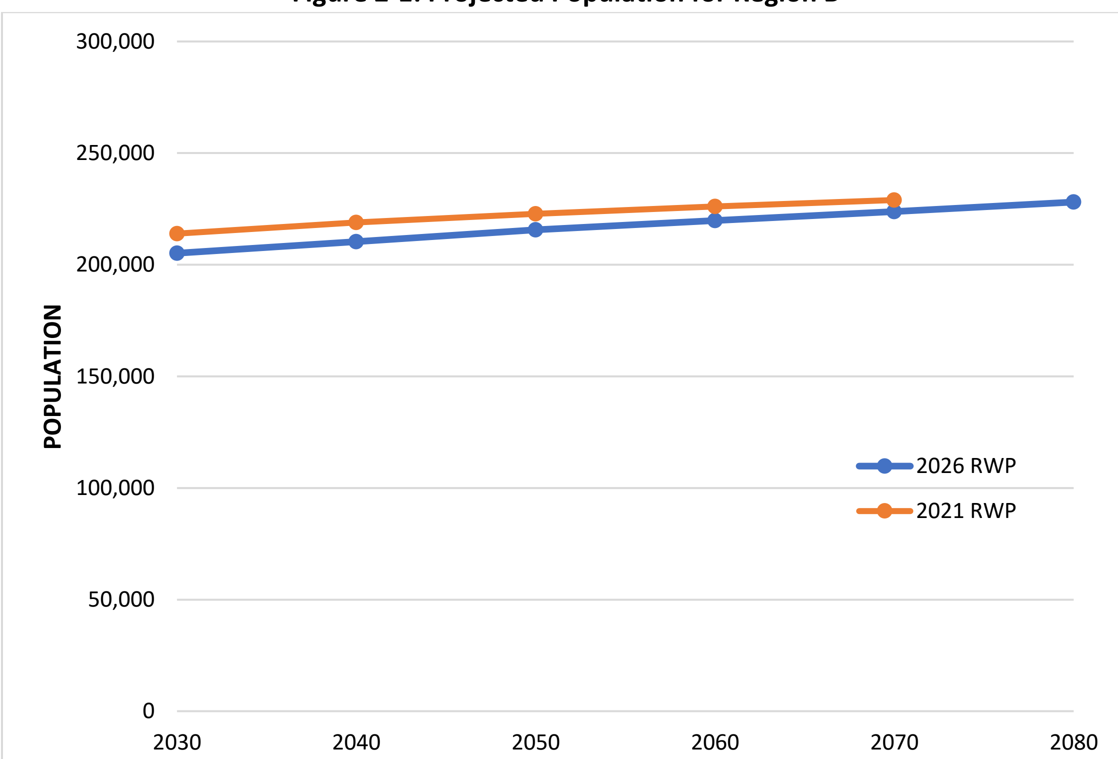


Table 2-1: Region B Projected Population

POPULATION	2030	2040	2050	2060	2070	2080
2026 RWP	205,160	210,369	215,625	219,737	223,827	228,068
2021 RWP	213,930	218,928	222,760	226,142	228,973	

The city with the highest projected growth rate is Saint Jo, and it is expected to grow by approximately 103 percent in the next fifty years. While agriculture and the oil and gas industry remain cornerstones of the regional economy, Wichita Falls has emerged as a regional hub for all forms of commerce ranging from the strong presence of manufacturing to regional health care services and regional retail centers. Other towns that may experience some growth include Nocona, Wichita Falls, Henrietta, Bowie, Burkburnett, Electra, Iowa Park, and Vernon.

2.3 Water Uses

2.3.1 Total Region B Water Use

The water use for Region B has been divided into several categories for analysis purposes. The various uses analyzed include water for municipal use (MUN), industrial or manufacturing (MFG), steam-electric power (SEP), mining (MIN), agricultural irrigation (IRR), and livestock watering (STK). **Figure 2-2** and Table 2-2 show the amounts of water predicted to be required for these categories through the year 2080. The water use is shown in ac-ft/yr units with one acre-foot being equivalent to 325,851 gallons of water.

Figure 2-2: Projected Water Use for Region B

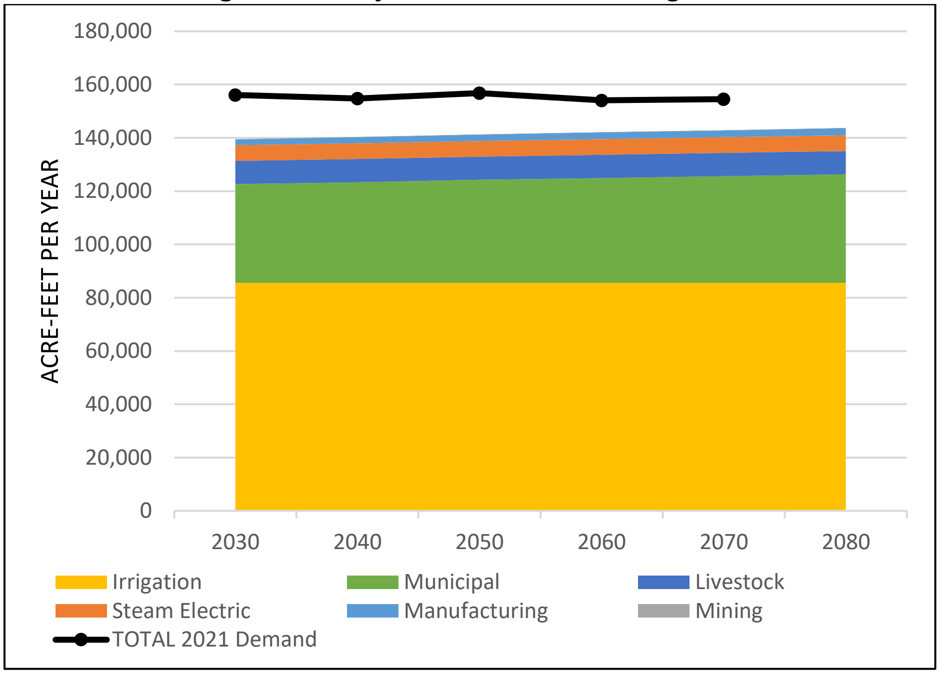
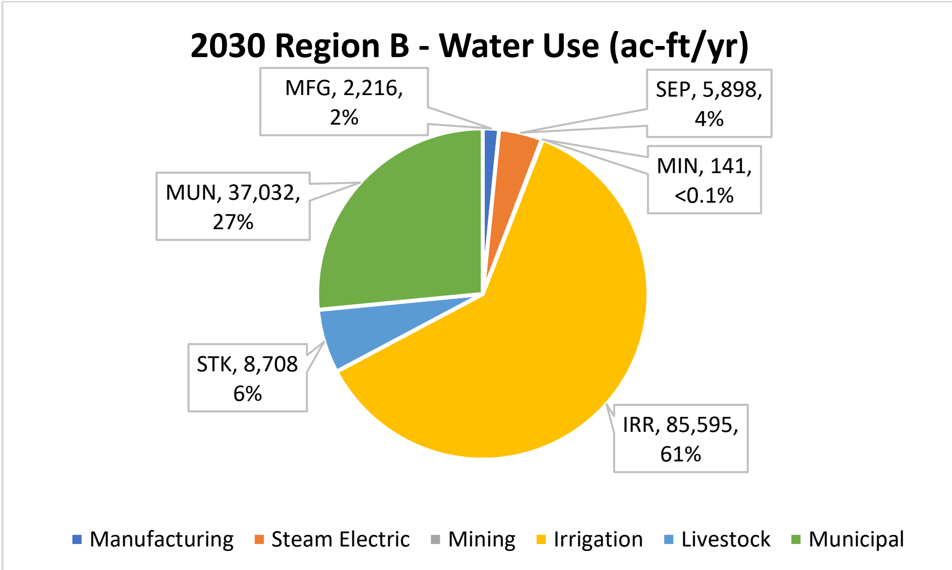


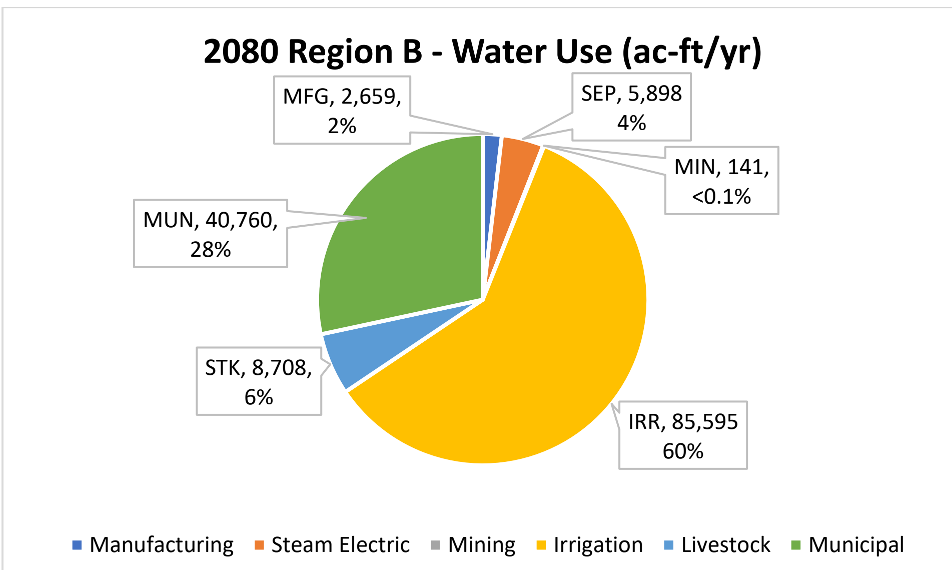
Table 2-2: Region B Projected Water Demand by Use Type (ac-ft/yr)

Use Type	2030	2040	2050	2060	2070	2080
MFG	2,216	2,298	2,384	2,472	2,563	2,659
SEP	5,898	5,898	5,898	5,898	5,898	5,898
MIN	141	141	141	141	141	141
IRR	85,595	85,595	85,595	85,595	85,595	85,595
STK	8,708	8,708	8,708	8,708	8,708	8,708
MUN	37,032	37,759	38,660	39,352	40,041	40,760
TOTAL	**139,590**	**140,399**	**141,386**	**142,166**	**142,946**	**143,761**

Total water consumption for the region is predicted to remain approximately level from 2030 to 2080. Figure 2-3 compares the water uses of 2030 to the projected water uses for 2080. The two scenarios for 2030 and 2080 in Figure 2-3 show that the composition of water use for this region is not anticipated to change much.

Figure 2-3: Composition of Projected Region B Water Use





2.3.2 Municipal Water Use

Municipal water use is defined by the TWDB as residential and commercial water use. Residential use includes single and multi-family household water use and commercial use includes water used by business establishments, public offices, and institutions, but does not include industrial water use. Residential and commercial water uses are categorized together because they are similar types of uses, for example, each category uses water primarily for drinking, cleaning, sanitation, cooling and landscape watering. Water use data are compiled for the water users of the region by the TWDB and the TCEQ.

A safety factor of 15 percent was added to the municipal water use projections for Region B to account for potentially higher than expected growth and provide a more conservative supply planning approach. The total municipal water use for Region B is shown to increase from 37,032 ac-ft/yr in the year 2030 to 40,760 ac-ft/yr in 2080, an increase of about 10 percent, which corresponds to a population increase of nearly 11 percent. The smaller percent increase in demand is anticipated because, as previously mentioned, the per capita water use is expected to decrease over the next fifty years. Decreases in per capita water use are expected due to water savings from more efficient plumbing fixtures as required by the State Plumbing Code.

2.3.3 Manufacturing Water Use

Manufacturing, or industrial, water use has been defined as water used in the production process of manufactured products, including water used by employees for drinking and sanitation purposes. Water use for manufacturing products (MFG) in Region B is a small percentage, approximately 2 percent, of the overall water use in this region.

The majority of the MFG water use is in Wichita and Wilbarger Counties by the industrial facilities in and around Wichita Falls and Vernon, respectively. 90 percent of the MFG water for the region is consumed in Wichita and Wilbarger Counties. Hardeman County also has several facilities that require water in the MFG category. The top MFG facilities in Wichita County include: Howmet Aerospace – gas turbines and engine components, Cryovac - Division of Sealed Air Corporation, Vitro – flat glass manufacturing. The top MFG facilities in Wilbarger County include: Mahard Egg Farm – food manufacturing, Solvay USA – chemical manufacturing, and Tyson Foods – food manufacturing. There are numerous other small industrial users in Region B.

Based on the increasing trend of water required for MFG in Region B, an increase from 2,216 ac-ft/yr in 2030 to 2,659 ac-ft/yr in 2080 has been projected, for a 20 percent increase in this category. Figure 2-4 shows the projections for manufacturing water use in Region B.

Region B will probably have some growth in the number of industrial facilities that are located in the area. The anticipated growth can be attributed to reasonable land prices, a good labor market, favorable business climate, and sufficient power supplies. While water resources have been a concern during the recent drought years, Wichita Falls has demonstrated leadership in developing short term solutions to sustain water supplies for existing and new industries.

2.3.4 Steam-Electric Power Water Use

The total demand for water for steam-electric power decreased from 7,742 ac-ft/yr in the last planning period to 5,898 ac-ft/yr in the current planning period. The total water use required for steam-electric power for Region B is projected to remain at 5,898 ac-ft/yr from 2030 through 2080. There is a power generating plant in Wilbarger County known as the Oklaunion Power Station (OPS). This facility has been inactive since 2020, but the historical demands for the facility were used to develop the steam-electric power demand projections for Region B, since it is possible the facility will resume operation in the future. The amount of water used for steam-electric power in Region B will remain around 6 percent of the total demand through the planning period. The projections for water use for steam-electric power are also shown in Figure 2-4.

2.3.5 Mining Water Use

The oil and gas industry has played a large role in the history and development of the North Central Texas area and is primary "mining" activity in the region. Fresh water has been used in the past to drill wells and in some cases to water flood oil fields. The demand for water required for oil and gas drilling and production is expected to decline during the planning period. Based on current status of the oil industry and recent trends in water required for mining in this region, a decrease from 1,701 ac-ft/yr (in 2070) in the previous planning period to only 141 ac-ft/yr for all decades in the current planning period is expected. The projected water use is shown in Figure 2-4.

Figure 2-4: Projected Industrial Water Use for Region B

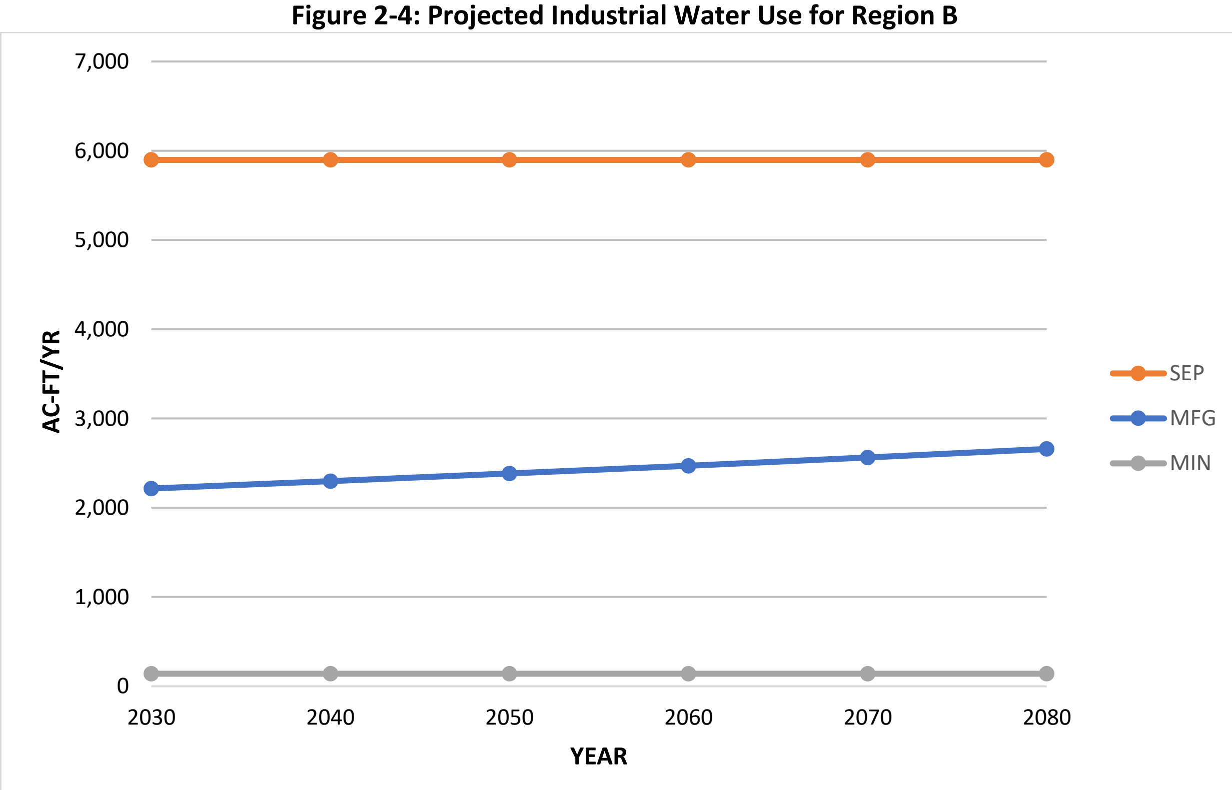


Table 2-3: Projected Industrial Water Use Data Points

YEAR	2030	2040	2050	2060	2070	2080
MFG	2,216	2,298	2,384	2,472	2,563	2,659
SEP	5,898	5,898	5,898	5,898	5,898	5,898
MIN	141	141	141	141	141	141

2.3.6 Agricultural Irrigation Water Use

The largest water use in Region B is irrigated agriculture. Irrigated crops in the region include cotton, wheat, peanuts, alfalfa, hay-pasture, vegetables, orchards, and others. The total acreage irrigated varies from year to year depending on weather, crop price, government programs, and other factors. Agricultural irrigation use accounts for approximately 60 percent of the water use in 2030 and is projected to remain at approximately 60 percent of all the water used in 2080. Figure 2-5 shows the projected agricultural irrigation water use.4

The majority of the water used for irrigation in Region B is from groundwater, but a portion of the water used is surface water, mostly from the Lake Kemp/Diversion system, which is delivered through unlined open canals and distribution laterals with some canals converted to pipelines to reduce water loss. The existing canal system is known to have significant water losses due to overflows out the end of many of the laterals. These water losses will remain in the total volume of water required for irrigation until the earthen laterals are converted to pipe.

Figure 2-5: Projected Agricultural Water Use for Region B

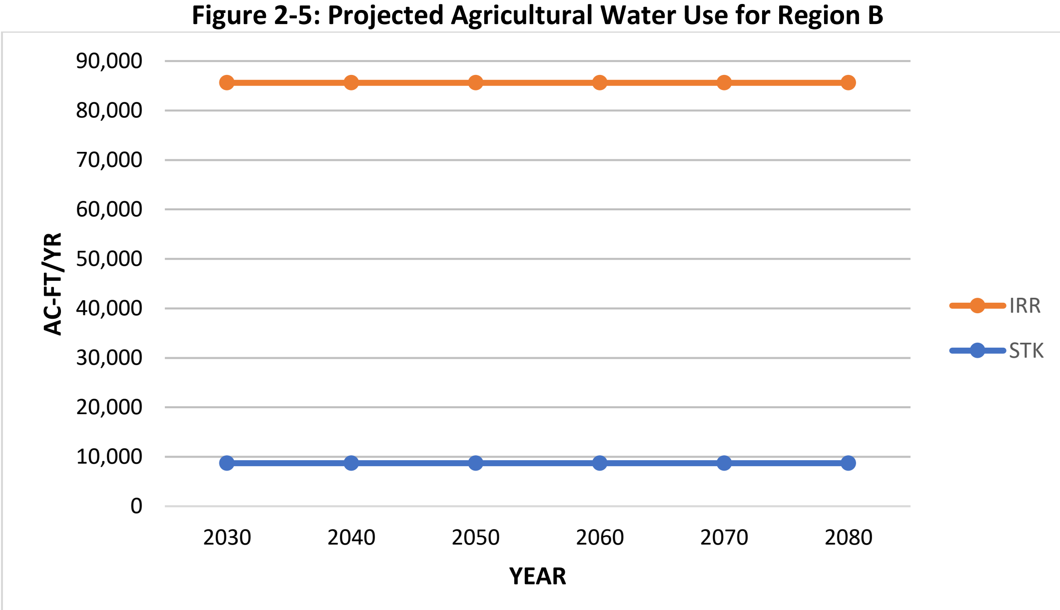


Table 2-4: Projected Agricultural Water Use Data Points

YEAR	2030	2040	2050	2060	2070	2080
IRR	85,595	85,595	85,595	85,595	85,595	85,595
STK	8,708	8,708	8,708	8,708	8,708	8,708

2.3.7 Livestock Water Use

Livestock production is an important part of the economy in Region B. In 2030, the total water used in the region for livestock is projected to be 8,708 ac-ft/yr, and the use is projected to stay the same through 2080. The livestock water use projections are shown in Figure 2-5.

2.3.8 Major Water Providers

Two Major Water Provider (MWP) were identified by the Region B Water Planning Group. The MWPs in Region B are the City of Wichita Falls and Wichita County Water Improvement District No. 2 (WCWID#2). The wholesale water demands for the Wichita Falls water system are shown in Table 2-5, and the wholesale water demands for the WCWID#2 system are shown in Table 2-6. The contract with OPS in Wilbarger County is listed for Wichita Falls in Table 2-5 but is a joint contract with Wichita Falls and WCWID#2 since both MWPs share the industrial water rights in the Lake Kemp/Diversion System.

Table 2-5: Wholesale Water Demands for the Wichita Falls Water System

Customers	Contract type	Contract Amount	Contract Amount (ac ft/yr)	Wichita Falls Contractual Obligations (ac ft/yr)					
				2030	2040	2050	2060	2070	2080
Wichita Falls	None			18,455	18,726	19,084	19,262	19,441	19,620
Archer City	Max Year (MG/YR)	155	476	476	476	476	476	476	476
Archer Co. MUD #1	Max Year (MG/YR)	168.4	517	517	517	517	517	517	517
Holliday	Max Year (MG/YR)	80	246	246	246	246	246	246	246
Lakeside City	Max Year (MG/YR)	60	184	184	184	184	184	184	184
Scotland	Max Year (MG/YR)	67	206	206	206	206	206	206	206
Windthorst WSC	Max Year (MG/YR)	273.75	840	840	840	840	840	840	840
Dean Dale WSC	Max Year (MG/YR)	301.125	924	924	924	924	924	924	924
Red River Auth.	Max Year (MG/YR)	136	417	417	417	417	417	417	417
Burkburnett	Max Year (MG/YR)	608	1,866	1,866	1,866	1,866	1,866	1,866	1,866
Friberg Cooper WSC	Max Year (MG/YR)	55	169	169	169	169	169	169	169
Iowa Park	Max Day (MGD)	2.5	1,401	1,401	1,401	1,401	1,401	1,401	1,401
Electra	Max Day (MGD)	1.5	841	841	841	841	841	841	841
Wichita Valley WSC	Max Day (MGD)	1.205	675	675	675	675	675	675	675
Pleasant Valley	Max Year (MG)	38.3	118	118	118	118	118	118	118
Sheppard A.F.B.	No contract amount		Set to municipal demand	1,075	1,069	1,069	1,069	1,069	1,069
Wichita Valley WSC	Max Year (MG/YR)	369	1,132	1,132	1,132	1,132	1,132	1,132	1,132
Olney	Max Year (MG/YR)	360	1,105	1,105	1,105	1,105	1,105	1,105	1,105
Wichita County Manufacturing	No contract amount		assume 60% of Wichita County Demands	528	548	568	589	611	634
Signal Hill Generating (SEP)			360	20	20	20	20	20	20
Oklaunion Power Station (SEP)	OPS contract		20,000	5,878	5,878	5,878	5,878	5,878	5,878
New Hydrogen Plant (MFG)	OPS contract				8,000	8,000	8,000	8,000	8,000

Table 2-6: Wholesale Water Demands for the WCWID#2 System

Customers	Demands (ac ft/yr)					
	2030	2040	2050	2060	2070	2080
Clay County Irrigation	100	100	100	100	100	100
Wichita County Irrigation	25,179	25,179	25,179	25,179	25,179	25,179
TPWD Dundee Fish Hatchery	1,529	1,529	1,529	1,529	1,529	1,529
TOTAL	**26,808**	**26,808**	**26,808**	**26,808**	**26,808**	**26,808**

2.3.9 Region B Water Plan

This chapter has been updated in accordance with the Texas Water Development Board requirements and all updated population and water use projections were adopted by the Region B RWPG in 2023.

2.4 TWDB Approved Population and Water Demand Projections

The TWDB adopted population projections for Region B are shown in Table 2-7. The TWDB adopted water demand projections by use type are shown in Table 2-8.

Table 2-7: TWDB Adopted Projected Population for Region B

POPULATION	2030	2040	2050	2060	2070	2080
2026 TWDB	199,116	198,526	195,661	192,041	188,649	185,480

Table 2-8: TWDB Adopted Projected Water Demand by Use Type (ac-ft/yr)

	2030	2040	2050	2060	2070	2080
MFG	2,216	2,298	2,384	2,472	2,563	2,659
SEP	5,898	5,898	5,898	5,898	5,898	5,898
MIN	141	141	141	141	141	141
IRR	85,595	85,595	85,595	85,595	85,595	85,595
STK	8,708	8,708	8,708	8,708	8,708	8,708
MUN	31,247	30,967	30,484	29,875	29,311	28,783
TOTAL	**133,805**	**133,607**	**133,210**	**132,689**	**132,216**	**131,784**

2.5 List of References

Bureau of Economic Geology, University of Texas at Austin. Water Use by the Mining Industry in Texas. Prepared for the Texas Water Development Board. August, 2022.

Texas Water Development Board. DRAFT Non-Municipal Water Demand Projections for Livestock, Manufacturing and Steam Electric Power. January 2022.

Texas Water Development Board. DRAFT Non-Municipal Water Demand Projections for Irrigation and Mining. August 2022.

Texas Water Development Board. Summary of 2026 RWP Draft Non-Municipal Water Demand Projection Methodologies and Supporting Data.

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CHAPTER 3 EVALUATION OF CURRENT WATER SUPPLIES

Under Regional Water planning guidelines, each region is to identify currently available water supplies to the region by 1) source and 2) user. The supplies available by source are based on the water available during drought of record conditions. For surface water reservoirs, this is the equivalent of safe yield supply or permitted amount (whichever is lower). The Region B Water Planning Group elected to use a safe yield with a 20 percent reserve supply, if possible, as the basis for planning for reservoir supplies. For reservoirs where a 20 percent reserve supply could not be achieved during the drought of record, a one-year safe yield was used. The one-year safe yield is defined as the amount that can be diverted from the reservoir each year while leaving a one-year supply in storage at the end of the drought of record. The firm yield for each reservoir is also reported in this chapter, but is not used as the available supply for planning purposes. The available supplies for each reservoir are described in Section 3.1.1. For diversions directly from a stream or river (run-of-the-river), this is the minimum supply available in a year over the historical record. Groundwater supplies are defined by availability by county and aquifer. Generally, groundwater supply is the supply available with acceptable long-term impacts as determined through the Groundwater Joint Planning Process.

In addition to surface water and groundwater supplies, there are available supplies from reuse and local supplies. The available supply from reuse is based on permitted authorizations and facilities. Currently, the majority of reuse in Region B is through the City of Wichita Falls indirect potable reuse project utilizing the bed and banks of Lake Arrowhead, which can supply up to 8 million gallons per day (MGD). The remaining reuse supplies are limited to municipal irrigation and/or use at the wastewater treatment facilities; however, the City of Bowie has sold nearly all of its wastewater effluent for mining purposes in the recent past. Other entities are looking to develop reuse projects, but these projects will not be online by 2030. Local supplies generally include stock ponds for livestock.

3.1 Existing Surface Water Supply

Water users in the Region B planning area receive surface water from sources in the Brazos, Trinity and Red River Basins. There are six major reservoirs in Region B that are used for water supply and several smaller reservoirs that were previously used for water supply or supply very small amounts of water. Brief descriptions of reservoirs in the region are included in Section 3.1.1. Other surface water sources include run-of-the-river diversion and local supplies used for livestock. These supplies, while limited, are important to rural areas and smaller communities, especially in areas with little groundwater.

Millers Creek Lake is partially located in Region B, but used by the North Central Texas MWD in the Brazos G Region. A small amount of water is sold by the North Central Texas MWD to users in Baylor County. Greenbelt Lake is located in the Panhandle Planning Area (Region A) and is used in both Regions A and B. Descriptions of both Millers Creek Lake and Greenbelt Lake are included in Section 3.1.1.

3.1.1 Existing Water Supply Reservoirs

Greenbelt Lake

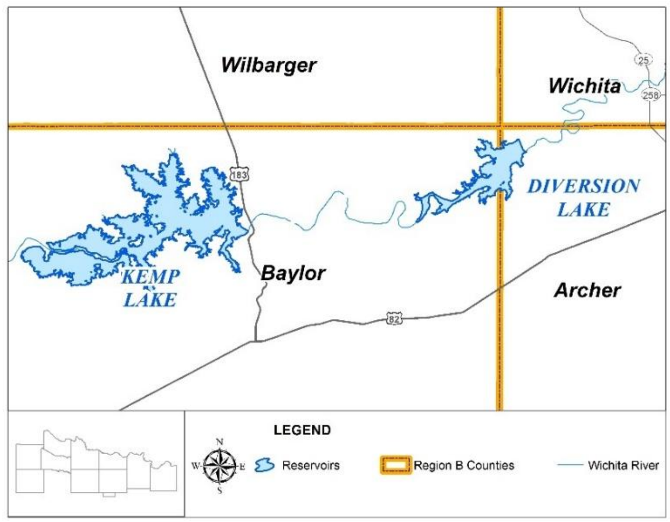
Greenbelt Lake is located in the Panhandle Planning Area (Region A), and water from the lake is used to supply several cities in Region B. The lake is owned and operated by the Greenbelt Municipal and Industrial Water Authority and is located on the Salt Fork of the Red River in Donley County near the City of Clarendon. Construction of Greenbelt Lake was completed in 1968, and the lake had an initial conservation capacity of 60,400 acre-feet (ac-ft). Greenbelt Municipal and Industrial Water Authority has a diversion right of 12,000 acre-feet per year (ac-ft/yr) from the lake to provide municipal, industrial, mining and irrigation water supply.

Lakes Kemp and Diversion

Lake Kemp is located on the Wichita River, immediately upstream of State Highway 183 in Baylor County. The lake is authorized to store 318,000 ac-ft of water. Lake Diversion was constructed approximately 20 miles downstream of Lake Kemp for secondary storage with an authorized capacity of 45,000 ac-ft. The reservoir lies in both Archer and Baylor Counties.

Lake Diversion is operated in conjunction with Lake Kemp to provide water supply for municipal, industrial, irrigation, mining and recreational purposes. The City of Wichita Falls and Wichita County Water Improvement District No. 2 (WCWID#2) own the water rights in Lake Kemp and Lake Diversion. Water released from Lake Kemp travels to Lake Diversion for distribution. Irrigation water is diverted into canal systems that distribute water to customers in Archer, Clay and Wichita Counties. Municipal water is diverted from the canal system to a pipe for transmission to Wichita Falls. The Oklaunion Power Station (OPS) in Wilbarger County has a contract to divert up to 20,000 ac-ft/yr. This water is diverted directly from Lake Diversion.

Due to high salinity loads in the tributaries that flow to Lake Kemp, most of the water use from Lake Kemp historically has been limited to irrigation and industrial purposes. In 2008 the City of Wichita Falls completed a reverse osmosis water treatment plant and infrastructure to utilize water from Lake Kemp for municipal purposes.



To improve the water quality of the Wichita River, the Red River Authority sponsors a chloride control project that diverts saline water from the South Wichita River above Lake Kemp to Truscott Brine Reservoir in Knox County. Evaluations of the effectiveness of the project found these diversions reduce the total chloride load to Lake Kemp by approximately 25 percent. This results in a lower chloride concentration in the reservoir. However, a significant chloride load to the reservoir system from the North and Middle Wichita Rivers remains. Future proposed low flow diversions from these tributaries should further reduce the chloride loading into Lake Kemp.

The yield of Lake Kemp and Lake Diversion was evaluated as a system with releases made to

Lake Diversion with target minimum elevations in Lake Diversion of 1050.0 feet msl in March and 1046.0 feet msl the remainder of the year. The elevation of 1050.0 feet msl is to allow the Dundee Fish Hatchery to divert water during the spring spawning season. The 1046.0 feet target is based in the intake constraints for OPS. The total permitted diversion for the system is 193,000 ac-ft /yr. The water right allows the WCWID#2 to divert a portion of the irrigation right (16,660 ac-ft/yr) directly from the Wichita River for irrigation purposes. This portion of the water right was evaluated as a run-of-the-river supply. However, there is no infrastructure in place to use the run-of-the-river supply.

In 2011, Kemp experienced record low inflows and high demand from the local irrigators. As a result, the lake content dropped to 20 percent of its capacity and the salinity levels increased significantly. Irrigation deliveries were suspended in 2012 and the Fish Hatchery was temporarily closed. Since then, the lake received significant inflow in 2015 and has resumed deliveries to the irrigators and the Fish Hatchery has resumed operations with limited production.

Little Wichita River System

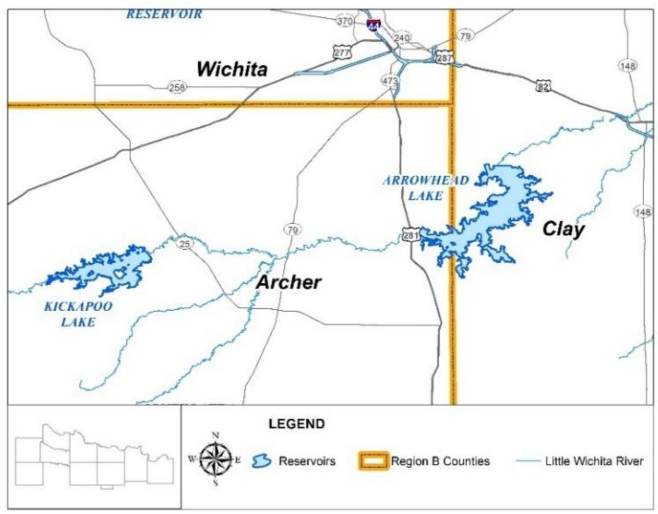
The Little Wichita River System consists of Lake Kickapoo and Lake Arrowhead. These lakes are owned and operated by the City of Wichita Falls for municipal and industrial supply. Water from the lakes is transported to Wichita Falls' water treatment plants for treatment and distribution. Some raw water is sold directly to wholesale customers. A brief description of each lake follows:

Lake Kickapoo

Lake Kickapoo was built by the City of Wichita Falls in 1946 for municipal water supply with an initial conservation storage capacity of 106,000 ac-ft. The reservoir is located on the North Fork of the Little Wichita River in Archer County. It is owned and operated by the City of Wichita Falls. The diversion rights from the lake total 40,000 ac-ft /yr.

Lake Arrowhead

Lake Arrowhead was built in 1966 by the City of Wichita Falls for municipal, industrial, and recreational use. The lake is located on Little Wichita River in Clay County, about 12 miles southeast of Wichita Falls. The lake is owned and operated by the City of Wichita Falls. The diversion rights from Lake Arrowhead total 45,000 ac-ft /yr; however, the maximum diversion from both Lake Arrowhead and Kickapoo cannot exceed 65,000 ac-ft/yr. This joint diversion limitation was considered in the evaluation of the system yield.

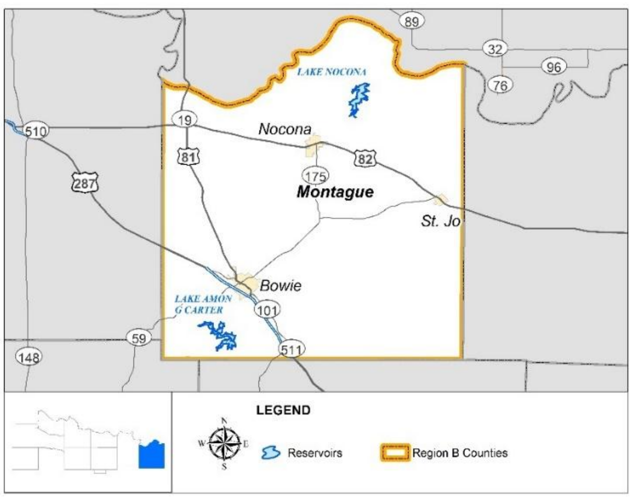


Lakes Olney and Cooper

Lakes Olney and Cooper are a twin-lake system located on Mesquite Creek in Archer County. Lake Olney dam was constructed in 1935 to provide municipal water for the City of Olney. In 1953 the dam for Lake Cooper was built for additional storage. Collectively, the lakes have a conservation storage capacity of 6,650 ac-ft with diversion rights of 1,260 ac-ft/yr.

Lake Nocona

Lake Nocona is a reservoir located on Farmers Creek in Montague County, approximately 8 miles northeast of the City of Nocona with a conservation storage capacity of 25,400 ac-ft. Construction was completed in 1960 to provide municipal water supply to the City of Nocona. The lake is now owned and operated by the City of Nocona. The original permit for Lake Nocona allowed the diversion and use of 4,500 ac-ft/yr for municipal, industrial, and mining purposes. In 1984, the final determination of water rights for the Middle Red River segment of the Red River Basin reduced the authorized diversion to 645 ac-ft/yr for municipal use only. Subsequent studies reported the firm yield of the reservoir to be 1,260 ac-ft/yr through year 2030 (F&N, 1986). The water right permit for diversions from Lake Nocona was amended in 1987 to 1,260 ac-ft/yr for municipal, irrigation and recreational uses.



Amon G. Carter

Lake Amon G. Carter is located on Big Sandy Creek in Montague County, about 6 miles south of the City of Bowie, Texas. The lake was originally constructed in 1956 and enlarged in 1979. It has a current storage capacity of approximately 27,500 ac-ft. The lake is owned and operated by the City of Bowie for water supply. The existing water right permit allows for a diversion of 5,000 ac-ft/yr for municipal, industrial and mining water use.

Miller's Creek Reservoir

Miller's Creek Reservoir is located about 7 miles southeast of Bomarton, Texas in the Brazos River Basin. The dam was constructed in 1977 on Miller's Creek in Baylor County, and the reservoir extends southwest into Throckmorton County. It is owned and operated by the North Central Texas MWA. It has a permitted diversion of 5,000 ac-ft/yr for municipal, industrial and mining uses. Water from this reservoir is currently used in the Brazos G Region. A small amount of water is sold from the North Central Texas MWD to Baylor WSC in Baylor County.

Santa Rosa Lake

Santa Rosa Lake is located in Wilbarger County on Beaver Creek. It was constructed in 1929 by the Waggoner Estate for irrigation and had an original capacity of 15,755 ac-ft. Current use is for livestock and irrigation. It is permitted for 3,075 ac-ft/yr, but recent historical use is much lower. According to a representative of the Waggoner Estate, the lake went totally dry in 1971. Recent reported use from the lake is approximately 40 to 100 ac-ft/yr.

Other Lakes and Reservoirs in the Region not Currently Utilized for Water Supply

There are six small lakes and reservoirs in Region B that are permitted for water supply but are no longer used. In most cases, the water right holder has developed other sources of water supply. Below is a brief description of each of these surface water resources and the current status for water supply.

Lake Electra

Lake Electra is located on Camp Creek near the City of Electra in Wichita County. It is owned and operated by the City of Electra and has a diversion right of 600 ac-ft/yr for municipal use. At normal pool elevation (1,111 feet MSL), the storage capacity of Lake Electra is 5,626 ac-ft.

However, due to the relatively small drainage area (14.5 square miles), the lake is usually below its normal pool elevation. Previous reports indicate the lake may never have completely filled since construction was completed in 1950.

Due to the poor performance of the lake during drought, the City of Electra has contracted for water from Wichita Falls through the City of Iowa Park. This supply is currently in place and the City is no longer using water from Lake Electra.

North Fork Buffalo Creek Reservoir

The North Fork Buffalo Creek Reservoir was constructed in 1964 to provide additional water for the City of Iowa Park. The dam is located below the confluence of North Fork Buffalo Creek and Lost Creek in Wichita County. The reservoir had an original storage capacity of 15,400 ac-ft with a drainage area of 33 square miles. The current permitted water right for the reservoir is 840 ac-ft/yr. North Fork Buffalo Creek Reservoir is owned and operated by the City of Iowa Park. The City stopped using water from North Fork Buffalo Creek Reservoir in 2002 and is purchasing water from the City of Wichita Falls.

Lake Iowa Park

Lake Iowa Park is located on Stevens Creek, northwest of the City of Iowa Park, and was a source of water for the City of Iowa Park since 1949. The lake has a storage capacity of 2,565 ac-ft and the water right permit allows a diversion of 500 ac-ft/yr for municipal use. Since 2000, the lake has experienced severe drought conditions and was nearly dry during recent droughts. The City of Iowa Park is no longer using this lake for water supply.

Lake Wichita

Lake Wichita is located south of the City of Wichita Falls and lies in Archer and Wichita Counties. It was constructed in 1901 on Holliday Creek for irrigation and municipal use, but little water has been used for municipal purposes since Lake Kickapoo water supply became available. Presently, Lake Wichita is used for recreational purposes only. Water from the Lake Kemp/Diversion System, under its recreation permitted use, is released to help maintain the water levels in Lake Wichita. There is currently no diversion structure or associated treatment facility to utilize supplies from Lake Wichita.

Lake Pauline

Lake Pauline is located on the upper reaches of Wanderers Creek near Quanah in Hardeman County. The dam was completed in 1928 and the reservoir had a reported conservation capacity of 4,137 ac-ft in 1968 (Bisset, 1999). Lake Pauline was formerly used as cooling water for a steam electric power plant. This facility is now privately owned and is used for recreation.

Bowie Lake

Bowie Lake is a small lake owned by the City of Bowie in Montague County. Bowie Lake was previously used for municipal water supply and is authorized for diversion of 1,286 ac-ft/yr and to impound 800 ac-ft (CA 02-4876). The lake is now used for recreational purposes with the City of Bowie receiving its water supply from Lake Amon G. Carter.

3.1.3 Reservoir and Run-of-River Yields

The amount of supply that can be reliably used from a reservoir during drought of record conditions is often referred to as “firm yield”. A firm yield analysis assumes that the reservoir never goes completely empty during the historical hydrological record, but there is little to no reserve supply during the critical period. Most reservoirs are operated with some level of reserved storage to account for minimum intake elevations, reduced water quality or future droughts worse than the historical drought. Safe yield for most reservoirs is the amount of water that can be used during a repeat of the critical drought while leaving a minimum one-year supply in reserve. Lake Kickapoo, Lake Arrowhead and the Lake Kemp/Diversion system have safe yield defined as the amount of water remaining as 20% of the capacity of the reservoir due to their high demand and limited supply unable to meet the first criteria for safe yield. Many surface water reservoirs in Region B were permitted for safe yield and operate on a safe yield basis. For some providers, different criteria are used for operations for reliable water supplies; such as higher reserve capacity to access intake structures. Therefore, the firm yield and a more conservative safe or reliable yield analysis were conducted for planning purposes for Region B reservoirs.

In accordance with the Texas Water Development Board's (TWDB) established procedures, the surface water supplies for the regional water plans are determined using the TCEQ Water Availability Models (WAMs). WAMs have been completed for each of the major river basins in Texas. The WAMs were developed for the purpose of reviewing and granting new surface water rights permits. The assumptions in the WAMs are based on the legal interpretation of water rights and in some cases do not accurately reflect current operations. For planning purposes, adjustments were made to the WAMs to better reflect current and future surface water conditions in the region. These adjustments generally included modifications to the reservoir capacities as a result of sediment accumulation over time and operational constraints as appropriate. The development of the data needed for the surface water modeling and descriptions of changes to the WAMs are documented in Appendix A. The Red River WAM was originally completed in 2002 and was recently extended to include hydrology through 2018. The extended hydrology includes several dry periods the region has experienced that were not included in the previous versions which only went through 1998, including the recent drought that began in 2011 and continued through 2015. The firm and safe yields were determined using the WAM hydrology through 2018.

To provide a more conservative estimate of reservoir yield for planning purposes, a reserve of 20 percent at the end of the drought of record was maintained for Lake Kemp and the Little Wichita River System (Lakes Arrowhead and Kickapoo). This amount of reserve is consistent with observed reservoir responses during the critical drought which prompted the City of Wichita Falls to initiate Stage 5 of its Drought-Contingency Plan. The reserve capacity provides the needed water elevations to continue operations and maintain minimal water quality.

The Trinity River WAM was updated by Region C for planning purposes and includes hydrology through 1996. Region B used this version to assess surface water supplies from the Trinity River Basin, including Lake Amon Carter and local run-of-the river supplies.

There is very little surface water in the Brazos River Basin that is used in Region B. The Brazos WAM developed for planning for the Brazos G Region with hydrology through 2018 was used to assess the supplies to users in Region B. The yield for Millers Creek Lake was developed by the Brazos G Region and reported in the Brazos G Regional Water Plan.

Table 3-1 summarizes the firm yield by reservoir source in Region B in ac-ft/yr. Table 3-2 shows the supplies by reservoir that are used for regional water planning. These supply values represent the safe yield or reliable supply of the reservoir. For the smaller reservoirs that are no longer being used, reliable supplies are assumed to be “0”.

Surface water that is diverted directly from a river (run-of-the-river) was evaluated using the TCEQ WAMs. Run-of-the-river supplies are presented in Table 3-3. Local livestock supplies shown in Table 3-4 are based on the historical surface water use for livestock as reported by the TWDB from 2010 to 2019. It is assumed that these estimates represent available surface water from stock ponds, which are not required to have a water right and are not included in the WAMs. It is assumed that these supplies would be firm during a drought of record, but cannot be confirmed to be firm through modeling. These supplies are used by a total of 11 WUGs (Livestock in all Region B counties) totaling 6,878 ac-ft/yr in all planning decades.

Table 3-1: Firm Yield of Reservoirs in Region B
-Values are in ac-ft/yr-

	Basin	2030	2040	2050	2060	2070	2080
WATER SUPPLY SYSTEMS							
Lake Kemp/ Diversion System	Red	46,500	43,480	40,460	37,440	34,420	31,400
Little Wichita System							
Kickapoo	Red	11,800	11,480	11,160	10,840	10,520	10,200
Arrowhead	Red	21,500	21,300	21,100	20,900	20,700	20,500
TOTAL	*Red*	*33,300*	*32,780*	*32,260*	*31,740*	*31,220*	*30,700*
Subtotal		**79,800**	**76,260**	**72,720**	**69,180**	**65,640**	**62,100**
RESERVOIRS IN REGION B							
Lake Amon Carter	Trinity	1,400	1,340	1,280	1,220	1,160	1,100
Lake Electra	Red	310	310	310	310	310	310
North Fork Buffalo Creek Reservoir	Red	840	840	840	840	840	840
Santa Rosa Lake	Red	2,200	2,200	2,200	2,200	2,200	2,200
Lake Cooper/Olney	Red	247	228	209	191	172	153
Lake Nocona*	Red	1,260	1,260	1,260	1,260	1,260	1,260
Subtotal		**6,257**	**6,178**	**6,099**	**6,021**	**5,942**	**5,863**
RESERVOIRS OUTSIDE REGION B							
Greenbelt Reservoir	Red	4,000	4,062	3,700	2,812	2,812	2,900
TOTAL		**90,057**	**86,500**	**82,519**	**78,013**	**74,394**	**70,863**

*Yield for Lake Nocona limited by permit amount.

Table 3-2: Reliable Supply for Reservoirs in Region B for Planning Purposes
-Values are in ac-ft/yr-

	Basin	2030	2040	2050	2060	2070	2080
WATER SUPPLY SYSTEMS							
Lake Kemp/ Diversion System*	Red	32,900	30,480	28,060	25,640	23,220	20,800
Little Wichita System							
Kickapoo*	Red	5,400	5,060	4,720	4,380	4,040	3,700
Arrowhead*	Red	10,900	10,220	9,540	8,860	8,180	7,500
TOTAL	*Red*	*16,300*	*15,280*	*14,260*	*13,240*	*12,220*	*11,200*
Subtotal		**49,200**	**45,760**	**42,320**	**38,880**	**35,440**	**32,000**
RESERVOIRS IN REGION B							
Lake Amon Carter	Trinity	1,080	1,018	956	894	832	770
Lake Electra	Red	230	230	230	230	230	230
North Fork Buffalo Creek Reservoir	Red	790	790	790	790	790	790
Santa Rosa Lake	Red	920	920	920	920	920	920
Lake Cooper/Olney	Red	145	133	121	109	97	85
Lake Nocona**	Red	1,260	1,260	1,260	1,260	1,260	1,260
Subtotal		**4,425**	**4,351**	**4,277**	**4,203**	**4,129**	**4,055**
RESERVOIRS OUTSIDE REGION B							
Greenbelt Reservoir	Red	3,140	2,947	2,754	2,561	2,368	2,175
TOTAL		**56,765**	**53,081**	**49,397**	**45,675**	**41,952**	**38,230**

*Lake Kemp/Diversion, Lake Kickapoo and Lake Arrowhead safe yield is 20% safe yield
**Yield for Lake Nocona limited by permit amount.

Table 3-3: Summary of Local Surface Water Supplies for Region B
-Values are in ac-ft/yr-

LOCAL RUN OF THE RIVER SUPPLIES									
	Use	County	Basin	2030	2040	2050	2060	2070	2080
Run-of-the-River[1]	Irrigation	Baylor	Brazos	13	13	13	13	13	13
Run-of-the-River	Irrigation	Clay	Red	1,241	1,241	1,241	1,241	1,241	1,241
Run-of-the-River	Irrigation	Cottle	Red	8	8	8	8	8	8
Run-of-the-River	Irrigation	Hardeman	Red	141	141	141	141	141	141
Run-of-the-River	Irrigation	Montague	Red	6	6	6	6	6	6
Run-of-the-River	Irrigation	Wichita	Red	878	878	878	878	878	878
Run-of-the-River	Irrigation	Wilbarger	Red	15	15	15	15	15	15
Run-of-the-River - Archer City Lake	Municipal	Archer	Red	137	137	137	137	137	137
Run-of-the-River - Petrolia	Municipal	Clay	Red	12	12	12	12	12	12
Run-of-the-River – Henrietta	Municipal	Clay	Red	1,559	1,559	1,559	1,559	1,559	1,559
Run-of-the-River - Iowa Park/Gordon	Municipal	Wichita	Red	545	545	545	545	545	545
Run-of-the-River	Municipal	Wilbarger	Red	81	81	81	81	81	81
Run-of-the-River	Industrial	Clay	Red	91	91	91	91	91	91
Run-of-the-River	Mining	Clay	Red	1	1	1	1	1	1
Run-of-the-River	Mining	Wilbarger	Red	11	11	11	11	11	11
Subtotal				**4,738**	**4,738**	**4,738**	**4,738**	**4,738**	**4,738**

[1] Run-of-the-River supplies were determined based on the TCEQ WAM Run 3 minimum annual diversion. Additional information is included in Appendix A.

Table 3-4: Local Livestock Surface Water Supplies for Region B
-Values are in ac-ft/yr-

	Use	County	Basin	2030	2040	2050	2060	2070	2080
Local Supply[2]	Livestock	Archer	Red	1,040	1,040	1,040	1,040	1,040	1,040
Local Supply	Livestock	Archer	Brazos	21	21	21	21	21	21
Local Supply	Livestock	Archer	Trinity	288	288	288	288	288	288
Local Supply	Livestock	Baylor	Red	375	375	375	375	375	375
Local Supply	Livestock	Baylor	Brazos	395	395	395	395	395	395
Local Supply	Livestock	Clay	Red	1,066	1,066	1,066	1,066	1,066	1,066
Local Supply	Livestock	Clay	Trinity	161	161	161	161	161	161
Local Supply	Livestock	Cottle	Red	113	113	113	113	113	113
Local Supply	Livestock	Foard	Red	341	341	341	341	341	341
Local Supply	Livestock	Hardeman	Red	232	232	232	232	232	232
Local Supply	Livestock	King	Red	34	34	34	34	34	34
Local Supply	Livestock	King	Brazos	100	100	100	100	100	100
Local Supply	Livestock	Montague	Red	775	775	775	775	775	775
Local Supply	Livestock	Montague	Trinity	625	625	625	625	625	625
Local Supply	Livestock	Wichita	Red	682	682	682	682	682	682
Local Supply	Livestock	Wilbarger	Red	585	585	585	585	585	585
Local Supply	Livestock	Young	Brazos	45	45	45	45	45	45
Subtotal				**6,878**	**6,878**	**6,878**	**6,878**	**6,878**	**6,878**

[2] Local Supply is based on TWDB reported historical values from 2010 to 2019.

3.2 Groundwater Supplies

3.2.1 General Description

While most of the water used in Region B is surface water, groundwater provides a valuable resource for parts of the region. There are two major aquifers and two minor aquifers within the Region B planning area. The central and western part of the region is primarily supplied by two aquifers, the Seymour and the Blaine. The Seymour is designated a major aquifer and is currently used in Hardeman, Wilbarger, Wichita, Clay, Baylor, and Foard Counties. The Blaine is considered a minor aquifer and useable groundwater is limited to the westernmost portion of the region. The eastern part of the region relies on the Trinity Aquifer, a major aquifer that extends from Montague County south to Bandera County in Region J and east to Red River County in Region D. The Cross Timbers Aquifer is a newly designated minor aquifer that occurs in Archer, Clay, Baylor, Montague, Wichita, Wilbarger and Young Counties. Supplies from this formation are limited, especially in the western part of the region. The locations of these aquifers are shown in Figure 3-1 and Figure 3-2

Figure 3-1 : Major Aquifers in Region B

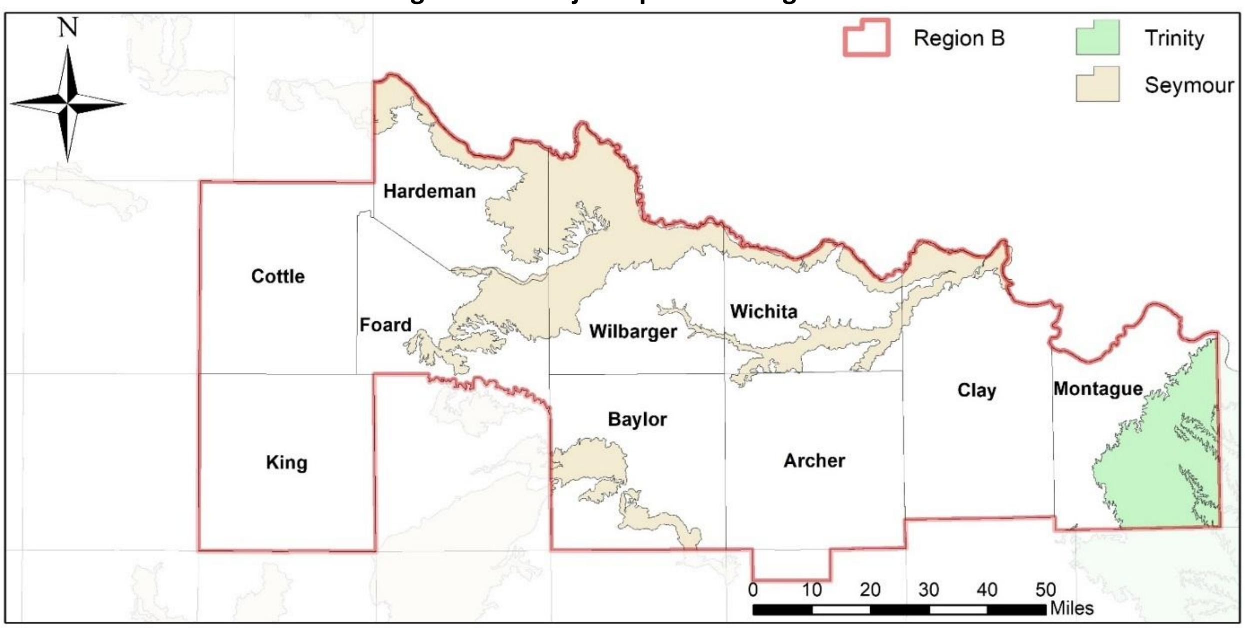
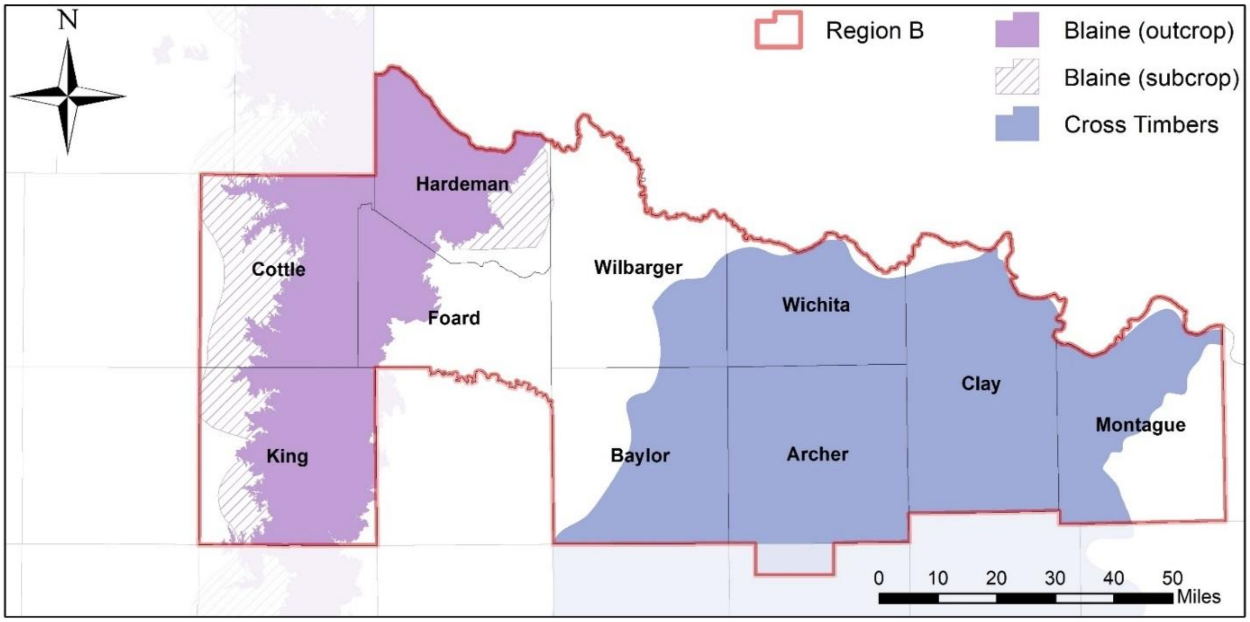


Figure 3-2: Minor Aquifers in Region B



There are also other formations within the region that are used for groundwater supply in limited areas. The TWDB identifies these sources as "Other Aquifer". These formations generally are not well defined in the literature, but still provide water in Cottle, Foard, Hardeman, King, and Wilbarger Counties.

Seymour Aquifer

The Seymour Formation consists of isolated areas of alluvium that vary in saturated thickness from less than 10 feet to over 80 feet. This aquifer is relatively shallow and exists under water table conditions in most of its extent. Artesian conditions can occur where the water-bearing zone is overlain by clay. The upper portion of the Seymour consists of fine-grained and cemented sediments. The basal portion of the formation has greater permeability and produces greater volumes of water. Yields of wells typically range from 100 gpm to 1,300 gpm, depending on the saturated thickness, and average about 300 gpm. In areas with little saturated thickness, well yields could be less.

Recharge to the Seymour is largely due to direct infiltration of precipitation over the outcrop area. Surface streams adjoining the outcrop are at elevations lower than the water levels in the Seymour Aquifer and do not contribute to recharge. Other possible sources of recharge include infiltration from irrigation or upward leakage of water from underlying Permian formations, but these amounts are insignificant.

Natural discharge from the Seymour occurs through seeps and springs, evapotranspiration, and leakage to the underlying Permian formations. It is estimated that a large part of the Seymour's total natural discharge is from evapotranspiration from plants and is considerably larger than discharges to seeps and springs (TWDB Report 337, 1992).

Water quality of the Seymour is variable throughout the region, and generally ranges from fresh to slightly saline. Brine pollution from earlier oil activities and excessive pumping has caused localized concentrations of minerals in the alluvium, limiting the full utilization of the water resource. In addition, high nitrate concentrations occur in the groundwater over a wide area. These nitrate concentrations are often due to agricultural practices, and can be attributed to nitrogen fertilizer or leaching from areas formerly covered by nitrogen fixing vegetation such as grasses or mesquite groves. Other sources of nitrate include organic matter from poorly functioning septic systems, infiltration of animal wastes or naturally occurring sources.

Blaine Aquifer

The Blaine Formation extends in a narrow outcrop band from Wheeler to King Counties. Groundwater occurs in numerous solution channels and caverns in beds of gypsum and anhydrite. In most places the aquifer exists under water table conditions, but it is also artesian where overlain by the Dog Creek Shale. Saturated thickness of the aquifer approaches 300 feet in its northern extent, and is generally less in the Region B area. Well yields vary considerably from one location to another due to the nature of solution channels. It is common for dry holes to be found adjacent to wells of moderate to high yield. The average well yield is 400 gpm.

The primary source of recharge to the Blaine Aquifer is precipitation that falls on the High Plains Escarpment to the west and the Blaine outcrop area. The solution openings and fractures in the gypsum provide access for water to percolate downward. The Blaine Aquifer may also receive some recharge from the overlying Dog Creek Shale.

Water in the Blaine Aquifer generally moves eastward through the solution channels, dissolving mineral deposits along the way, and discharging to low topographic areas. The dissolved solids concentrations in the aquifer increase with depth and generally range from 1,000 to over 10,000 mg/l. Due to the high mineral content, the TWDB has limited the extent of the Blaine Aquifer to areas with water less than 10,000 mg/l of dissolved solids.

Natural salt springs and seeps from the Blaine formation contribute to increased salinity of surface water. Due to the high mineral content the Blaine Aquifer has been used primarily for irrigation of salt tolerant crops.

Trinity Aquifer

The Trinity Group consists of three formations, the Travis Peak, Glen Rose and Paluxy. In the northern part of its extent, the Glen Rose thins out and the Travis Peak and Paluxy coalesce into a single geologic unit known as the Antlers Formation. In Region B, the Trinity Group outcrops in the eastern portion of Montague County. The thickness of the Trinity Aquifer ranges from less than 10 feet to 600 feet. Water table conditions occur in outcrop area, while artesian conditions exist in the downdip formation. Well yields in the Trinity Aquifer range from moderate to low. The effective recharge for the entire Trinity Aquifer as determined by the Texas Department of Water Resources (TDWR) is 1.5 percent of the mean annual precipitation over the outcrop area (TDWR, 1982).

Limited amounts of good quality water can be obtained from the Trinity in Montague County. Groundwater is generally used for municipal, mining, irrigation and livestock purposes. Water level declines have been recorded in heavily pumped areas to the south and southeast of Montague County.

Cross Timbers Aquifer

The Cross Timbers (formerly known as the Paleozoic Aquifer) was recently designated a minor aquifer by the TWDB. This formation has considerable extent through Region B, but production is limited. Upon review of the wells listed in the TWDB database for the Cross-Timber Aquifer, there is current production from this formation in Archer, Baylor, Clay, Montague, Wichita and Young Counties. While the formation is present in southwestern Wilbarger County, there are no known wells that produce useable water.

The TWDB has developed a conceptual groundwater availability model (GAM) for the Cross Timbers but has not published official modeled available groundwater (MAG) values yet. Availability estimates for this formation were approved by the Region B Groundwater Technical Committee for use in the 2026 Region B Water Plan.

3.2.2 Modeled Available Groundwater

The State of Texas initiated a Joint Planning program to assist in determining groundwater supplies for both regulatory and planning purposes. One of the results of this planning effort was the development of groundwater availability values to be used for regional water planning. The TWDB, which oversees this initiative, divided the state into Groundwater Management Areas (GMA) based on locations of major and minor groundwater aquifers. The planning effort within each GMA is directed by the Groundwater Conservation Districts (GCDs) that fall within the GMA. Each GMA was tasked with adopting desired future conditions (DFC) of each aquifer that falls within the GMA. Based on these conditions, the TWDB developed MAG values that are used by the GCDs and the regional water planning groups to effectively manage the state's groundwater resources.

Most of the counties in Region B are in GMA 6, with Montague County included in GMA 8. DFCs and the supporting MAG values were determined for each major and minor aquifer in the region within a GCD. These values are reported by county and are shown in Table 3-5. Table 3-6 shows the estimated supplies for aquifers without MAG values. In Region B, aquifers without MAGs include portions of the Seymour and Blaine not within the purview of a GCD, the Cross-Timbers, and Other Aquifer. The Region B RWPG evaluated the supplies for the aquifers without MAG values using available GAM data, reported historical use, and RWPG input.

Table 3-5: Modeled Available Groundwater Values – Region B

Aquifer	County	Modeled Available Groundwater (ac ft/yr)					
		2030	2040	2050	2060	2070	2080
Seymour (Pod 4)	Foard	3,779	4,209	6,900	6,628	2,777	4,049
	Hardeman	14,209	20,002	18,689	21,116	34,037	26,577
Seymour (Pods 7, 8)	Baylor	7,330	6,962	6,731	6,593	6,930	5,722
Blaine	Cottle	11,621	11,621	11,621	11,621	11,621	11,621
	Foard	6,565	6,565	6,565	6,565	6,565	6,565
	Hardeman	8,465	8,465	8,465	8,465	8,465	8,465
	King	49	49	49	49	49	49
Trinity	Montague	6,104	6,104	6,104	6,104	6,104	6,104

Table 3-6: Estimated Available Groundwater Supplies for Aquifers without MAG Values*

Aquifer	County	Estimated Available Groundwater Supplies (ac ft/yr)						*Source*
		2030	2040	2050	2060	2070	2080	
Seymour	Archer	35	35	35	35	35	35	*2016 RWP*
	Clay	787	787	787	787	787	787	*2016 RWP*
	Wichita	2,295	2,295	2,288	2,291	2,291	2,291	*2016 RWP*
	Wilbarger	30,000	30,000	30,000	30,000	30,000	30,000	*modified GAM run*
Cross-Timbers	Archer	625	625	625	625	625	625	*2016 RWP*
	Baylor	60	60	60	60	60	60	*2016 RWP*
	Clay	2,000	2,000	2,000	2,000	2,000	2,000	*2016 RWP*
	Montague	4,000	4,000	4,000	4,000	4,000	4,000	*2016 RWP*
	Wichita	840	840	840	840	840	840	*2016 RWP*
	Young	700	700	700	700	700	700	*2016 RWP*
Other Aquifer	Cottle	1,800	1,800	1,800	1,800	1,800	1,800	*2016 RWP*
	Foard	200	200	200	200	200	200	*2016 RWP*
	Hardeman	50	50	50	50	50	50	*2016 RWP*
	King	650	650	650	650	650	650	*2016 RWP*
	Wilbarger	3,050	3,050	3,050	3,050	3,050	3,050	*Historical use (2010-2015)*

*Imported groundwater comes from the Ogallala Aquifer in Region A and Dickens County in Region O. Values are shown in Table 3-9.

3.2.3 Springs in Region B

The most comprehensive source of information on major springs in Texas was published in 1981 (Brune, 1981). This work identified six major springs in Region B that are listed in Table 3-7. Some of these springs had historical significance as water supplies for nomadic Indians and western travelers. None of these springs are currently used for water supply, and at least one is no longer flowing.

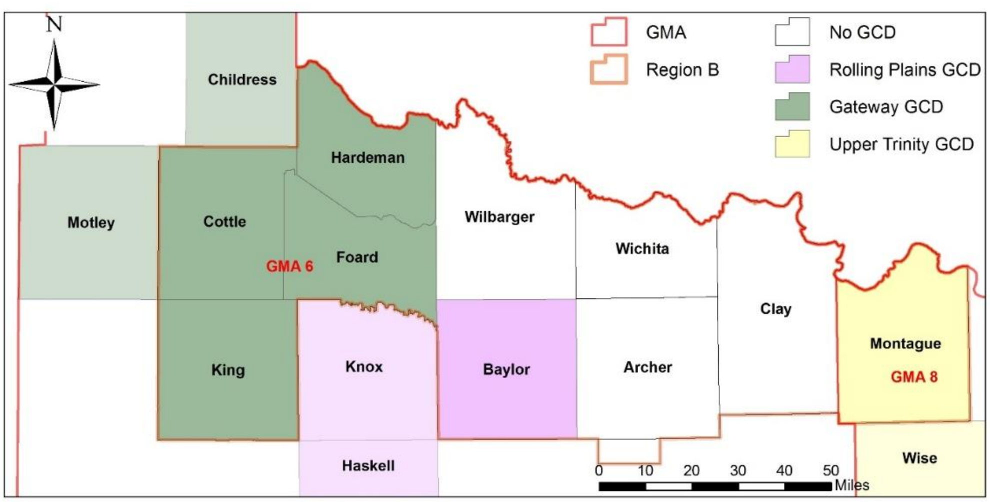
Table 3-7: Major Springs in Region B

County	Spring	Location	Status
Baylor	Buffalo Springs	3 miles west of Seymour	Flow at 25 gpm in 1969
Clay	Buffalo Springs	At Buffalo Springs	Uncertain
Montague	Barrel Springs		No longer flowing
Wichita	China Springs	2 miles west of Haynesville	Brackish water flow at 100 gpm in 1970
Wilbarger	Doans Springs	1 mile northwest of Doans	Flowing in 1970. Impounded in a recreational lake.
	Condon Springs	3 miles northwest of Vernon	Flowing in 1969

3.2.4 Groundwater Conservation Districts

There are three groundwater conservation districts located in Region B. The Rolling Plains GCD covers Baylor, Knox and Haskell Counties. Only Baylor County is in Region B, which uses water from the Seymour and Cross Timbers Aquifer. The Gateway GCD covers Cottle, Foard and Hardeman and King Counties in the northwestern part of Region B. Both the Blaine and Seymour Aquifers are present in this GCD. The Upper Trinity GCD includes Montague County in the eastern part of the region, which includes the Trinity and Cross Timbers Aquifers. As previously discussed, the GCDs have an important role in the Joint Planning process and development of the groundwater supplies used for regional water planning. The three GCDs and two GMAs are shown in Figure 3-3. Approved GCD management plans and groundwater regulatory plans were considered in the existing supply evaluation.

Figure 3-3: Groundwater Conservation Districts and Pods of the Seymour Aquifer in Region B



3.2.5 Priority Groundwater Management Areas

In areas, where there is no GCD, the state may designate a Priority Groundwater Management Area (PGMA). The PGMA process is initiated by the TCEQ, who designates a PGMA when an area is experiencing critical groundwater problems or is expected to do so within 50 years. These problems include shortages of surface water or groundwater, land subsidence resulting from groundwater withdrawal, or contamination of groundwater supplies. Once an area is designated a PGMA, landowners have two years to create a GCD. Otherwise, the TCEQ is required to create a GCD or to recommend that the area be added to an existing district. The TWDB works with the TCEQ to produce a legislative report every two years on the status of PGMAs in the state. The PGMA process is completely independent of the current GMA process and each process has different goals. The goal of the PGMA process is to establish GCDs in these designated areas so that there will be a regulating entity to address the identified groundwater issues.

In February 2009, Montague County was identified as part of the North – Central Texas Trinity and Woodbine Aquifers PGMA. Since that time all the counties in the PGMA with the exception of Dallas County have been included in a GCD.

3.3 Wastewater Reuse Supplies

In 2018, Wichita Falls completed an indirect potable reuse project utilizing the bed and banks of Lake Arrowhead which is permitted for up to 16 MGD and is currently supplying an average of 8 MGD. Treated wastewater from the Wichita Falls Resource Recovery Facility is pumped 17.5 miles to Lake Arrowhead where it is blended within the lake. Following blending, water is pumped to the Secondary Reservoir then diverted to the Jasper WTP and Cypress WTP for treatment and distribution as drinking water.

The City of Bowie has historically sold treated wastewater to oil and gas customers within Montague County. In recent years, overall mining water use had decreased significantly in Montague County, and it is anticipated that the City of Bowie will continue to sell only a small amount of reuse supplies for mining use through 2080. Other entities providing reuse supplies include: Burkburnett, Iowa Park, Nocona, Olney, and Seymour, as shown in Table 3-8.

Table 3-8: Water Reuse Supplies Region B
-Values are in ac-ft/yr-

Seller	Reuse Type	Recipient	2030	2040	2050	2060	2070	2080
City of Bowie	Direct	Mining, Montague County	3	3	3	3	3	3
City of Burkburnett	Direct	ISD, Golf Course and Parks	167	167	167	167	167	167
Cities of Iowa Park/Wichita Falls	Direct	Manufacturing, Wichita County	190	190	190	190	190	190
City of Nocona	Direct	Irrigation, Montague County	31	31	31	31	31	31
City of Olney	Direct	Golf Course/Manufacturing	5	5	5	5	5	5
City of Seymour	Direct	Salt Fork Golf Course	63	63	63	63	63	63
City of Wichita Falls	Indirect	Wichita Falls and Customers	8,968	8,968	8,968	8,968	8,968	8,968
Total			**9,427**	**9,427**	**9,427**	**9,427**	**9,427**	**9,427**

The reuse projects identified in Table 3-8 represent the major reuse projects in the Region for water supply purposes.

3.4 Inter-Basin Transfers and Inter-Region Transfers

There is only one known inter-basin transfer in Region B. This is from Lake Kickapoo in the Red River Basin to the City of Olney in the Brazos Basin. The City of Olney has a contract with the City of Wichita Falls to provide 1 MGD of water during times of drought. During wet years this additional supply is not used or minimally used.

Inter-regional transfers occur from the Panhandle Planning Area to Region B through the Greenbelt Municipal and Industrial Water Authority, a small amount from Miller's Creek in Region G and groundwater from Dickens County in Region O. Inter-regional transfers by source and region are shown in Table 3-9.

Table 3-9: Inter-Regional Transfers
-Values are in ac-ft/yr-

Source	Region	2030	2040	2050	2060	2070	2080
Greenbelt Lake	A	545	536	530	526	523	524
Ogallala Aquifer - Donley County	A	279	282	282	277	272	262
Millers Creek Reservoir	G	6	5	4	2	1	0
Other Aquifer - Dickens County	O	61	62	62	64	65	66
Total		**891**	**885**	**878**	**869**	**861**	**852**

3.5 Allocation of Existing Supplies

3.5.1 Water User Groups

To assess the projected water shortages in the region, the amount of water that is available to each water user is determined. This allocation process considers water rights, contracts, the reliable supply from the source, and current infrastructure capacities (well fields, transmission and treatment). The amount allocated to a user is restricted to the most restraining limitation. Obligations to provide water to other users through sales is also considered during the allocation process. Surface water use reported to TWDB for livestock watering was assumed supplied by on farm stock ponds.

In cases where there is insufficient water to meet the users' demands, the supplies were generally shorted equally among the entities. This generally occurred for wholesale water providers that have insufficient supplies to meet retail and customer demands. In several instances, all or nearly all of the available supply from a source was allocated to existing water users. This means that there are limited supplies from these sources for future water management strategies without the transfer of water from another entity.

The supplies to each water user are shown in the Water User Group Summary Tables in Appendix B. A summary of the currently available supplies by county is presented in Table 3-10.

Table 3-10: Summary of Currently Available Supplies to Water Users by County
-Values are in ac-ft/yr-

County	2030	2040	2050	2060	2070	2080
Archer	4,382	4,224	4,077	3,957	3,834	3,718
Baylor	6,803	6,792	6,794	6,779	6,765	6,463
Clay	6,791	6,729	6,659	6,596	6,536	6,475
Cottle	5,077	5,032	5,031	5,027	5,023	5,018
Foard	3,890	3,888	3,888	3,886	3,647	3,884
Hardeman	19,769	19,772	19,774	19,776	19,776	19,778
King	771	771	772	774	776	777
Montague	5,579	5,584	5,550	5,518	5,485	5,450
Wichita	47,625	45,349	42,853	40,327	37,799	35,267
Wilbarger	39,079	38,585	38,093	37,598	37,102	36,608
Young[1]	1,321	1,190	1,127	1,069	1,014	957
TOTAL	**141,087**	**137,916**	**134,619**	**131,306**	**127,756**	**124,396**

[1]Only includes the portion of Young County within Region B

3.5.2 Major Water Providers

A major water provider is a water user group or a wholesale water provider of particular significance to the region's water supply as determined by the regional water planning group. The Region B RWPG designated two major water providers: The City of Wichita Falls and WCWID#2. Both of these entities are considered major providers because they provide significant quantities of water to users over a wide geographic area. These providers also are responsible for the four largest surface water sources in the region. Wichita Falls currently receives water from three primary sources: Lake Arrowhead, Lake Kickapoo and Lake Kemp. It also reuses an average of 8 MGD of treated wastewater effluent, with the potential to reuse up to 16 MGD at peak capacity. The total available supply to Wichita Falls is shown in Table 3-11.

Table 3-11: Available Supply to Wichita Falls
-Values are in ac-ft/yr-

Reliable Supply[1]	2030	2040	2050	2060	2070	2080
Kickapoo	5,400	5,060	4,720	4,380	4,040	3,700
Arrowhead	10,900	10,220	9,540	8,860	8,180	7,500
Little Wichita System	***16,300***	***15,280***	***14,260***	***13,240***	***12,220***	***11,200***
Kemp Municipal[2]	3,344	3,098	2,852	2,606	2,360	2,114
Indirect Reuse	8,968	8,968	8,968	8,968	8,968	8,968
Total Municipal Supply	*28,612*	*27,346*	*26,080*	*24,814*	*23,548*	*22,282*
Kemp Industrial[3]	6,819	6,317	5,816	5,314	4,812	4,311
Total – Wichita Falls	**35,431**	**33,663**	**31,896**	**30,128**	**28,360**	**26,593**

[1] The reliable supplies for the Wichita Falls supply reservoirs are based on a yield analysis with a 20% reserve supply at the end of the drought of record.
[2]Municipal supply from Lake Kemp assumes a 25 percent loss during reverse osmosis treatment.
[3]Industrial water right is jointly owned by Wichita Falls and WCWID#2 but is shown as supply for Wichita Falls for simplicity.

WCWID#2 owns and operates water in Lake Kemp jointly with the City of Wichita Falls. WCWID#2 supplies irrigation water to users in Archer, Clay and Wichita Counties. The City of Wichita Falls and WCWID#2 administer a contract with American Electric Power for 20,000 ac-ft/yr for the Oklaunion Power Station facility. Table 3-12 shows the amount of supply available to WCWID#2 based on the proportional yield from Kemp/Diversion System for irrigation use. For simplicity, the entire amount of the Lake Kemp industrial supply for American Electric Power is shown with Wichita Falls in Table 3-11.

Table 3-12: Available Supply to Wichita County Water Improvement District No. 2
-Values are in ac-ft/yr-

Reliable Supply	2030	2040	2050	2060	2070	2080
Kemp - Irrigation	20,252	18,762	17,273	15,783	14,294	12,804
Kemp - Fish Hatchery[1]	375	347	320	292	265	237
Total – WCWID#2	**20,627**	**19,109**	**17,593**	**16,075**	**14,559**	**13,041**

[1]The water supply is for the Dundee Fish Hatchery.

3.6 Summary of Currently Available Supplies

The total amount of supply available to Region B in 2030 is approximately 183,000 ac-ft/yr, as shown in Figure 3-4.

Table 3-13. This includes all groundwater in place and reliable supplies from surface water and reuse. By 2080, the supply to Region B decreases slightly by about 7,300 ac-ft/yr. This is mostly due to the reduced storage capacities of existing reservoirs due to sediment accumulation.

The supplies connected to water users in 2030 totals approximately 141,100 ac-ft/yr, which is less than the total available regional supply due to operational and contractual constraints, infrastructure limitations, and water treatment capacities. Most of the unallocated supplies is groundwater that has not been developed to date. The amount of water available by source for Region B is included in DB27 Report 3. Source water supplies remaining that are not currently used are shown in Table 3-14. A comparison of the regional supply to the supply available to the water users is shown in Figure 3-4.

Table 3-13: Summary of Reliable Supplies to Region B Water Users
-Values are in ac-ft/yr-

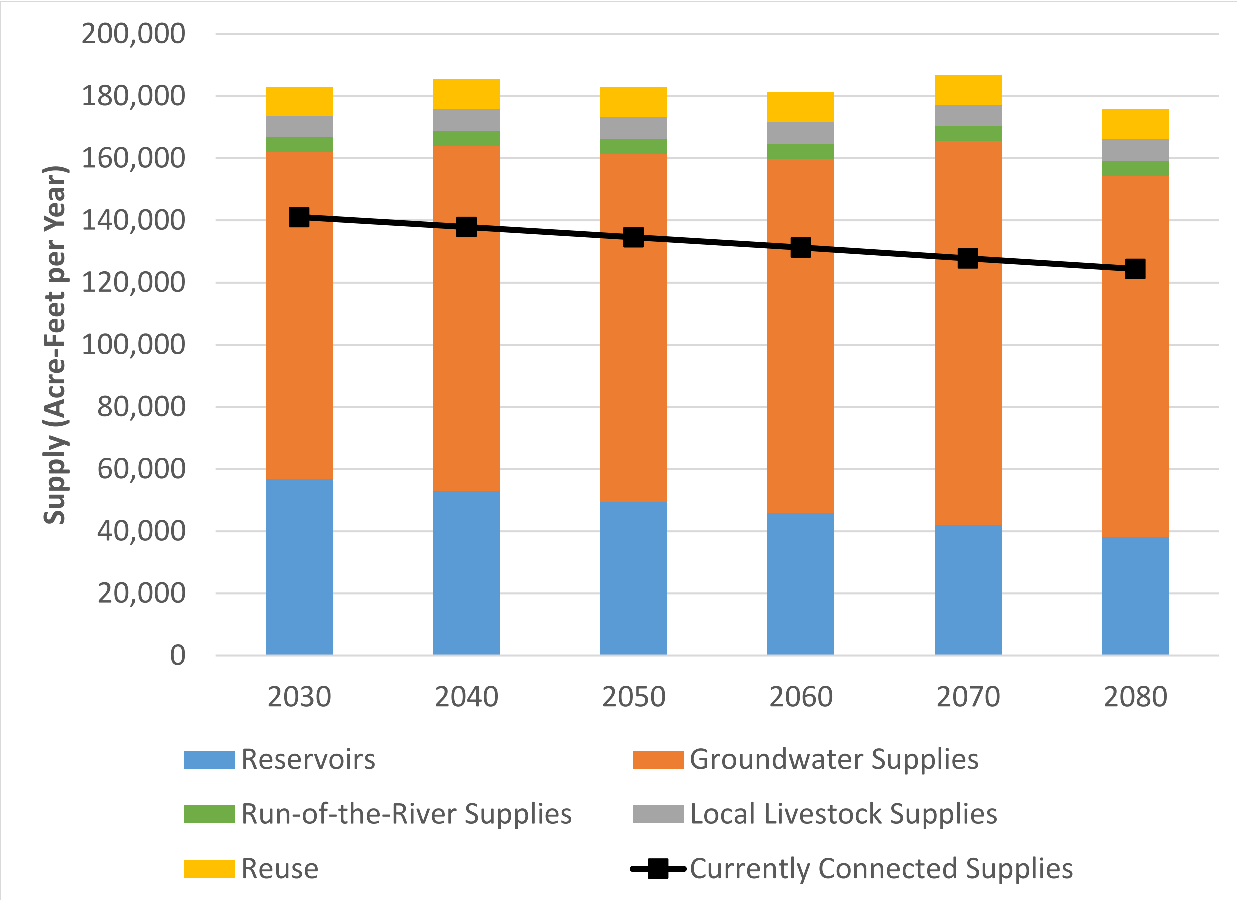
	2030	2040	2050	2060	2070	2080
Reservoirs in Region B	53,625	50,111	46,597	43,083	39,569	36,055
Reservoirs outside Region B[1]	3,140	2,970	2,800	2,592	2,383	2,175
Run-of-the-River Supplies	4,738	4,738	4,738	4,738	4,738	4,738
Local Livestock Supplies	6,878	6,878	6,878	6,878	6,878	6,878
Groundwater Supplies	105,214	111,069	112,209	114,229	123,636	116,240
Reuse	9,427	9,427	9,427	9,427	9,427	9,427
Total	**183,022**	**185,193**	**182,649**	**180,947**	**186,631**	**175,512**

[1] The supply reported for reservoirs outside of Region B is the safe yield of Greenbelt Reservoir

Table 3-14: Source Water Supply Remaining
-Values are in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Groundwater	34,881	37,919	41,771	43,738	53,313	45,909
Reuse	0	0	0	0	0	0
Surface Water	4,117	4,045	3,969	3,898	3,823	3,751
Total	**38,998**	**41,964**	**45,740**	**47,636**	**57,136**	**49,660**

Figure 3-4: Comparison of Reliable Supplies to Supplies Available to Water Users



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CHAPTER 4 IDENTIFICATION OF WATER NEEDS

4.1 Introduction

Water needs are identified by calculating the difference between currently available supplies and the projected demands. This chapter outlines water needs based on the quantity of water that is currently available to a user, the quality of water for its intended use, and the reliability of existing supplies as assessed by a safe supply analysis.

This comparison of developed water supply to demands is made for the region, county, basin, major water provider (MWP), and water user group (WUG). If the projected demands for an entity exceed the developed supplies, then a shortage is identified (represented by a negative number in Appendix B). For some users, the supplies may exceed the demands (positive number). A comparison of current supply to demand was performed using the projected demands developed in Chapter 2 and the allocation of existing supplies developed in Chapter 3 as evaluated under drought of record conditions. As discussed in Chapter 3, allocations of existing supplies to water providers (WUGs and MWPs) were based on the most restrictive of current water rights, contracts, available yields for surface water, and modeled available groundwater (MAG) for groundwater. For some aggregated water users (e.g., irrigation), reported historical use was also considered during the allocation process.

Water quality was addressed to some extent by not assigning supplies with known impaired water quality (e.g., nitrates and high salinity) for municipal use. This included some users of the Seymour Aquifer and most of the Blaine Aquifer. Further discussion of water quality issues and the effect on supply is presented in Section 4.4.

4.2 Region B Water Needs Analysis

On a regional basis, there is a projected surplus of 1,497 acre-feet per year (ac-ft/yr) in 2030. By 2040, regionwide demands exceed available connected supplies leading to a shortage of 2,484 ac-ft/yr in 2040, and a maximum projected shortage of 19,368 ac-ft/yr in 2080, as shown in Table 4-1 and Figure 4-1. These needs are calculated by subtracting the total regional demand from the total regional water supply. It includes both shortages for some water users and surpluses for others. However, this does not represent the total water needs for the region at the utility scale as water users with surpluses may not have the infrastructure, or the infrastructure is not cost effective, to provide excess water supply to those with shortages. Considering only the water users with shortages, a summary of the water needs by county is presented in Table 4-2. Total water needs for the region ranges from 7,803 acre-feet (ac-ft) in 2030 to 25,665 ac-ft in 2080.

Table 4-1: Comparison of Supplies and Demands for Region B
-Values are in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Supply	141,087	137,915	134,616	131,305	127,753	124,393
Demand	139,590	140,399	141,386	142,166	142,946	143,761
Surplus/Storage	**1,497**	**-2,484**	**-6,770**	**-10,861**	**-15,193**	**-19,368**

Figure 4-1: Region B Supplies and Demands (ac-ft/yr)

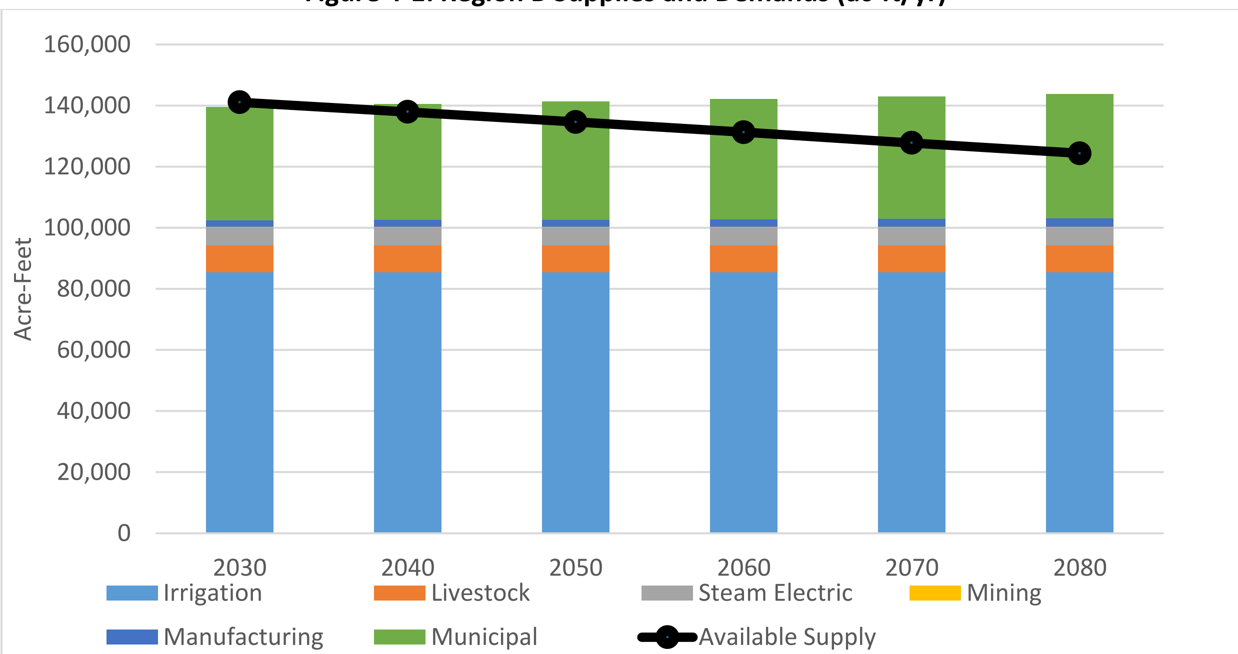

Table 4-2: Needs by County
-Values are in ac-ft/yr-

County	2030	2040	2050	2060	2070	2080
Archer	34	44	62	73	83	92
Baylor	0	0	0	0	0	308
Clay	108	125	142	159	175	189
Cottle	0	0	0	0	0	0
Foard	0	0	0	0	0	0
Hardeman	0	0	0	0	0	0
King	0	0	0	0	0	0
Montague	874	1,334	1,931	2,529	3,127	3,723
Wichita	6,781	9,318	11,974	14,564	17,168	19,773
Wilbarger	6	9	72	575	1,077	1,580
Young	0	0	0	0	0	0
Total	**7,803**	**10,830**	**14,181**	**17,900**	**21,630**	**25,665**

4.2.1 Identified Shortages for Water User Groups

A shortage occurs when developed supplies are not sufficient to meet projected demands. In Region B, there are eighteen water user groups with identified water quantity shortages during the planning period.

Total shortages for all water user groups are projected to be approximately 7,803 ac-ft/yr in 2030, increasing to 14,181 ac-ft/yr in 2050 and approximately 25,665 ac-ft/yr by the year 2080. Table 4-3 lists the water user groups with projected water shortages. The comparison of supply versus demands by user group for Region B is presented in the Water User Group Summary Tables in Appendix B.

A summary of when the individual water user group shortages begin by county and demand type is presented in Table 4-4.

Table 4-3: Projected Water Shortages for Water User Groups
-Values are in ac-ft/yr-

Water User Group	County	2030	2040	2050	2060	2070	2080
Holliday	Archer, Wichita	-34	-45	-56	-61	-68	-72
Lakeside City	Archer	0	0	-7	-13	-16	-22
Irrigation	Baylor	0	0	0	0	0	-308
Red River Authority	Clay	-108	-125	-142	-159	-175	-189
Bowie	Montague	-363	-536	-714	-894	-1,073	-1,251
County-Other	Montague	-511	-725	-948	-1,170	-1,392	-1,614
Nocona	Montague	0	-58	-199	-340	-482	-623
Saint Jo	Montague	0	-15	-70	-125	-180	-235
Electra	Wichita	-152	-187	-224	-260	-294	-327
Harrold WSC	Wichita	-10	-13	-15	-17	-18	-21
Iowa Park	Wichita	0	0	-42	-99	-154	-209
Sheppard Air Force Base	Wichita	-89	-137	-188	-232	-277	-321
Wichita Falls	Wichita	-1,528	-2,495	-3,532	-4,454	-5,393	-6,328
Irrigation	Wichita	-5,007	-6,491	-7,974	-9,458	-10,942	-12,426
Manufacturing	Wichita	0	0	-4	-49	-95	-146
Steam Electric Power	Wichita	-1	-3	-4	-5	-5	-6
Steam Electric Power	Wilbarger	0	0	-62	-564	-1,066	-1,567
Total		**-7,803**	**-10,830**	**-14,181**	**-17,900**	**-21,630**	**-25,665**

Table 4-4: Decade Shortage Begins by County and Category

County	Irrigation	Municipal	Manufacturing	Mining	Steam Electric Power	Livestock
Archer	-	2030	-	-	-	-
Baylor	2080	-	-	-	-	-
Clay	-	2030	-	-	-	-
Cottle	-	-	-	-	-	-
Foard	-	-	-	-	-	-
Hardeman	-	-	-	-	-	-
King	-	-	-	-	-	-
Montague	-	2030	-	-	-	-
Wichita	2030	2030	2050	-	2030	-
Wilbarger	-	2030	-	-	2050	-
Young	-	-	-	-	-	-

Irrigation

Irrigation shortages are identified for Baylor and Wichita Counties. The shortages for Baylor County are associated with reduced MAG availability in the Seymour Aquifer in 2080. The shortages for Wichita County are associated with reduced supplies from Lake Kemp due to sedimentation. Projected irrigation shortages are shown in Table 4-5.

Table 4-5: Projected Irrigation Shortages in Region B
-Values are in ac-ft/yr-

County	2030	2040	2050	2060	2070	2080
Baylor	0	0	0	0	0	-308
Wichita	-5,007	-6,491	-7,974	-9,458	-10,942	-12,426
Total	**-5,007**	**-6,491**	**-7,974**	**-9,458**	**-10,942**	**-12,734**

Municipal

Municipal shortages are identified in Archer, Clay, Montague, Wichita, and Wilbarger Counties. Many of the municipal water users in these counties receive supplies through a wholesale or major water provider, which is shown to have shortages associated with surface water supplies. In the case of

Montague County, significant projected growth is driving the needs and existing supplies are not sufficient to keep up with the pace of growth. Projected municipal shortages are shown in Table 4-6.

Table 4-6: Projected Municipal Shortages in Region B
-Values are in ac-ft/yr-

County	2030	2040	2050	2060	2070	2080
Archer	-34	-44	-62	-73	-83	-92
Clay	-108	-125	-142	-159	-175	-189
Montague	-874	-1,334	-1,931	-2,529	-3,127	-3,723
Wichita	-1,774	-2,824	-3,992	-5,052	-6,126	-7,195
Wilbarger	-6	-9	-10	-11	-11	-13
Total	**-2,796**	**-4,336**	**-6,137**	**-7,824**	**-9,522**	**-11,212**

Manufacturing

Wichita County was the only county with manufacturing shortages identified in Region B. Most manufacturing interests buy water from retail providers or develop their own groundwater supplies. For Wichita County, the shortages are associated with limited supplies from major and wholesale water providers. Projected manufacturing shortages are shown in Table 4-7.

Table 4-7: Projected Manufacturing Shortages in Region B
-Values are in ac-ft/yr-

County	2030	2040	2050	2060	2070	2080
Wichita	0	0	-4	-49	-95	-146
Total	**0**	**0**	**-4**	**-49**	**-95**	**-146**

Mining

No shortages for mining water were identified.

Steam Electric Power

Steam Electric Power (SEP) shortages are identified for Wichita and Wilbarger Counties. The shortage for SEP in Wilbarger County is associated with reduced supplies from Lake Kemp for the Oklaunion Power Station (OPS). The power generation facility operated by American Electric Power is inactive as of 2020, but there is potential for power generation operations to resume in the future at the OPS site. A new industrial facility in Wilbarger County has been approved that will receive water supply from Lake Kemp under the same industrial water right used to provide water to OPS. The shortages in Wichita County are associated with a small electric generating facility in Wichita Falls that is supplied by Wichita Falls. Projected SEP shortages are shown in Table 4-8.

Table 4-8: Projected Steam Electric Power Shortages in Region B
-Values are in ac-ft/yr-

County	2030	2040	2050	2060	2070	2080
Wichita	-1	-3	-4	-5	-5	-6
Wilbarger	0	0	-62	-564	-1,066	-1,567
Total	**-1**	**-3**	**-66**	**-569**	**-1,071**	**-1,573**

Livestock

No shortages for livestock water were identified.

4.2.2 Comparison of Supply and Demand for Major Water Providers

Region B has two major water providers: City of Wichita Falls and Wichita County Water Improvement District No. 2 (WCWID#2). The City of Wichita Falls is a regional provider for much of the water in Wichita, Archer, and Clay Counties. The City also provides water to customers as far away as the City of Olney in Young County. The City of Wichita Falls and WCWID#2 jointly provide water from the Lake Kemp/Diversion system to industrial customers in Wilbarger County. For simplicity, the contracts for these customers and associated supplies are shown only on Wichita Falls. Considering current customer contracts and the City's municipal demands, Wichita Falls has 1,642 ac-ft/yr of needs in 2030 that increases to 19,745 ac-ft/yr in 2080. A summary of the supply and demand comparison for Wichita Falls is shown in Table 4-9.

Table 4-9: Projected Water Shortages for the City of Wichita Falls
-Values are in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Demands[1]	37,073	45,358	45,736	45,936	46,136	46,338
Supplies	35,431	33,663	31,896	30,128	28,360	26,593
Needs	**-1,642**	**-11,695**	**-13,840**	**-15,808**	**-17,776**	**-19,745**

[1]Includes demands for OPS and future green hydrogen facility.

WCWID#2 provides irrigation water from the Lake Kemp/Diversion system to users in Archer, Clay, and Wichita Counties and the Dundee Fish Hatchery near Lake Diversion. Based on this analysis, the needs for the WCWID#2 are 6,181 ac-ft/yr in 2030 and increase to 13,767 ac-ft/yr by 2080. A summary of the supply and demand comparison for WCWID#2 is shown in Table 4-10.

Table 4-10: Projected Water Shortages for the Wichita County WID No. 2
-Values are in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Demands	26,808	26,808	26,808	26,808	26,808	26,808
Supplies	20,627	19,109	17,593	16,075	14,559	13,041
Needs	**-6,181**	**-7,699**	**-9,215**	**-10,733**	**-12,249**	**-13,767**

4.2.3 Summary of Water Needs

For several water user groups, the total demands exceed the total developed supply starting in 2030. Most of the shortages are associated with reductions in surface water supplies for the major water providers or wholesale providers and contract limitations. Other shortages are due to limitations of available groundwater and increased manufacturing demands. The evaluation of regional water supplies indicates that there is little fresh groundwater that could be further developed, and options for new surface water are limited in the western part of the region due to high salinity levels. Further review of the region's options and strategies to meet shortages is explored in more detail in Chapter 5 and the impacts of these strategies on water quality are discussed in Chapter 6.

4.3 Effect of Water Quality on Supply

Water quality is a significant issue in Region B. Due to limited resources, some user groups are using water of impaired quality or having to install additional treatment systems to utilize existing sources. An implied assumption of the supply analysis is that the quality of existing water supplies is acceptable for the listed use. In other words, water supplies that are currently being used are assumed to continue to be available, regardless of the quality. Senate Bill 1 requires that water quality issues be considered when determining the availability of water during the planning period. For this report, evaluations of source water quality are generally confined to waters used for human consumption. The effect of water quality of Lake Kemp on agricultural use is also reviewed.

4.2.1 Municipal Water Systems with Existing or Potential Quality Concerns

To determine whether the quality of specific sources of supply imposes a potential limitation on their use, the quality of the major sources of supply was compared to current and proposed drinking water standards. Pursuant to the Federal Safe Drinking Water Act, the U.S. Environmental Protection Agency (EPA) has adopted maximum contaminant levels (MCLs) for a list of organic and inorganic contaminants of drinking water. This list constitutes the primary drinking water standards, and water used for human consumption is to comply with the MCLs established by this list.

The Texas Commission on Environmental Quality (TCEQ) identifies systems that are not compliant with current and proposed primary drinking water standards. This information was reviewed for water users in Region B. Compliance with secondary drinking water standards was not evaluated since the secondary standards do not have the same regulatory and public health implications. Also, compliance with the bacteriological standards (total coliform and fecal coliform) was not evaluated since violations of these standards, when they occur, are typically associated with operational techniques and not the quality of the raw water supply. The water systems in Region B that have existing or potential non-compliances are identified in Table 4-11 along with the parameter of concern.

Table 4-11: Water Systems Not Compliant with Primary Drinking Water Quality Standards

Water System	County	Water Source	Current standard NO^3 MCL 10 mg/L
Northside WSC (Red River Authority)	Wilbarger	Seymour Aquifer	X

The TCEQ records indicate that the only primary drinking water standard (other than bacteriological) currently exceeded by water users in Region B is the nitrate criterion. Two water users have water supplies that exceed the MCL for nitrate.

Nitrate Concerns

The nitrate MCL is 10 mg/L. Consumption of water with nitrate levels in excess of 10 mg/L by infants can cause methemoglobinemia or "blue baby syndrome", a potentially fatal condition. Additionally, pregnant women are urged not to drink water with a high concentration of nitrates because of the potential health effects on the unborn fetus.

In Region B, moderate to high nitrate levels are found in water from the Seymour Aquifer. These concentrations are partly attributed to agricultural activities in the area. Long-standing practices associated with fertilizing crops are believed to have caused an increase in nitrates in the groundwater. Not all water produced from the Seymour Aquifer has excessive nitrates, but the water users shown in Table 4-12 have historically exhibited nitrate concentrations above the MCL of 10 mg/L. Other users of Seymour water with high nitrates have implemented advanced treatment, such as the City of Vernon, and are not identified with water quality concerns. The Red River Authority indicated they are in the process of addressing the nitrate issues for the Hinds-Wildcat Water System.

Removal of nitrates requires advanced treatment, such as reverse osmosis or a comparable advanced membrane technique. Nitrates can also be reduced by blending the water with another water source with low nitrate levels, if such a source is available and otherwise of acceptable quality. The TCEQ currently is urging all water systems in the region using water with high nitrate levels to reduce the nitrate concentration by treatment, by blending, or by securing an alternate source of water. Most of the systems have complied with the standards through one of these means.

4.3.2 Salinity Concerns for Lake Kemp and Diversion Lake

Waters in the Wichita River Basin have historically exhibited high dissolved solids and chloride concentrations. Previous studies, dating back to 1957, have documented that the salt concentrations in the area significantly limit the use of these waters for municipal, industrial, and irrigation purposes.

The U.S. Army Corps of Engineers (USACE) determined that an average of over 3,600 tons per day of chlorides were being discharged to the Red River system from natural and man-made sources. A project, known as the Chloride Control Project, has been designed to reduce the amount of salt contamination from eight of the Red River Basin's natural salt sources; three of which lie within the Wichita River Basin. To date, two proposed chloride control facilities have been constructed and are operational for the study. These low-flow dam structures in the Red River basin at Truscott Lake and Crowell Mitigation Area (USACE Areas VIII, and X) retain low flows that are high in salts and diverts them via a pump station and pipeline to brine storage lakes like the Truscott Brine Reservoir. When the study is completed, high chloride water that would normally flow to Lake Kemp and Lake Diversion would be diverted to Truscott Brine Reservoir. Two public meetings were held by the USACE in February 2024 with a 30-day public comment period related to closure of the Red River Chloride Control Project, which ended in March 2024.

Recent water quality data of the Lake Kemp/Diversion system indicate that chloride levels have reduced since completion of the first chloride control project, but they still limit the water use. The primary uses impacted by the lakes' salt content are potable water supplies and irrigation. Water quality criteria established pursuant to the Safe Drinking Water Act considers high salt content aesthetically undesirable and is regulated under the secondary drinking water standards. Chloride, sulfate, and total dissolved solids concentrations are subject to the secondary standards. The TCEQ established criteria for these parameters that are somewhat higher than EPA criteria, and water systems in Texas are subject to the state criteria. Both the TCEQ and EPA standards and typical Lake Kemp levels for these parameters are presented in Table 4-12.

Table 4-12: Secondary Drinking Water Standards and Salinity Levels for Lake Kemp

Parameter	TCEQ Criteria	EPA Criteria	Lake Kemp Typical concentration[1]	Lake Kemp 2011 2014 concentrations[1]
Chloride (mg/L)	300	250	1,000 – 1,400	1,600-1,900
Sulfate (mg/L)	300	250	700 - 900	1,000-1,200
Total Dissolved Solids (mg/L)	1,000	500	2,700 – 3,600	4,300-5,100

[1]TCEQ Surface Water Web Reporting Tool (typical is defined as 25th percentile to 75th percentile)

The salinity of irrigation water from Lake Kemp can also limit the crops to which it can be applied. There are several systems for classifying the salinity of waters that characterize the suitability of the water for various types of crops. One classification system developed by the U.S. Department of Agriculture (USDA) in 1954 identifies four classes of water, based on the chloride concentration of the water, and describes the suitability of each class for irrigation. The water in Lake Kemp and Diversion Lake is generally Class III - High Salinity Water (Chloride > 750 mg/L, but < 2,150 mg/L). Therefore, its use for irrigation is limited to plants with high salt tolerance. The USDA Plant Sciences Group has performed research on the salt tolerance of various herbaceous crops, and examples of salt tolerant crops include cotton, barley, sugar beet, Bermuda grass, and asparagus.

Following the drought of 2011, the water quality of Lake Kemp further deteriorated and the water was determined to be unsuitable for irrigation use. Water was not released from Lake Kemp-Diversion for irrigation use from the summer of 2011 through 2015. Wichita Falls constructed a reverse osmosis water treatment facility to treat water from the Lake Kemp-Diversion system. Even with this facility, there were concerns that the high salinity levels during drought would impact the City's ability to use this source.

4.4 Summary of Needs

In Region B, water supply needs were identified for two different categories: quantity, and quality. As shown in Table 4-13, a total of twenty water user groups were identified with one or more of these need categories. Eighteen water user groups were identified with needs from supply shortages. An additional municipal supplier in Wilbarger County and two irrigation users were found to have water quality concerns.

Table 4-13: Water Users with Identified Needs

Water User	County	Quantity	Quality
Holliday	Archer	X	
Lakeside City	Archer	X	
Irrigation	Archer		X
Irrigation	Baylor	X	
Red River Authority	Clay	X	
Bowie	Montague	X	
County-Other	Montague	X	
Nocona	Montague	X	
Saint Jo	Montague	X	
Electra	Wichita	X	
Harrold WSC	Wichita	X	
Iowa Park	Wichita	X	
Sheppard AFB	Wichita	X	
Wichita Falls	Wichita	X	
Irrigation	Wichita	X	X
Manufacturing	Wichita	X	
Steam Electric Power	Wichita	X	
Harrold WSC	Wilbarger	X	
Red River Authority	Wilbarger		X
Steam Electric Power	Wilbarger	X	

4.5 TWDB Adopted First-Tier Water Needs

A summary of First-Tier water needs based on the TWDB adopted water demand projections is shown in Table 4-14. The First-Tier needs are based on all supply limitations identified in Chapter 3.

Table 4-14: Summary of TWDB Adopted First-Tier Water Needs by WUG

WUG	County	Type	2030	2040	2050	2060	2070	2080
Irrigation	Baylor	Irrigation	0	0	0	0	0	-308
Red River Authority of Texas	Clay	Municipal	-19	-9	0	0	0	0
Bowie	Montague	Municipal	-102	-246	-395	-545	-696	-847
County-Other, Montague	Montague	Municipal	-193	-343	-500	-655	-810	-966
Nocona	Montague	Municipal	0	0	0	-94	-196	-298
Saint Jo	Montague	Municipal	0	0	0	-28	-69	-109
Electra	Wichita	Municipal	-25	-40	-46	-50	-53	-57
Harrold WSC	Wichita	Municipal	-1	0	-1	-1	-1	-2
Irrigation	Wichita	Irrigation	-5,007	-6,491	-7,974	-9,458	-10,942	-12,426
Manufacturing	Wichita	Manufacturing	0	0	-4	-49	-95	-146
SEP	Wichita	SEP	-1	-3	-4	-5	-5	-6
Sheppard Air Force Base	Wichita	Municipal	0	0	-39	-83	-128	-172
Wichita Falls	Wichita	Municipal	0	0	0	0	-64	-306
Harrold WSC	Wilbarger	Municipal	-1	-2	-2	-2	-2	-3
SEP	Wilbarger	SEP	0	0	-62	-564	-1,066	-1,567

4.6 TWDB Adopted Second-Tier Water Needs Analysis

The Second-Tier water needs analysis compares currently available supplies with TWDB adopted demands after reductions from conservation and direct reuse. Conservation and direct reuse are both considered water management strategies and are discussed further in Chapter 5. Table 4-15 shows TWDB adopted second-tier water needs by WUG. TWDB adopted second tier water needs are also reported by MWP for Wichita Falls and WCWID#2 in Table 4-16 and Table 4-17, respectively.

The Second-Tier water needs report can be viewed through the TWDB Database Reports application at https://www3.twdb.texas.gov/apps/SARA/reports/list.

Table 4-15: Summary of TWDB Adopted Second-Tier Water Needs by WUG

WUG	County	Type	2030	2040	2050	2060	2070	2080
Irrigation	Baylor	Irrigation	0	0	0	0	0	-53
Bowie	Montague	Municipal	-10	-123	-243	-356	-466	-584
County-Other, Montague	Montague	Municipal	-91	-192	-287	-377	-460	-535
Nocona	Montague	Municipal	0	0	0	-14	-82	-153
Saint Jo	Montague	Municipal	0	0	0	0	-7	-29
Electra	Wichita	Municipal	-16	-23	-17	-12	-6	-9
Harrold WSC	Wichita	Municipal	-1	0	0	0	0	0
Manufacturing	Wichita	Manufacturing	0	0	-4	-49	-95	-146
SEP	Wichita	SEP	-1	-3	-4	-5	-5	-6
Sheppard Air Force Base	Wichita	Municipal	0	0	0	-13	-38	-62
Harrold WSC	Wilbarger	Municipal	0	-1	0	0	0	0

Table 4-16: TWDB Adopted First and Second Tier Water Needs for Wichita Falls

	2030	2040	2050	2060	2070	2080
Demands	34,243	42,062	41,697	41,167	40,658	40,167
Supplies	35,431	33,663	31,896	30,128	28,360	26,593
First Tier Needs	0	-8,399	-9,801	-11,039	-12,298	-13,574
Conservation	410	772	4,123	4,563	5,008	5,460
Direct Reuse	362	362	362	362	362	362
Second Tier Needs	0	-7,265	-5,316	-6,114	-6,928	-7,752

Table 4-17: TWDB Adopted First and Second Tier Water Needs for Wichita County WID #2

	2030	2040	2050	2060	2070	2080
Demands	26,808	26,808	26,808	26,808	26,808	26,808
Supplies	20,627	19,109	17,593	16,075	14,559	13,041
First Tier Needs	-6,181	-7,699	-9,215	-10,733	-12,249	-13,767
Conservation	3,496	5,659	7,822	9,958	12,149	12,149
Direct Reuse	0	0	0	0	0	0
Second Tier Needs	-2,685	-2,040	-1,393	-775	-100	-1,618

4.7 List of References

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CHAPTER 5 WATER MANAGEMENT STRATEGIES

Chapter 5 identifies and discusses the water management strategies to meet the Region B identified water needs as outlined in Chapter 4. These needs are met through a variety of strategies that have been developed through coordination with the water users.

This chapter is divided into five main sections. Section 5.1 discusses the types of potentially feasible water management strategies. Section 5.2 discusses the process used to develop the strategies, and the factors considered in evaluating the strategies. Section 5.3 discusses the water conservation strategies that were considered and recommended for users in Region B. This includes the identification and evaluation for municipal, irrigation and mining conservation measures. Section 5.4 presents the recommended water management strategies for the two major water providers in Region B. Section 5.5 addresses the recommended strategies for each water user group with identified shortages and summarizes the water management plans by county.

Over the planning period there may be additional water users that will need to upgrade their water supply systems or develop new supplies but are not specifically identified in this plan. For aggregated water users, such as "County-Other", the identification of needs can be challenging due to the nature of the data evaluation. It is the intent of this plan to include all water systems that may demonstrate a need for water supply. This includes established water providers and new water supply corporations formed by individual users that may need to band together to provide a reliable water supply. In addition, Region B considers water supply projects that do not impact other water users but are needed to meet demands or to meet regulatory requirements are consistent with the regional plan even though not specifically recommended in the plan.

This plan assumes that management strategies to meet any identified shortages are employed or implemented by the respective water user. The Region B Water Planning Group (RWPG) does not take responsibility in planning or implementing the strategies.

5.1 Evaluation of Potentially Feasible Strategies

This section provides a review of the types of water management strategies (WMS) considered for Region B and the approach for identifying the potentially feasible water management strategies for water users with shortages. Once a list of potential feasible strategies has been identified, the most feasible strategies are recommended for implementation. Alternative strategies can also be identified in case the recommended strategies become unfeasible. These strategies are discussed in more detail in later sections. This section identifies the potentially feasible strategies for water users that were found to have a projected need in Chapter 4. Where applicable the following information was considered when evaluating existing supplies and WMSs:

- Publicly available plans for major agricultural, municipal, manufacturing, and commercial water users

- Local and regional water management plans
- Water availability requirements relating to Priority Groundwater Management Areas
- The Texas Clean Rivers Program
- The U.S. Clean Water Act
- Water management plans
- Other planning goals, including regionalization of water and wastewater services
- Any other information available from local or regional water planning studies

5.1.1 Identification of Potentially Feasible Strategies

In accordance with TWDB rules, the Region B RWPG has adopted a standard procedure for identifying potentially feasible strategies. This procedure classifies strategies using the TWDB's standard categories developed for regional water planning. These strategy categories include:

- Water Conservation
- Drought Management Measures
- Wastewater Reuse
- Management and/or Expanded Use of Existing Supplies
    - System Operation
    - Conjunctive Use of Groundwater and Surface Water
    - Reallocation of Reservoir Storage
    - Voluntary Redistribution of Water Resources
    - Voluntary Subordination of Existing Water Rights
    - Yield Enhancement
    - Water Quality Improvement
- New Supply Development
    - Surface Water Resources
    - Groundwater Resources
    - Brush Control
    - Desalination
    - Water Right Cancellation
    - Aquifer Storage and Recovery (ASR)/Managed Aquifer Recharge (MAR)
- Interbasin Transfers
- Emergency Transfers of Water

One of the purposes of this chapter is to provide a big picture discussion on the various strategy types that were identified to potentially reduce the identified shortages, the applicability of these strategies for users in Region B, and provide documentation of the strategy types that are not appropriate for Region B.

<u>Potentially Feasible Strategies not appropriate for Region B</u>

While each of these strategy types were considered by the RWPG, not all were determined as viable options for addressing shortages in the region. Region B does not consider drought management as an appropriated strategy to meet long-term growth in demands. This strategy is considered a temporary strategy to conserve available water supplies during times of drought or emergencies and acts as means to minimize the adverse impacts of water supply shortages during drought. Drought management will be employed in the region through the implementation of local drought contingency plans. Region B is supportive of the development and use of these plans during periods of drought or emergency water needs.

The RWPG also does not consider water right cancellation to be an appropriate strategy for Region B. Instead, Region B recommends that a water right holder consider selling water under their existing water right to the willing buyer. Emergency transfers of water are considered in Chapter 7. Similar to drought management, this strategy is an emergency response to drought or loss of water supplies and is not appropriate for long-term growth in demands.

Voluntary subordination is not appropriate for Region B since most of the water rights held in the region are reliable based on the priority in the Water Availability Models. It should also be noted that most of the major water rights held in reservoirs in the basin are owned by the MWPs that coordinate water diversions from Lake Kemp.

Potential Yield Enhancement projects, which could include dredging or evaporation suppression, have not been shown to be cost effective for water supply purposes. Wichita Falls did conduct a pilot study on evaporation suppression during the drought and the results indicated potential reductions in evaporation, however the study was unable to state these savings with a high level of confidence.

The opportunities for reallocation of reservoir storage from non-water supply to water supply is very limited in Region B (i.e. flood control or hydropower to water supply). Lake Kemp is the only surface water supply in Region B with a dedicated flood control storage pool. There are no hydropower lakes in the region. Lake Kemp has been studied as a potential source for reallocation, and studies have indicated reallocation of flood storage would not result in additional reliable supply. As such, this strategy type is not considered appropriate for Region B.

Marine seawater desalination is also not considered a potentially feasible strategy for Region B as there is no nearby source of marine seawater.

<u>Potentially Feasible Water Management Strategies for Region B</u>

The strategy types (and associated subcategories) that were determined as potentially feasible strategies for entities within Region B are: 1) water conservation 2) wastewater reuse 3) expanded use of existing supplies (system operation, conjunctive use, voluntary redistribution, and water quality improvements), and 4) new supply development (new surface water, new groundwater, ASR/MAR brush control, and desalination).

A brief discussion of each of these strategy types and the specific application to the users in Region B is presented in the following subsections.

5.1.2 Water Conservation

Water conservation is defined as methods and practices that reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses. Water conservation is typically viewed as long-term changes in water use that are incorporated into daily activities.

Water conservation is a valued water management strategy in Region B because it helps extend the water resources in the region. It is recommended for all municipal and irrigation water users, whether the user has a defined shortage or not. It is recommended for all mining users that are shown to have a shortage, and it is encouraged for manufacturing, and steam electric users.

5.1.3 Wastewater Reuse

Wastewater reuse utilizes treated wastewater effluent as either a supplement for a potable water supply (direct reuse) or utilizes treated wastewater that has been returned to a water supply resource (indirect reuse). Currently, the majority of reuse in Region B is through the City of Wichita Falls' indirect potable water project via the bed and banks of Lake Arrowhead, which can supply up to 8 million gallons per day (MGD). The remaining reuse supplies are limited to municipal irrigation and/or use at the wastewater treatment facilities; however, the City of Bowie has sold nearly all wastewater effluent for mining purposes in the recent past. With a high value placed on reclaimed water produced by water reclamation facilities more entities have begun to consider reuse projects to offset the use of potable water for irrigation of public turf areas, industrial cooling water, construction water, and other uses. The City of Bowie has a proposed indirect potable reuse project expected to be online in 2030.

5.1.4 Expanded Use of Existing Supplies

Expanded use of existing supplies includes seven subcategories ranging from selling developed water that is not currently used to enhancing existing supplies through operations, storage, treatment or other means. In Region B, four of the seven subcategories were determined potentially feasible. These include system operations, conjunctive use of groundwater and surface water, water quality improvements and voluntary transfer (sales or contracts for developed water).

System Operation

System operation involves the management of two or more water supplies to maximize the supplies from these sources, which can result in increased water supplies. Wichita Falls owns and operates multiple surface water systems that do not benefit from system operation. In previous planning, system operation analyses of these systems found minimal increases in water supplies from system operation. While this strategy is employed by Wichita Falls and supported by Region B, this strategy type does not provide additional supply in Region B.

Conjunctive Use of Groundwater and Surface Water

Conjunctive use is the operation of multiple sources of water to optimize the water resources for additional supply. In the past, Wichita Falls considered the development of new groundwater sources that could operate conjunctively with existing surface water sources. This would help reduce evaporative losses associated with the surface water reservoirs, while still meeting demands with groundwater when less surface water is available. This strategy is considered potentially feasible for entities with both surface water and groundwater.

Water Quality Improvements

Water quality improvements allow for the use of impaired water for municipal or other uses. In Region B, there are considerable amounts of brackish surface water and groundwater. Water quality improvement for these sources are typically accomplished through desalination. This discussion is under the strategy type "Desalination". This strategy type would apply to treatment of other water quality parameters.

In addition to the treatment of existing sources the Corps of Engineers has a Red River Chloride Control Project to control natural chloride brine emissions at ten major source areas to improve water quality. The Wichita Basin portion was completed May 2004. It is a federally funded and directed project.

Voluntary Redistribution

Voluntary redistribution is transfer of existing water supplies from one user to another through sales, leases, contracts, options, subordination or other similar types of agreements. Typically, the entity providing the water has determined that it does not need the water for the duration of the transfer. The transfer of water could be for a set period of years or a permanent transfer. Redistribution of water makes use of existing resources and provides a more immediate source of water. In Region B, there is little to no existing developed water that is available for redistribution without the development of additional strategies. This strategy is used to represent sales and contracts between a water provider and its customers. It can include current contractual obligations and potential future customers. New Supply Development

New supply development utilizes water that is not currently being used or generates new supplies through aquifer storage and recovery of water that otherwise would not have been available. This strategy type typically includes substantial infrastructure improvements to develop the new source, transport the water and, if needed, treat the water for its ultimate end use. The subcategories for this strategy type include new surface water development, new groundwater development, and brush control.

Surface Water Development

The opportunity for new surface water development is limited in Region B with many of the suitable locations already developed. The Water Availability Model (WAM) for the Red River Basin shows water available for new appropriations in the Little Wichita River Basin. There are existing water rights that are currently not being used but could potentially be further developed such as run-of-river supplies from Lake Kemp, however these supplies would need advanced treatment for municipal use. Lake Ringgold has been a recommended strategy for Wichita Falls in past plans and remains a recommended strategy for Region B in this plan.

Groundwater Development

Groundwater accounts for approximately 50 percent of the total water use in Region B. The Blaine Aquifer in Cottle, Foard, and Hardeman County is shown to have available supplies, however, the challenges with using water from the Blaine Aquifer are that the water tends to be brackish and the source in not near areas with need. The remaining supply from the Seymour Aquifer in Foard and Hardeman counties is a case where the Modeled Available Groundwater (MAG) exceeds historical use and the RWPG indicated they will not allocate this as a current or future supply strategy. Table 5-1 shows the amount of groundwater that is available for new groundwater development by county and by aquifer.

Aquifer Storage and Recovery/Managed Aquifer Recharge

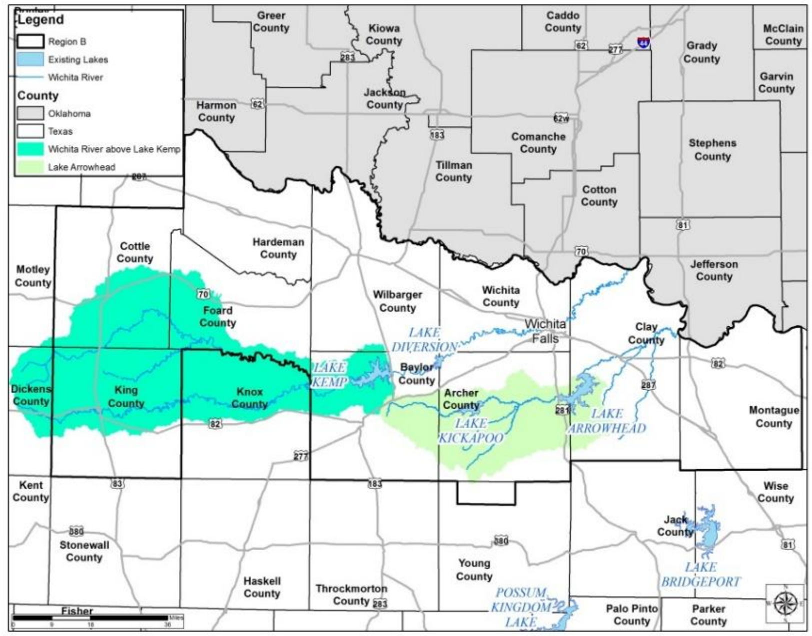
ASR/MAR is considered a feasible strategy for Region B in very limited circumstances. Rolling Plains Groundwater Conservation District (RPGCD) is planning to develop a MAR project in Baylor County to capture stormwater runoff and allow it to recharge into the Seymour Aquifer.

For the purpose of evaluating ASR, the RWPG defined a significant need as greater than 4,000 acre-feet during any decade of the planning period. This threshold was identified by developing a histogram of needs and presenting those to the RWPG. Two water user groups meet this criterion (City of Wichita Falls, Irrigation - Wichita County). The key components of ASR are the availability of suitable geologic formation for storage of the water, available water source, and the infrastructure to place the water into the aquifer and then recover the water when needed. ASR was not considered for any of these two entities in Region B due to the lack of suitable geologic formations in close proximity to the need.

Table 5-1: Available Groundwater Supplies for Strategies
-Values are in ac-ft/yr-

Aquifer	County	2030	2040	2050	2060	2070	2080
Blaine	Cottle	8,384	8,428	8,429	8,433	8,437	8,442
Blaine	Foard	6,335	6,335	6,335	6,335	6,335	6,335
Blaine	Hardeman	1,882	1,882	1,882	1,882	1,882	1,882
Blaine	King	0	0	0	0	0	0
Cross Timbers	Archer	587	588	588	574	557	540
Cross Timbers	Baylor	20	20	20	20	20	20
Cross Timbers	Clay	877	877	877	877	877	877
Cross Timbers	Montague	2,909	2,909	2,909	2,909	2,909	2,909
Cross Timbers	Wichita	134	134	134	134	134	134
Cross Timbers	Young	646	640	632	624	616	616
Other	Cottle	83	84	85	85	85	86
Other	Foard	92	92	92	92	92	92
Other	Hardeman	0	0	0	0	0	0
Other	King	123	123	123	123	123	123
Seymour	Archer	35	35	35	35	35	35
Seymour	Baylor	1,299	943	710	583	934	0
Seymour	Clay	0	0	0	0	0	0
Seymour	Foard	762	1,192	3,883	3,611	0	1,033
Seymour	Hardeman	2,023	7,808	6,486	8,904	21,817	14,347
Seymour	Wichita	1,031	1,031	1,024	1,027	1,027	1,027
Seymour	Wilbarger	2,488	2,469	2,467	2,459	2,450	2,439
Trinity	Montague	5,255	5,227	5,199	5,169	5,140	5,113
Total		**34,965**	**40,817**	**41,910**	**43,876**	**53,470**	**46,050**

Brush Control



In 1985, the Texas Legislature authorized the Texas State Soil and Water Conservation Board (TSSWCB) to conduct a program for the "selective control, removal, or reduction of brush species that consume water to a degree that is detrimental to water conservation." In 1999 the TSSWCB began the Brush Control Program. In 2011, the 82nd legislature replaced the Brush Control Program with the Water Supply Enhancement Program (WSEP). The WSEP's purpose is to increase available surface and groundwater supplies through the selective control of brush species that are detrimental to water conservation.

WSEP considers priority watersheds across the state, the need for conservation within the territory of a proposed projection based on the State Water Plan and if the Regional Water Planning Group has identified brush control as a strategy in the State Water Plan as part of their competitive grant, cost sharing program. Feasibility studies have been conducted for two watersheds in Region B: Wichita River upstream of Lake Kemp, and Little Wichita River Watershed upstream of Lake Arrowhead. These studies indicate there is potential for water loss reduction from brush, but these losses have been difficult to quantify during periods of drought. Brush control will be considered a potentially feasible strategy for Region B.

Desalination

Desalination is the removal of excess salts from either surface water or groundwater for beneficial use. In Region B, most of the fresh groundwater supplies have been developed and are currently being used. The region has brackish water that potentially could be desalinated and used for municipal use. This process tends to require considerable energy and is more costly than conventional treatment. It also produces a waste stream that can vary from less than 20 percent to nearly 50 percent of the raw water, depending upon the level of salts. Since this strategy is fairly expensive, it is not an economically viable option for agricultural use. This strategy is considered for the municipal development of brackish water.

5.1.5 Summary of Potentially Feasible Strategies

There are four potentially feasible water management strategies that were identified for water users and major water providers in Region B. These strategies include a wide assortment of strategy types, which were carefully reviewed for entities with identified needs. Strategies were only considered potentially feasible if the strategy:

- Is appropriate for regional planning;
- Utilizes proven technology;
- Has an identifiable sponsor;
- Could meet the intended purpose for the end user, considering water quality, economics, geographic constraints, and others, as appropriate; and

- Meets existing regulations.

A list of the potentially feasible water management strategies considered for Region B is included in Attachment 5-1 at the end of this chapter. The process for strategy development and evaluation is presented in the following sections.

5.2 Strategy Development and Evaluation

Water management strategies were developed for water user groups to meet projected needs in the context of their current supply sources, previous supply studies and available supply within the region. Where site-specific data were available, this information was used. When specific well fields could not be identified, assumptions regarding well capacity, depth of well and associated costs were developed based on county and aquifer. The primary new surface water supplies are associated with the use of unappropriated water in the Little Wichita River Basin.

Water transmission lines were assumed to take the shortest route, following existing highways or roads where possible. Profiles were developed using GIS mapping software or topographic maps. Pipes were sized to deliver peak-day flows within reasonable pressure and velocity ranges. Water losses associated with transmission systems were assumed to be negligible.

Municipal and manufacturing strategies were developed to provide water of sufficient quantity and quality that is acceptable for its end use. Water quality issues affect water use options and treatment requirements. For the evaluations of the strategies, it was assumed that the final water product would meet existing state water quality requirements for the specified use. For example, a strategy that provided water for municipal supply would meet existing drinking water standards, while water used for mining may have a lower quality. If advanced water treatment was required, associated water losses were assumed to be 25 percent of the treated water. For some strategies, only a portion of the water may require treatment and losses were accounted for accordingly.

5.2.1 Strategy Evaluation Criteria

The consideration and selection of water management strategies for water user groups with needs followed TWDB guidelines and were conducted in open meetings with the Region B RWPG. In accordance with state guidance, the potentially feasible strategies were evaluated with respect to:

- Quantity, reliability and cost;
- Environmental factors, including effects on environmental water shortages, wildlife habitat and cultural resources;
- Impacts on water resources, such as playas and other water management strategies;
- Impacts on agriculture and natural resources; and
- Other relevant factors.

Other relevant factors include regulatory requirements, political and local issues, amount of time required to implement the strategy, recreational impacts of the strategy, third party impacts, and other socio-economic benefits or impacts.

The definition of quantity is the amount of water the strategy would provide to the respective user group in ac-ft/yr (ac-ft/yr). This amount is considered with respect to the user's short-term and long-term shortages. Reliability is an assessment of the availability of the specified water quantity to the user over time. If the quantity of water is available to the user all the time, then the strategy has a high reliability. If the quantity of water is contingent on other factors, reliability will be lower.

The assessment of cost for each strategy is expressed in dollars per acre-foot per year for water delivered and treated for the end user requirements. Calculations of these costs follow the Texas Water Development Board's guidelines for cost considerations and identify capital and annual costs by decade. Project capital costs are based on September 2023 price levels and include construction costs, engineering, land acquisition, mitigation, right-of-way, contingencies and other project costs associated with the respective strategy. Annual costs include power costs associated with transmission, water treatment costs, water purchase (if applicable), operation and maintenance, and other project-specific costs. Debt service for capital improvements was calculated over 20 years (40 years for reservoir projects) at a 3.5 percent interest rate. Costs were not assessed for fulfillment of existing contracts if no new infrastructure is needed.

Potential impacts to sensitive environmental factors were considered for each strategy. Sensitive environmental factors may include wetlands, threatened and endangered species, unique wildlife habitats, and cultural resources. In most cases, a detailed evaluation could not be completed because previous studies have not been conducted or the specific location of the new source (such as a groundwater well field) was not identified. Therefore, a more detailed environmental assessment will be required before a strategy is implemented.

The impact on water resources considers the effects of the strategy on water quantity, quality, and use of the water resource. A water management strategy may have a positive or negative effect on a water resource. This review also evaluated whether the strategy would impact the water quantity and quality of other water management strategies identified.

A water management strategy could potentially impact agricultural production or local natural resources. Impacts to agriculture may include reduction in agricultural acreage, reduced water supply for irrigation, or impacts to water quality as it affects crop production. Various strategies may actually improve water quality, while others may have a negative impact. The impacts to natural resources may consider inundation of parklands, impacts to exploitable natural resources (such as mining), recreational use of a natural resource, and other strategy-specific factors.

Infrastructure cost estimates for Region B strategies may be found in Appendix C. Appendix D includes a Strategy Evaluation Matrix and Quantified Environmental Impact Matrix.

5.3 Water Conservation

Water conservation is defined by Texas Water Code §11.002(8) as "the development of water resources; and those practices, techniques and technologies that will reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or increase the recycling and reuse of water so that a water supply is made available for future or alternative uses." Water conservation measures are long-term, permanent strategies to reduce water use that apply to all categories of water use and supply sources.

Title 31 of the Texas Administrative Code (31 TAC) §357.34 (j) requires the 2026 Plan to consolidate and present recommendations that may include Best Management Practices (BMPs) appropriate for the region. Some of the demand projections developed for SB1 Planning (Chapter 2) incorporate an expected level of conservation to be implemented over the planning period. Further, for WUGs with identified water needs, conservation WMSs must be included as part of the WUGs list of strategies to meet shortages; or a summary of reasons must be provided in the plan for not including conservation WMSs.

Section 5.3.1 identifies WUGs and WWPs that are required to have conservation plans and plan requirements, provides a review of water conservation plans and practices in Region B. Section 5.3.2 summarizes water conservation included in the demand projections for each water use category. This is followed by a discussion in Section 5.3.3 of WUGs with needs and recommendations for BMPs which could be implemented by WUGs with needs. Section 5.3.4 discusses the gallons per capita per day (GPCD) goals for each municipal WUG in the region. A summary of water conservation is provided in Section 5.3.5.

5.3.1 WUG and WWP Conservation Requirements

The following types of entities are required to develop and submit water conservation plans to the TWDB, the TCEQ, and/or the RWPG, as noted.

- Any entity applying for a new or an amended water right is required to prepare and implement a Water Conservation Plan and submit it to the TCEQ with the application in accordance with 30 TAC §295.9. The entity may or may not be required to submit this plan to the RWPG depending on the requirements of rules.
- Any entity holding an existing permit, certified filing, or certificate of adjudication for the appropriation of surface water in the amount of 1,000 acre-feet a year or more for municipal, industrial, and other non-irrigation uses is required to develop, submit, and implement a water conservation plan (30 TAC §288.30). The plan must be submitted to the TCEQ and the RWPG.
- Any entity holding an existing permit, certified filing, or certificate of adjudication for the appropriation of surface water in the amount of 10,000 ac-ft/yr or more for irrigation uses is required to develop, submit, and implement a water conservation plan. (30 TAC §288.30). The plan must be submitted to the TCEQ and the RWPG.
- A public water system providing potable water service to 3,300 or more connections is required to develop a water conservation plan and submit the plan to the Executive Director of the Texas Water Development Board. (Texas Water Code §13.146)
- Each public water supplier is required to update and submit a Water Conservation Plan to the Texas Commission on Environmental Quality (TCEQ) every five years in accordance with 30 TAC §288.2. These plans are to document coordination with the regional water planning group.
- A wholesale water provider shall review and update its water conservation plan every five years to coincide with the regional water planning group. (30 TAC 288.5)

The entities in Region B that are required to develop water conservation plans and submit them to the regional water planning group are identified in Table 5-2

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Table 5-2: Water Users Required to Develop, Implement, and Submit Water Conservation Plans

Entity	WUG	3,300 Connections or More	Non Irrigation Water Right of 1,000 ac ft/yr or More				Irrigation Water Right of 10,000 ac ft/yr or More	Wholesale Water Provider
			Municipal/ Domestic	Industrial	Mining	Other		
City of Archer City	Yes	No						•
City of Bowie	Yes	Yes	•	•				•
City of Burkburnett	Yes	Yes						
City of Henrietta	Yes	No	•					
City of Iowa Park	Yes	Yes	•					•
City of Olney	Yes	No	•					
City of Vernon	Yes	Yes						•
City of Wichita Falls	Yes	Yes	•	•	•	•	•	•
Greenbelt Municipal and Industrial Water Authority[1]	No	Yes	•					•
Red River Authority of Texas	Yes	Yes	•			•		
Wichita County WID No. 2	No		•	•	•	•	•	•

[1]Office of Greenbelt MIWA is in Donley County, however, several cities/water systems located in Region B buy water from this entity.

Requirements vary for each type of water supply entity. A summary of water conservation plan requirements by type of water use is provided below.

Municipal/Public Water Supply Conservation Plan Requirements

At a minimum each plan must include:

- Utility Profile that describes the entity, water system and water use data.
- Record management system that is capable of recording water use by different types of users.
- Quantified five-year and ten-year water savings goals.
- Metering device with a 5% accuracy to measure the amount of water diverted from the source of supply.
- A program for universal metering (customers and public uses); and a meter maintenance program.
- Measures to determine and control water loss.
- A program of continuing public education and information regarding water conservation.
- A non-promotional water rate structure.
- Reservoir operations plan if appropriate.
- Means of implementation and enforcement.

- Documentation of coordination with regional planning.

If a public water supplier serves over 5,000 people, they are additionally required to have a conservation-oriented rate structure and a program of leak detection, repair, and water loss accounting for the water transmission, delivery, and distribution system.

Industrial or Mining Water Conservation Plan Requirements

At a minimum each plan must include the following elements or an explanation of why the element is not included:

- Description of the source of water and the water use in production, estimates of water consumed, and estimates of discharge.
- Specific quantifiable goals for 5-year and 10-year water savings and the basis for the goals.
- Description of devices or methods used to measure water use within 5% accuracy.
- Leak detection, repair, and an accounting of water loss.
- Application of state-of-the-art equipment or process modifications to improve water conservation efficiency.
- Other water conservation practices that will enable the water user to achieve the stated goals.
- Update the plan to coincide with the regional water planning group.

Agricultural Water Conservation Plan Requirements

At a minimum each plan must include the following elements or an explanation of why the element is not included:

- For agricultural users other than irrigation, the requirements are essentially the same as those for industrial or mining water conservation plans.
- For individual irrigation users the requirements include:
    - Description of irrigation processes, methods, and crops.
    - Water measurement devices within 5% accuracy.
    - Specific 5-year and 10-year goals.
    - Identification and implementation of water conserving irrigation equipment.
    - Leak detection and control of water losses.
    - Irrigation scheduling to determine timing and volume of irrigation water.
    - Land improvements to improve irrigation efficiency
    - Tailwater recovery and other conservation practices.
- For systems providing irrigation water to multiple users the requirements include:
    - System profile describing the structural facilities, management practices, and user profile.
    - Specific 5-year and 10-year conservation goals.
    - Description of devices or practices used to measure water diverted from source(s).
    - Monitoring and records management to assess deliveries, sales, and losses.
    - Leak detection and water loss control program.
    - A program to assist customers with implementing water

conservation plans and/or measures.

- Record of plan adoption and documentation of coordination with regional water planning.

Water Conservation Plans for Wholesale Water Providers

The requirements of conservation plans for wholesale water providers (WWPs) are essentially the same as those for public water system except that WWPs are required to include provisions in contracts with individual water users requiring them to develop and implement water conservation plans consistent with the goals of the WWP. In addition, the WWP is required to coordinate with the regional water planning group.

5.3.2 Water Conservation Included in the Demand Projections

The adopted water demands included in Chapter 2 incorporate some “built-in” water conservation for municipal demands. The following sections describe any water conservation efforts that are already included in the demand projections.

Municipal Demands

Projected water demands are based on water usage during the base planning year, which was the most recent very dry year. For most Region B WUGs, the base planning year is 2011. However, the per capita water use projected for future years is estimated to be less than the per capita water usage during the base year. The assumed reductions in per capita water use are the result of the implementation of the State Water-Efficiency Plumbing Act. Among other things, the Plumbing Act specifies that only water-efficient fixtures can be sold in the State of Texas. Savings occur because all new construction must use water-efficient fixtures, and all new fixtures sold for replacement of existing fixtures must satisfy the water efficiency requirements. For the entire region, the Plumbing Act results in about a four percent reduction in municipal water use (1,400 ac-ft/yr) by year 2080.

Manufacturing Demands

For the current round of regional water planning, the TWDB adopted a new policy for projecting water demands for manufacturing WUGs. Manufacturing demands for 2030 are estimated by the TWDB based on highest historical reported use from 2015 to 2019 and employment growth data over the last ten years. For the rest of the planning period (2040-2080) manufacturing demands were projected linearly using a County Business Patterns statewide manufacturing growth rate of 0.37 percent.

Mining Demands

The mining demands do not specifically include a level of basic conservation. Opportunities for advanced conservation for mining are addressed in Section 5.3.3.

Livestock Demands

Most of the livestock demand in Region B is for free-range livestock. Region B encourages individual ranchers to adopt practices that prevent the waste of water for livestock. However, savings that results from these practices will be small and difficult to quantify. Therefore, livestock water conservation is not included in the demand projections and is not considered to provide an opportunity for advanced conservation. The water demand per animal was adjusted from the 2021 plan for dairy cattle and hogs, but these have a small impact on the regional water demand.

Irrigation Demands

Based on the TWDB projections, irrigation demands are expected remain constant throughout the planning cycle. The irrigation demands do not specifically include a level of basic conservation. Opportunities for advanced conservation are described in Section 5.3.3.

Steam Electric Demands

Demands for steam electric power were developed on a state-wide basis and these demands assume that long-term power needs will be met with more water efficient facilities, and that the mixture of generating facilities includes wind and solar, which do not require cooling water. However, the steam electric demands for Region B do not include a component of Basic Conservation. The water use estimates are based on the highest water use for existing facilities during the recent period (2015-2019). Opportunities for advanced conservation are described in Section 5.3.3.

The volume of Basic Conservation included for each water use category is summarized in

Table 5-3.

Table 5-3: Basic Conservation Included in Demand Projections
-Values are in ac-ft/yr-

Water Use Category	2030	2040	2050	2060	2070	2080
Municipal	1,116	1,292	1,324	1,349	1,374	1,400
Manufacturing	0	0	0	0	0	0
Mining	0	0	0	0	0	0
Livestock	0	0	0	0	0	0
Irrigation	0	0	0	0	0	0
Steam Electric	0	0	0	0	0	0
Total	**1,116**	**1,292**	**1,324**	**1,349**	**1,374**	**1,400**

5.3.3 Water Conservation Strategies for Region B

Water conservation strategies must be considered for all water users with a projected water supply need prior to additional water management strategies. In Region B, this includes municipal, manufacturing, mining, agricultural water, and steam electric power users. Water conservation strategies will help address the needs through adoption of Advanced Conservation strategies. The water users with needs (firm or safe supply) are identified in Table 5-4.

Table 5-4: WUGs with Needs based on RWPG Adopted Demands

Water User Group	County
Holliday	Archer/Wichita
Lakeside City	Archer
Irrigation	Baylor
Red River Authority	Clay
Bowie	Montague
County-Other	Montague
Nocona	Montague
Saint Jo	Montague
Electra	Wichita
Harrold WSC	Wichita/Wilbarger
Iowa Park	Wichita
Sheppard Air Force Base	Wichita
Wichita Falls	Wichita
Irrigation	Wichita
Manufacturing	Wichita
Steam Electric Power	Wichita
Steam Electric Power	Wilbarger

Conservation strategies to reduce industrial (manufacturing, mining, and steam electric power) water use are typically industry and process-specific and cannot be specified to meet county-wide needs. The region recommends that industrial water users be encouraged to develop and implement site-specific water conservation practices. Wastewater reuse is a more general strategy that can be utilized by various industries for process water, and this strategy will be considered where appropriate.

For municipal and irrigation users, additional conservation savings can potentially be achieved in the region through the implementation of conservation best management practices (BMPs). These additional conservation measures were considered for all municipal water user groups in Region B with a projected need.

Although water conservation and drought management have proven to be effective strategies in Region B, the RWPG believes that water conservation should not be relied upon exclusively for meeting future needs. The region will need to develop additional surface water, groundwater and alternative supplies to meet future needs. However, each entity that is considering developing a new water supply should monitor on-going conservation activities to determine if conservation can delay or eliminate the need for a new water supply project.

The RWPG recognizes that it has no authority to implement, enforce or regulate water conservation and drought management practices. The water conservation practices described in this chapter and elsewhere in this plan are intended only as guidelines. Water conservation strategies determined and implemented by municipalities, water providers, industries or other water users supersede the recommendations in this plan and are consistent with this plan.

Municipal Conservation

Both the water conservation plans and water loss audit reports for water suppliers in Region B were reviewed to help identify appropriate municipal water conservation measures.

A retail public water utility that serves more than 3,300 connections or has obtained financial assistance from the TWDB is required to complete and submit a water loss audit annually by May 1st. Smaller utilities that do not satisfy these requirements may submit an audit every 5 years in coordination with the regional water planning cycle. For these facilities the scheduled audit is for the year 2025 with the audit reports due to the TWDB by May 1, 2026. The TWDB compiles data from these reports. The water audit reporting requirements follow the International Water Association and American Water Works Association Water Loss Control Committee methodology.

The primary purposes of a water loss audit are to account for all the water being used and to identify potential areas where water can be saved. Water audits track multiple sources of water loss that are commonly described as apparent loss and real loss. Apparent loss is water that was used but for which the utility did not receive compensation. Apparent losses are associated with customer meters under-registering, billing adjustment and waivers, and unauthorized consumption. Real loss is water that was physically lost from the system before it could be used, including main breaks and leaks, customer service line breaks and leaks, and storage overflows. The sum of the apparent loss and the real loss make up the total water loss for a utility.

Thirty-nine (39) water providers in Region B have submitted water loss audits since 2015 with some submitting annual reports. Based on these reports, the six-year average (2017 to 2022) percentage of real water loss for Region B is approximately 18 percent.

HB 3605 passed by the 83rd Legislature required the Texas Water Development Board to establish water loss thresholds, to be used in consideration of applications for drinking water projects. The following thresholds were approved by TWDB in February 2023, and apply only to retail public utilities requesting financial assistance for a water supply project after July 1, 2023:

1. For all water utilities, the apparent loss threshold is a system-specific calculation. The calculation includes a customer meter accuracy limit of 94.7 percent and unauthorized consumption and data handling error volumes at the default value.
2. For water utilities with a service connection density of 32 or more connections per mile, the real loss threshold is 30 gallons per connection per day.
3. For water utilities with a service connection density of less than 32 connections per mile, the real loss threshold is 57 gallons per connection per day.

These water loss limits establish a basis for evaluating water loss and setting reasonable water loss reduction targets.

Water Quantity, Reliability and Cost

The water savings associated with municipal conservation vary depending on the potential of the entity's customers to reduce water use. For most water users in Region B, water that is conserved (i.e., not consumed) will further protect the natural resources for future use. The reliability is moderate because this strategy relies on actions of others (customers) and the willingness to change daily behaviors. The suite of recommended strategies focuses on the actions of the water provider, which have shown to be successful in reducing water consumption. The costs are low to moderate for larger entities and high for smaller entities. Much of the higher costs are associated with the leak detection and repair strategy which can reduce water loss.

For smaller entities, major infrastructure replacement associated with the leak detection and repair strategy may not be cost effective compared to system monitoring to identify specific leaks and completing point repairs. Other practices that have shown to have a long-term impact on water conservation include:

- enhanced public school education,
- water conserving rate structure that addresses price elasticity,
- water waste ordinances,
- setting time of day irrigation limits,
- and regional cooperation between utilities to address the need for water conservation.

The Municipal Water Conservation Planning Tool (developed for the TWDB) was used to evaluate this mix of water conservation strategies for a small/medium utility. Implementing these strategies results in a conservation cost of about $400 per acre-foot. Table 5-5 shows the total water savings by provider for each decade and Table 5-6 shows the associated costs for each decade.

Table 5-5: Water Savings by Decade for Municipal Conservation
-Values are in ac-ft/yr-

Water User Group	2030	2040	2050	2060	2070	2080
Bowie	92	123	152	189	230	263
Electra	16	31	45	59	72	86
Harrold WSC	1	2	3	4	5	5
Holliday	11	15	19	23	26	29
Iowa Park	23	47	65	88	111	135
Lakeside City	4	7	10	13	16	18
Montague - County Other	39	79	131	186	248	319
Nocona	45	101	132	172	216	257
Red River Authority of Texas (Clay County)	42	60	68	76	83	91
Saint Jo	13	22	33	46	62	80
Sheppard Air Force Base	20	36	50	70	90	110
Wichita Falls	190	471	760	1,127	1,502	1,883
Total	**496**	**994**	**1,468**	**2,053**	**2,661**	**3,276**

Table 5-6: Annual Cost for Advanced Municipal Conservation by Decade
-Values are in $/yr-

Water User Group	2030	2040	2050	2060	2070	2080
Bowie	$36,800	$49,200	$60,800	$75,600	$92,000	$105,200
Electra	$6,400	$12,400	$18,000	$23,600	$28,800	$34,400
Harrold WSC	$400	$800	$1,200	$1,600	$2,000	$2,000
Holliday	$4,400	$6,000	$7,600	$9,200	$10,400	$11,600
Iowa Park	$9,200	$18,800	$26,000	$35,200	$44,400	$54,000
Lakeside City	$1,600	$2,800	$4,000	$5,200	$6,400	$7,200
Montague - County Other	$15,600	$31,600	$52,400	$74,400	$99,200	$127,600
Nocona	$18,000	$40,400	$52,800	$68,800	$86,400	$102,800
Red River Authority of Texas (Clay County)	$16,800	$24,000	$27,200	$30,400	$33,200	$36,400
Saint Jo	$5,200	$8,800	$13,200	$18,400	$24,800	$32,000
Sheppard Air Force Base	$8,000	$14,400	$20,000	$28,000	$36,000	$44,000
Wichita Falls	$76,000	$188,400	$304,000	$450,800	$600,800	$753,200
Total	**$198,400**	**$397,600**	**$587,200**	**$821,200**	**$1,064,400**	**$1,310,400**

Environmental Factors

Potential environmental impacts associated with municipal conservation should be neutral to positive. Reductions in water use will preserve water for other uses, including potential environmental purposes.

Impacts on Water Resources and Other Water Management Strategies

Impacts to natural resources should be neutral to positive. Conserved water by cities would protect limited groundwater supplies and surface waters for future use. If the water remains in the original source and is not used for other purposes, municipal conservation could help maintain existing water quality of these resources. High use of some water sources can possibly degrade water quality over time.

Impacts on Agriculture and Natural Resources

Impacts to agricultural and natural resources should be neutral to positive. Conserved water by cities could provide additional supplies for agricultural and rural areas.

Other Relevant Factors

There are no known impacts to other water resources and management strategies.

Agricultural Conservation

The agricultural water needs in Region B include livestock and irrigated agriculture. New water supply strategies to meet these needs are limited. Water conservation for livestock is not addressed due to the diffuse nature of providing water supply. Livestock producers implement conservation strategies as an essential practice in maintaining the viability of their operations.

For irrigated agriculture, the primary strategies identified to address irrigation shortages are demand reduction strategies (conservation).

The agricultural water conservation strategies considered include:

- Changes in irrigation equipment or irrigation method
- Crop type changes and crop variety changes
- Conversion from irrigated to dry land farming
- Water loss reduction in irrigation canals

Water loss reduction in irrigation canals was addressed in a special study completed in 2009 as a first phase of the 2011 regional water planning effort. The Wichita County Water Improvement District No. 2 (WCWID#2) Water Conservation Implementation Plan presented the study results. As a major water provider, the details of this effort are addressed in Section 5.4.2. In general, the study indicated that nine of the canals or significant laterals with the greatest water loss could be replaced with pipe to initially achieve 13,034 ac-ft/yr of conservation if fully implemented. Over the last 15 years WCWID#2 has been successful in replacing canal segments with pipe each year. The completed canal conversions have reduced the number of segments remaining to convert and have reduced water use while also reducing system maintenance. Considering the converted segments, the remaining high priority conversions will achieve a total of 10,816 ac-ft/yr in conserved water for the full planning period (2030-2080). It is assumed that 20 percent or 2,163 ac-ft/yr of conservation savings could be achieved in each decade totaling to 10,816 ac-ft/yr by 2070 and then carrying forward to 2080. A total cost of $7,975,000 (September 2023 cost basis) will be required to fully implement the remaining canal conversions.

In addition to these practices, the region encourages research into development of drought-tolerant crops and implementation of a region-wide evapotranspiration and soil moisture monitoring network to aid farmers in irrigation scheduling.

Irrigation conservation is a strategy that proactively causes a decrease in future water needs by increasing the efficiency of current irrigation practices throughout the region. The adoption of irrigation conservation will help preserve the existing water resources for continued agricultural use and provide for other demands. However, without technical and financial assistance it is unlikely that aggressive irrigation conservation programs will be implemented. Also, increased efficiencies may lead to increased water application rates or increased acreage to increase crop yields while utilizing the same volume of water, thereby negating the potential for water savings.

Region B recognizes that it has no authority to implement, enforce, or regulate irrigation conservation practices. These water conservation practices are intended to be guidelines. Water conservations strategies determined and implemented by the individual water user group may supersede the recommendations in this plan and are considered to meet regulatory requirements for consistency with this plan. For purposes of this plan, it is estimated that irrigators will implement such measures that result in a minimum water savings of five percent of the projected water use for counties with identified irrigation shortages. These savings, along with the estimated water savings developed for WCWID#2, are shown in Table 5-7. The conservation quantities shown can be achieved by advances in plant breeding which are estimated to cost $11.00 per acre-foot per year. The total on-farm irrigation conservation cost is shown in Table 5-8. Costs for the WCWID#2 canal replacement are discussed in Section 5.4.2.

Table 5-7: Water Savings by Decade for Irrigation Conservation
-Values are in ac-ft/yr-

WCWID#2 Water Savings from Converting Canals to Pipelines						
County	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Archer	0	0	0	0	0	0
Clay	0	0	0	0	0	0
Wichita	2,163	4,326	6,489	8,625	10,816	10,816
Voluntary On farm Conservation Estimated at 5% of Demand						
County	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Archer	0	0	0	0	0	0
Baylor	254	254	254	254	254	254
Clay	68	68	68	68	68	68
Cottle	216	216	216	216	216	216
Foard	124	124	124	124	124	124
Hardeman	915	915	915	915	915	915
King	12	12	12	12	12	12
Montague	21	21	21	21	21	21
Wichita	1,333	1,333	1,333	1,333	1,333	1,333
Wilbarger	1,337	1,337	1,337	1,337	1,337	1,337
Young	0	0	0	0	0	0
Total	**6,443**	**8,606**	**10,769**	**12,905**	**15,096**	**15,096**

Table 5-8: Annual Cost for On-farm Irrigation Conservation by Decade
-Values are in $/yr-

County	2030	2040	2050	2060	2070	2080
Archer	$0	$0	$0	$0	$0	$0
Baylor	$2,794	$2,794	$2,794	$2,794	$2,794	$2,794
Clay	$748	$748	$748	$748	$748	$748
Cottle	$2,376	$2,376	$2,376	$2,376	$2,376	$2,376
Foard	$1,364	$1,364	$1,364	$1,364	$1,364	$1,364
Hardeman	$10,065	$10,065	$10,065	$10,065	$10,065	$10,065
King	$132	$132	$132	$132	$132	$132
Montague	$231	$231	$231	$231	$231	$231
Wichita	$14,663	$14,663	$14,663	$14,663	$14,663	$14,663
Wilbarger	$14,707	$14,707	$14,707	$14,707	$14,707	$14,707
Young	$0	$0	$0	$0	$0	$0
Total	**$47,080**	**$47,080**	**$47,080**	**$47,080**	**$47,080**	**$47,080**

Mining Conservation

Most of the mining water use in Region B is used in gas production, and the decline in projected future use is associated with the current Barnett Shale activities declining. In accordance with §27.0511 of the Texas Water Code, Region B encourages the use of alternatives to fresh water for oil and gas production whenever it is economically and technically feasible to do so. Furthermore, Region B recognizes the regulatory authority of the Railroad Commission and the TCEQ to determine alternatives to freshwater use in the permitting process.

Oil and gas companies have been actively developing technologies for recycling and reuse of the flow-back water. These activities are a form of conservation, which is a demand management strategy that decreases future water needs by treating and reusing water used in exploration operations. Water conservation and recycling is also possible for sand and gravel mining. As a result, water conservation was considered for all mining operations in Region B.

The amount of water that can be reused/ recycled is dependent on the amount of water that flows back to the surface during and after the completion of the hydraulic fracturing or oil field flooding. The flow back water is of low quality and requires treatment or must be blended with fresh water. During treatment, some of the flow back water is lost. For planning purposes, it is assumed that 25% of projected water demands for mining purposes would be sourced from waters that are not suitable for other demands (such as brackish water) or would be available through flow back and reuse/recycle. Therefore, the anticipated amount of water conservation is equal to 25% of the projected demand.

Conservation of water in mining operations can result in a total savings of 35 ac-ft/yr across the planning period. The mining water savings by county is provided in Table 5-9.

Table 5-9: Mining Water Conservation by Decade
-Values are in ac-ft/yr-

County	2030	2040	2050	2060	2070	2080
Archer	0	0	0	0	0	0
Baylor	3	3	3	3	3	3
Clay	1	1	1	1	1	1
Cottle	2	2	2	2	2	2
Foard	0	0	0	0	0	0
Hardeman	1	1	1	1	1	1
King	1	1	1	1	1	1
Montague	9	9	9	9	9	9
Wichita	11	11	11	11	11	11
Wilbarger	8	8	8	8	8	8
Young	0	0	0	0	0	0
Total	**35**	**35**	**35**	**35**	**35**	**35**

Costs for mining conservation may vary considerably depending upon the proximity to water sources, treatment options available, and other factors. Capital costs are estimated at $10,600 times the maximum annual conservation amount, in ac-ft/yr. Annual costs are assumed to be $3,200 per ac-ft/yr of water conserved with all costs in September 2023 dollars. The costs shown in Table 5-10 are based on treating flow back water using different treatment technologies

Table 5-10: Mining Conservation Costs in Region B by County
-Values are in $/yr-

County	Capital Cost	Annual Costs					
		2030	2040	2050	2060	2070	2080
Archer	$0	$0	$0	$0	$0	$0	$0
Baylor	$27,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000
Clay	$11,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000
Cottle	$16,000	$5,000	$5,000	$5,000	$5,000	$5,000	$5,000
Foard	$0	$0	$0	$0	$0	$0	$0
Hardeman	$13,000	$4,000	$4,000	$4,000	$4,000	$4,000	$4,000
King	$11,000	$3,000	$3,000	$3,000	$3,000	$3,000	$3,000
Montague	$90,000	$27,000	$27,000	$27,000	$27,000	$27,000	$27,000
Wichita	$119,000	$36,000	$36,000	$36,000	$36,000	$36,000	$36,000
Wilbarger	$85,000	$26,000	$26,000	$26,000	$26,000	$26,000	$26,000
Young	$0	$0	$0	$0	$0	$0	$0
Total	**$372,000**	**$112,000**	**$112,000**	**$112,000**	**$112,000**	**$112,000**	**$112,000**

Steam Electric Power Conservation

Wichita and Wilbarger counties are the only counties in Region B with Steam Electric Power needs. The needs in Wichita County can be met with contractual supplies from Wichita Falls. The needs in Wilbarger County however are associated with a decline in the supplies from Lake Kemp. Options for additional sources of supply in Wilbarger County are limited. Previous investigations into local brackish groundwater found that the quantity was limited, and the total dissolved solids (TDS) levels were very high. The most likely option would be to retrofit the facility for alternative cooling technology. Transitioning to this kind of technology is a form of conservation, which is a demand management strategy that decreases future water needs by using alternative sources, such as air for cooling. The Oklaunion Power Station (OPS), in Wilbarger County, ceased operation in 2020. A new green hydrogen facility is planned to begin operation in 2027 at the OPS site and will receive water from Wichita Falls under the current OPS contract. Future demands for Steam Electric Power in Wilbarger County are uncertain. Table 5-11 shows the projected savings from Steam Electric Power Conservation. Capital costs are estimated at $61.3 million in September 2023 dollars.

Table 5-11: Steam Electric Power Conservation Water Savings by Decade
-Values are in ac-ft/yr-

County	2030	2040	2050	2060	2070	2080
Wilbarger	0	0	3,000	3,000	3,000	3,000
Total	**0**	**0**	**3,000**	**3,000**	**3,000**	**3,000**

5.3.4 GPCD Goals

The RWPG recognizes that it has no authority to implement, enforce, or regulate water conservation practices. The water conservation measures outlined in this chapter are intended as guidelines. Local, entity specific conservation strategies and BMPs are consistent with this plan and encouraged by the RWPG. Entity specific recommendations supersede the recommendations in this Plan.

RWPGs are required to recommend GPCD goals for each municipal WUG for each planning decade. It should be noted that these goals are different than the goals set by utilities as part of their water conservation plans. Water conservation plan goals are often based on multi-year averages. GPCD goals in this plan are based on drought conditions to align with TWDB guidance principals, and thus, will generally be higher than the GPCD goal shown in an entity's water conservation plan. GPCD goals for each municipal user Region B are included as Attachment 5-4 at the end of this chapter.

5.3.5 Water Conservation Summary

Water conservation is a demand management strategy that can reduce projected demands and extend the availability of existing supplies. Water conservation strategies have been specifically identified for municipal, irrigation and mining demands. It is expected that conservation strategies will also be adopted by manufacturing and livestock demands, but these have not been quantified. Table 5-12 provides a summary of the conservation savings by decade.

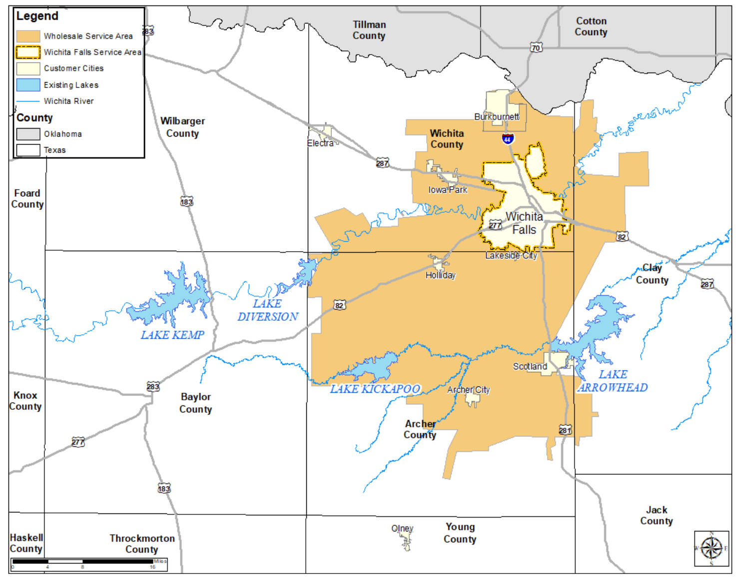
Table 5-12: Summary of Conservation Savings by Water Use
-Values are in ac-ft/yr-

Use	2030	2040	2050	2060	2070	2080
Municipal	496	994	1,468	2,053	2,661	3,276
Irrigation	6,443	8,606	10,769	12,905	15,096	15,096
Mining	35	35	35	35	35	35
SEP	0	0	3,000	3,000	3,000	3,000
Total	**6,974**	**9,635**	**15,272**	**17,993**	**20,792**	**21,407**

5.4 Major Water Providers

There are two major water providers in Region B: Wichita Falls and WCWID#2. Both major providers are projected to have needs within the planning period. Discussion of the water needs and recommended water management strategies for each of the major water providers follows.

5.4.1 Wichita Falls



The City of Wichita Falls is located in the southeastern portion of Wichita County. It is the largest city within a radius of about 100 miles, and the nearby communities and towns share economic and cultural ties to Wichita Falls.

The service area of Wichita Falls is approximately 70 percent of the entire Region B population and the municipal water demand on the Wichita Falls system accounts for approximately 70 percent of the total Region B municipal demand. With the majority of the municipal demand being dependent on Wichita Falls for the next 50 years, it is imperative that water management strategies be identified and evaluated to increase the system reliability.

In 2015 the City developed a Long-Range Water Supply Plan (LRWSP) in response to on-going extreme drought conditions. As part of this plan, Wichita Falls considered 22 potential strategies, then selected 12 for further evaluation. These strategies were evaluated based on several factors including water quantity, water quality, reliability, regulatory requirements, environmental impacts, potential cost, time to implement, development obstacles, supply independence and competition for water supply. Conservation, indirect reuse (IPR), and Lake Ringgold were determined to be the most viable strategies for the City to meet its needs. The remaining alternative strategies were determined to not provide sufficient water to meet the City's projected water need or the water supplies were too uncertain and/or expensive to be considered feasible strategies for Wichita Falls.

The City has since implemented the IPR project which provides up to 8,968 ac-ft/yr (8 MGD) of additional water supply to Lake Arrowhead. The City has an ongoing water conservation program and continues to increase its conservation efforts. Even with these two strategies currently implemented, the City is still projected to have significant water supply shortages if another drought of record occurs. Therefore, the City must pursue the Lake Ringgold project. The recommended water management strategies for Wichita Falls are water conservation and the Lake Ringgold project.

<u>Recommended Strategies:</u>

- Water Conservation
- Lake Ringgold

The costs for these strategies have been adjusted to be consistent with regional planning requirements. Wichita Falls is also supportive of Brush Control which is discussed in Section 0.

Water Conservation

Water Conservation/Efficiency has been a critical drought response strategy for the City of Wichita Falls. Through conservation and drought management, the City was able to reduce its demand by 50 percent during the recent drought. While these measures were critical for demand management during the historic drought experienced in the early 2010s, some are not sustainable for the long-term. Now that the drought has ended, some water efficiency measures have continued, and include:

- Increasing block rate structure
- Municipal irrigation conservation
- Residential outdoor watering schedule
- Prohibition on wasting water

New or expanded measures considered in this strategy include:

- Advanced Metering Infrastructure
- Increased public education and outreach
- Partnership with nonprofit organizations

Water Quantity, Reliability and Cost

For the purposes of this plan it was assumed that Wichita Falls could reduce demand by up to 1,883 ac-ft/yr by 2080 by actively implementing the identified best management practices identified in Section 5.3.3. The City has an active leak detection, repair and pipeline replacement program and it is expected that the City will continue with this program. The amount of additional water savings can vary depending on how proactive the program is at identifying leaks and replacing pipe.

The reliability is moderate because this strategy relies on actions of others (customers) and the willingness to change daily behaviors. The suite of recommended strategies focuses on the actions of Wichita Falls, which have shown to be successful in reducing water consumption for other entities.

As shown in Table 5-6 the estimated annual cost for water conservation ranges from $76,000 ($1.23 per 1,000 gallons) in 2030 up to $753,200 by 2080 (These costs are actually less if cost savings for deferred pumping and treatment are considered).

Environmental Factors

Potential water quality impacts associated with water conservation should be neutral to positive. Reductions in water use should increase the water remaining in the lakes and streams, potentially improving the water quality.

Impacts on Water Resources and other Water Management Strategies

Potential impacts associated with water conservation should be neutral to positive. Reductions in water use may delay implementing new strategies and reduce demands on existing water resources.

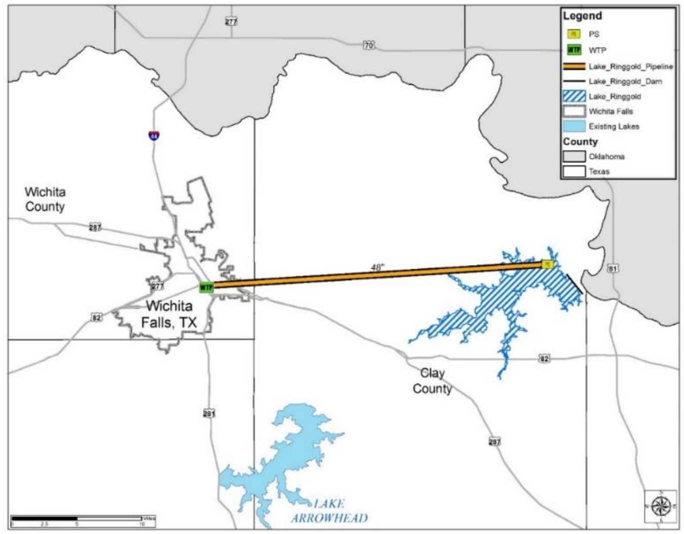
Impacts on Agriculture and Natural Resources

No impacts to agriculture and natural resources were identified.

Other Relevant Factors

There may be a tendency by customers to revert back to water use patterns prior to the drought. It is the goal of this alternative to create a new normal with the same quality of life (reasonable restrictions) while reducing consumption.

Lake Ringgold



Lake Ringgold is a proposed 15,500-acre reservoir site located in Clay County, Texas. The proposed dam would be located on the Little Wichita River, approximately 0.5 miles upstream of its confluence with the Red River and would impound 275,000 acre-feet of water at the normal pool elevation of 844 feet-msl.

This strategy includes construction of the Lake Ringgold dam, intake pump station and a 29-mile pipeline to transport water to Wichita Falls for treatment. Alternatively, Wichita Falls could transport water to Lake Arrowhead for subsequent transmission to Wichita Falls. The recommended strategy supply is based on the safe yield of the reservoir, with 20% of the reservoir capacity as a reserve supply. Supplies were estimated using the 2021 TCEQ Red River WAM.

This reservoir site has been considered a potential water supply source for Wichita Falls since 1958. Wichita Falls applied for a water use permit for the proposed reservoir with TCEQ in 2017. The permit was approved by TCEQ in May 2024.

There have been several studies on the feasibility of this project. The project was studied extensively in the feasibility study conducted in 2013. It was evaluated in the Wichita Falls Long Range Water Supply Plan completed in 2015 and during the water use permit application process. The project has also been included in each Region B water plan since 2006. Information from these previous studies was used as the basis for this evaluation.

<u>Water Quantity, Reliability and Cost</u>

The estimated safe yield for Lake Ringgold using the Red River WAM is approximately 22,300 ac-ft/yr in 2040 decreasing slightly each decade to 19,550 ac-ft/yr in 2080 due to projected sedimentation. The reliability of this water supply would be good. With the reservoir site being downstream of Wichita Falls' existing Little Wichita River lakes (Lakes Arrowhead and Kickapoo), Lake Ringgold would capture any spills from these sources. Based on the WAM hydrology, the drought of record is from 2011-2015.

Of the 15,500 acres of land needed for Lake Ringgold, the City currently owns approximately 6,737 acres. Along with purchasing the remaining lands for the site, additional facilities including a 43 MGD lake intake structure and pump station facilities, and 29 miles of 48" transmission line to convey raw water to existing treatment facilities in Wichita Falls. As shown in the detailed cost estimate provided for the construction of the Lake Ringgold Reservoir, the total capital cost is $560 million with a unit cost of $5.27 per thousand gallons during debt service and $0.70 per thousand gallons after debt service. Now that the water use permit has been approved by TCEQ, it is estimated that it will take approximately 10 - 15 years until Lake Ringgold is complete. About half of this time is estimated for the permitting process.

Environmental Factors

The construction of Lake Ringgold requires a water right permit from the State to impound and divert water from the Little Wichita River. This permit was approved by TCEQ in 2024. It also would require a Section 404 permit from the U.S. Army Corps of Engineers (USACE) to construct the dam. Wichita Falls is initiating the Section 404 permitting process with the Tulsa District of the USACE

This reservoir would be in the same drainage basin as Lake Arrowhead and Lake Kickapoo so it is anticipated that the water quality would be very similar to the existing reservoirs.

Based on the supporting data for the water right application, Lake Ringgold would impact approximately 100 acres of existing open water (small ponds, stock tanks, ox bow lakes, etc.) and approximately 123 miles of streams. At the conservation elevation of 844 feet, approximately 418 acres of wetlands will be impacted. An assessment of threatened and endangered species in the feasibility study found low to no potential to negatively impact any federally listed threatened or endangered species. Only two of the nine state listed species (Texas horned lizard and Texas kangaroo rat) were identified as having a moderate potential to be impacted by Lake Ringgold. The greatest uncertainty associated with Lake Ringgold is cultural resources with the project site located in an area with known American Indian activities. In addition, pump stations and the pipeline into the City would be located to avoid or minimize environmental and cultural impacts.

Impacts on Water Resources and Other Water Management Strategies

Lake Ringgold is near the confluence of the Little Wichita River and the Red River Basin. The impoundment should have minimal impact on other water resources or other water management strategies. The City of Henrietta's intake structure and small lake would be impacted by Lake Ringgold and would be mitigated.

Impacts on Agriculture and Natural Resources

Lake Ringgold would have a moderate impact on both agriculture and rural lands in that approximately 5,750 acres of cultivated crops and grassland could be required for the site. Additional lands would likely need to be acquired for mitigation of the project. Some lands owned by the City have been proposed for mitigation as part of the water right, but additional lands will likely be needed. Other potential mitigation sites have not been identified. For planning purposes, it is assumed that a total of 15,500 acres may be needed. The actual amount may be less.

Other Relevant Factors

Lake Ringgold is highly supported by both retail and wholesale customers of Wichita Falls. These customers recognize that the water is needed to meet the City's needs should another drought similar to that of the 2011-2015 drought or worse occur. Despite this support, there is some local opposition to the project.

Summary of Recommended Strategies for Wichita Falls

The recommended strategies to meet the projected water supply needs for Wichita Falls include water conservation and the Lake Ringgold project. The recommended strategies shown in Table 5-13 could provide 190 acre-feet by the year 2030, with an additional 22,300 acre-feet of supply in 2040 when Lake Ringgold is completed. The available supply from Lake Ringold is projected to decrease to 19,550 ac-ft by 2080 due to sedimentation. Table 5-14 shows the capital and annual cost associated with the recommended water management strategies.

Table 5-13: Recommended Water Management Strategies for Wichita Falls
-Values are in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Wichita Falls Supply Needs	1,528	2,495	3,532	4,454	5,393	6,328
Wichita Falls Wholesale Customer Supply Needs	1,055	1,639	2,246	2,789	3,317	3,850
Total Wichita Falls and Wholesale Customers Supply Need	*2,583*	*4,134*	*5,778*	*7,244*	*8,710*	*10,178*
Wilbarger County Industrial Needs[1]	0	7,561	8,062	8,564	9,066	9,567
Total Wichita Falls Supply Needs	**2,583**	**11,695**	**13,840**	**15,808**	**17,776**	**19,745**
Recommended Strategies						
Water Conservation	190	471	760	1,127	1,502	1,883
Lake Ringgold		22,300	21,613	20,925	20,238	19,550
Total	**190**	**22,771**	**22,373**	**22,052**	**21,740**	**21,433**
Unmet Needs for Wichita Falls Municipal Only	*1,338*	*0*	*0*	*0*	*0*	*0*
Unmet Needs For all Wichita Falls Customers	*2,393*	*0*	*0*	*0*	*0*	*0*

[1]Includes OPS historical demands and proposed green hydrogen facility demands

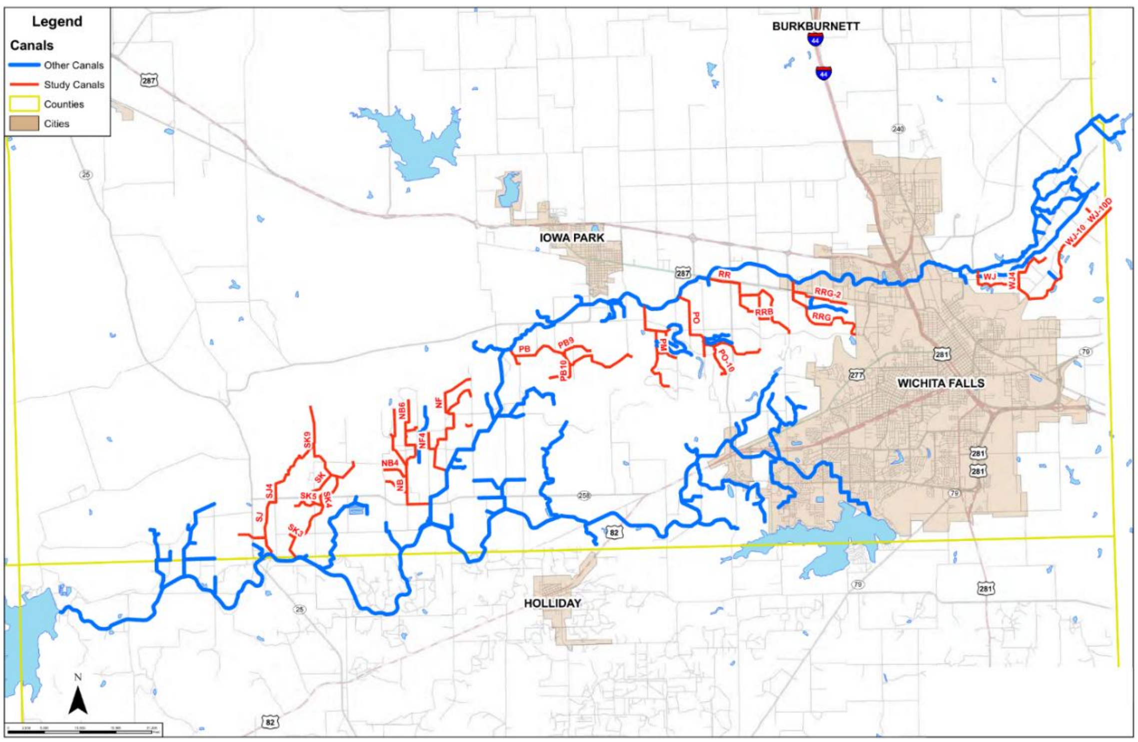
Table 5-14: Cost of Recommended Water Management Strategies for Wichita Falls

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$76,000	$188,400	$304,000	$450,800	$600,800	$753,200
Lake Ringgold	$560 M		$38.3 M	$38.3 M	$17.2 M	$17.2 M	$5.1 M
Total	**$560 M**	**$76,000**	**$38.5 M**	**$38.6 M**	**$17.7 M**	**$17.8 M**	**$5.9 M**

5.4.2 Wichita County Water Improvement District No. 2

WCWID#2 operates a canal system that distributes water from Lake Diversion to farmers in Wichita County, Archer County, and extends slightly into Clay County.

A study was completed in 2009 as part of the first phase of the 2011 regional water planning effort. The study, *Wichita County Water Improvement District No. 2 Water Conservation Implementation Plan,* presented results of an evaluation of the canals in the District. The flow and losses in some canals was measured directly. The direct measurements provided water loss per canal segment or unit length of canal that could then be related to other canals based on canal characteristics: soil type, canal width, and size and type of canal vegetation. The water loss evaluation indicated that nine canal segments, divided into three priority groups, should be considered for conversion to pipelines. The high priority canal segments that were evaluated are included in the figure below.



The costs for conversion of the canals to pipe have been updated to a September 2023 cost basis and the costs along with the water savings are presented in Table 5-15, considering that some segments have been converted since completion of the study.

Table 5-15: Cost and Water Savings for Conversion of Canals to Pipelines

Lateral	Ranking	Water Saved (ac ft/yr)	Capital Cost ($)	Annual Cost ($)	Unit Cost ($/ac ft)
Priority Group A					
PB	1	0 (completed)	$0	$0	$0.00
SJ	2	1,462	$674,000	$50,122	$34.28
RR	3	1,364	$735,000	$54,619	$40.04
NF	4	3,362	$2,325,000	$172,765	$51.39
Subtotal		***6,188***	***$3,734,000***	***$277,506***	***$44.85***
Priority Group B					
WJ	5	691	$847,000	$62,977	$91.14
PO	6	953	$1,175,000	$87,328	$91.64
Subtotal		***1,644***	***$2,022,000***	***$150,305***	***$91.43***
Priority Group C					
RRG	7	1,672	$1,525,000	$113,358	$67.80
SK	8	446	$228,000	$16,956	$38.02
NB	9	866	$466,000	$34,602	$39.96
Subtotal		***2,984***	***$2,219,000***	***$164,916***	***$55.27***
Total		**10,816**	**$7,975,000**	**$592,727**	**$54.80**

An update accounting for completed segments indicates that nine remaining canal segments could be replaced with pipe for a total cost of $7,975,000, saving 10,816 acre-feet/year for the full planning period (2030-2080) at a unit cost of $54.80 per acre-ft. This equates to a savings of approximately 40% of the projected irrigation demand. The water savings would be apportioned to Wichita County since the canals to be replaced are almost exclusively located in Wichita County.

Water Quantity, Reliability and Cost

The water savings associated with irrigation conservation vary depending upon the rate at which canal conversion to pipelines can be accomplished. Once converted, the savings is reliable because the pipelines will remain in service, permanently eliminating the water loss from the canal segments. The average cost is low relative to other strategies.

Environmental Factors

Potential environmental impacts associated with irrigation conservation should be neutral to positive. Reductions in water use will preserve water for other uses, including potential environmental purposes.

Impacts on Water Resources and Other Water management Strategies

Impacts to natural resources should be neutral to positive. Conserved water by irrigation systems would protect limited surface water supplies for future use. If the water remains in the original source and is not used for other purposes, irrigation conservation could help maintain existing water quality of these resources. Excessive depletion of surface water sources can degrade water quality over time due to increased temperatures, leading to more rapid evaporation and concentration of salts.

Impacts on Agriculture and Natural Resources

Impacts to agricultural and natural resources should be neutral to positive. Conserved water could enable agricultural producers greater access to water for irrigation and would improve the natural resources in the vicinity of the water source.

Other Relevant Factors

There are no known impacts to other water resources and management strategies.

Summary of Recommended Strategies for WCWID#2

The recommended strategy to meet the projected water supply needs for WCWID#2 is water conservation through conversion of irrigation canals to pipeline.

As shown in Table 5-16, this strategy could provide 2,163 ac-ft/yr by 2030, and up to 11,072 ac-ft/yr by 2080. Although the projected water supply needs for WCWID#2 exceed the amount of conservation savings from this strategy in all decades, there are no unmet needs for WCWID#2 across the planning period since there are recommended strategies for other WUGs that reduce the water needs for WCWID#2. These include on-farm conservation in Clay and Wichita Counties and the Red River Chloride Control Project. These strategies are not shown in Table 5-16 as recommended strategies for WCWID#2 since they are not the project sponsor, but these strategies do reduce the projected need for WCWID#2 by meeting irrigation demands in Clay and Wichita Counties. Table 5-17 shows the capital and annual cost associated with the recommended water management strategy for WCWID#2.

Table 5-16: Recommended Water Management Strategies for WCWID#2
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Supply Needs	6,181	7,699	9,215	10,733	12,249	13,767
Recommended Strategies						
Canal Conversion to Pipeline	2,163	4,326	6,489	8,625	10,816	10,816

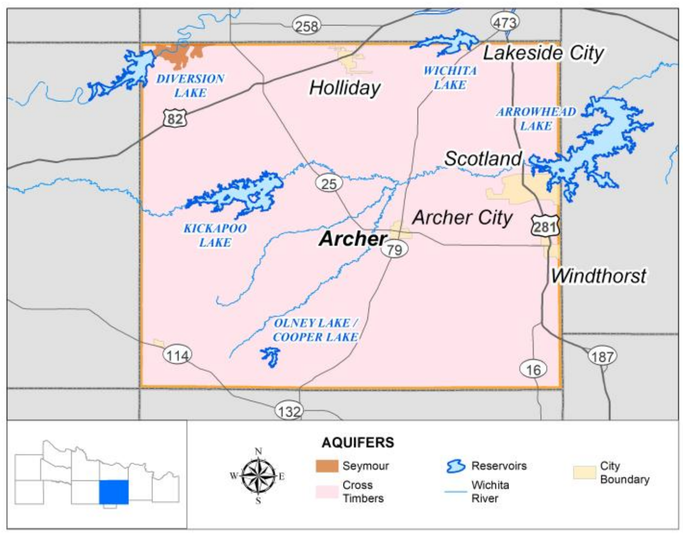
Table 5-17: Cost of Recommended Water Management Strategies for WCWID#2

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Canal Conversion to Pipeline	$7,975,000	$593,000	$593,000	$5,900	$5,900	$5,900	$5,900

5.5 County Summaries & Recommended WMSs

There are ten full counties and one partial county in Region B, of which five (Cottle, Foard, Hardeman, King, and the Region B portion of Young County) show no projected water needs. This subchapter discusses the water issues of each county and outlines the proposed water management strategies to meet the identified needs. For some counties, there are projected shortages that cannot be met through an economically viable project. It is important to remember that economic viability of a project is based on the current understanding of the value of water and that maximum cost that can be paid for water in certain industries such as irrigated agriculture. These assumptions of economic viability may change over time and will be reevaluated in the next plan. These “unmet needs” are also identified, if present, by county. Descriptions of water management strategies that are developed by a major water provider are discussed in Section 5.4 and included in the county summary tables for completeness, as appropriate. Detailed costs are presented in Appendix C, and a summary evaluation matrix is included in Appendix D.

5.5.1 Archer County



Archer County is located in the southeast portion of the Region B planning area. Most of the municipal water supply in Archer County is supplied by Wichita Falls as either treated water or raw water directly from Lakes Arrowhead and Kickapoo. Some local groundwater supplies are used by Baylor County Special Utility District (SUD), County-Other, Livestock, Manufacturing and Mining. The total water supply need in Archer County is 34 ac-ft in 2030 increasing to 92 ac-ft by 2080. Individual water user groups with projected water supply needs and their strategies are listed below. For the municipal water user groups the recommended strategies include water conservation and fulfillment of the existing contracts from Wichita Falls through Wichita Falls’ development of strategies. The evaluation of the recommended strategies for Wichita Falls are discussed in Section 5.4.1.

Holliday

Holliday’s service area includes portions of both Archer and Wichita County. Since the service area is primarily in Archer County, the discussion of their water supply needs, recommended strategies, and costs will be addressed here as part of Archer County. Holliday has a treated water contract with Wichita Falls to supply an average annual supply of 246 ac-ft/yr. The recommended strategies for Holliday include water conservation, fulfillment of the existing contract from Wichita Falls and voluntary transfer of additional water from Wichita Falls.

Recommended Strategies:

- Water Conservation
- Fulfillment of Existing Contract from Wichita Falls - This strategy would provide the full contracted supply from Wichita Falls.
- Voluntary Transfer from Wichita Falls

Summary of Recommended Strategies for Holliday

The recommended strategies for Holliday of water conservation and the existing contract from Wichita Falls are not sufficient to meet all of the water needs, so some additional supply will be voluntarily transferred to fully meet the water needs. Table 5-18 shows the need and recommended strategies to meet that need. Since Holliday has an existing contract with Wichita Falls and the existing infrastructure is sufficient to deliver the full contracted amount, there are no capital or annual costs with the existing contract, however, there will be annual costs associated with voluntary water transfers of raw water at a rate of $4.23 per 1,000 gallons. Table 5-19 shows the annual cost for the recommended strategies.

Table 5-18: Holliday Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	34	45	56	61	68	72
Recommended Strategies						
Water Conservation	11	15	19	23	26	29
Fulfillment of Existing Contract with Wichita Falls		32	44	53	64	73
Voluntary Transfer	23					
Total	**34**	**45**	**56**	**61**	**68**	**73**

Table 5-19: Holliday Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$4,400	$6,000	$7,600	$9,200	$10,400	$11,600
Voluntary Transfer	$0	$31,668	$0	$0	$0	$0	$0
Total	**$0**	**$36,068**	**$6,000**	**$7,600**	**$9,200**	**$10,400**	**$11,600**

Lakeside City

Lakeside City has a treated water contract with Wichita Falls to supply an average annual supply of 184 ac-ft/yr. The recommended strategies for Lakeside City include water conservation and fulfillment of the existing contract from Wichita Falls.

Recommended Strategies:

- Water Conservation
- Fulfillment of Existing Contract from Wichita Falls - This strategy would provide the full contracted supply from Wichita Falls.

Summary of Recommended Strategies for Lakeside City

The recommended strategies for Lakeside City of water conservation and the existing contract from Wichita Falls are sufficient to meet the supply shortages. Table 5-20 shows the need and recommended strategies to meet that need. Since Lakeside City has an existing contract with Wichita Falls and the existing infrastructure is sufficient to deliver the full contracted amount, there are no capital costs or annual costs associated with fulfillment of the contractual obligations. Any water purchased would be under the existing contract. Table 5-21 shows capital cost and the annual cost for the recommended strategies.

Table 5-20: Lakeside City Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	0	0	7	13	16	22
Recommended Strategies						
Water Conservation	4	7	10	13	16	18
Fulfillment of Existing Contract with Wichita Falls		24	32	41	47	55
Total	**4**	**31**	**42**	**54**	**63**	**73**

Table 5-21: Lakeside City Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$1,600	$2,800	$4,000	$5,200	$6,400	$7,200

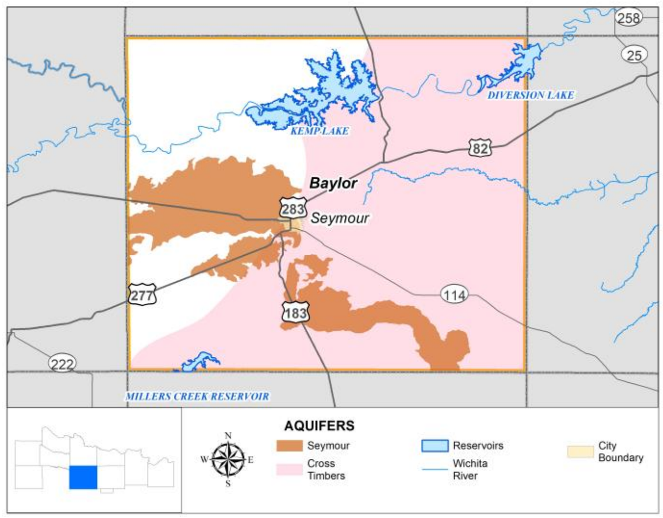
Archer County Summary

The total supply need in Archer County is 34 ac-ft in 2030 increasing to 92 ac-ft by 2080. These needs are associated with insufficient water supplies from Wichita Falls. As Wichita Falls develops its strategies to meet its contractual demands, the municipal water needs will be met. A summary of the recommended strategies for Archer County is shown in Table 5-22.

Table 5-22: Archer County Recommended Strategies Summary

Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Holliday	Water Conservation	29	$1.23	2030
	By Contract	73	NA	2040
	Voluntary Transfer	23	$4.23	2030
Lakeside City	Water Conservation	18	$1.23	2030
	By Contract	55	NA	2040
TOTAL		**198**		
ALTERNATE STRATEGIES – NONE IDENTIFIED				

5.5.2 Baylor County



Baylor County is located in the south central portion of the Region B planning area. Most of the water supply in Baylor County is supplied from the Seymour Aquifer, Other supplies include the Cross Timbers Aquifer, Millers Creek Reservoir, run-of-river supplies, stock ponds, and direct reuse for golf course irrigation. The only identified supply needs for Baylor County are for Irrigation in 2080. The recommended strategies for Irrigation in Baylor County are listed below.

Irrigation – Baylor County

Irrigation is projected to have a supply need of 308 ac-ft by 2080. The shortage is due to limited MAG availability in the Seymour aquifer in 2080. The recommended strategies for irrigation in Baylor County are agricultural water conservation and managed aquifer recharge (MAR) in the Seymour Aquifer. Rolling Plains Groundwater Conservation District (RPGCD) covers Baylor County in Region B and Haskell and Knox Counties in Region G. RPGCD manages groundwater supplies within these three counties. The majority of the groundwater supplies within the district are located in the Seymour Aquifer. RPGCD is planning to develop several MAR projects to capture stormwater runoff and allow it to recharge into the Seymour Aquifer. One of the identified MAR sites is located in Baylor County approximately 3.5 miles northwest of the City of Seymour. The proposed MAR would include construction of a large detention basin to capture stormwater runoff and an infiltration trench to facilitate infiltration into the aquifer. The estimated completion date for the project is in 2035, so the additional water supply associated with this strategy would be available by the 2040 planning decade. It is estimated that the MAR project could supply up to 4,500 ac-ft/yr of additional recharge to the Seymour Aquifer. This would provide additional supply that could be used for irrigation in Baylor County to meet their projected water supply needs in 2080.

Recommended Strategies:

- Water Conservation
- Managed Aquifer Recharge (RPGCD)

Summary of Recommended Strategies for Irrigation – Baylor County

The recommended strategies for irrigation in Baylor County of water conservation and MAR are sufficient to meet the projected water needs as shown in Table 5-23. The capital cost and the annual cost for the recommended strategies are shown in Table 5-24.

Table 5-23: Irrigation – Baylor County Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	0	0	0	0	0	308
Recommended Strategies						
Water Conservation	254	254	254	254	254	254
Managed Aquifer Recharge		4,500	4,500	4,500	4,500	4,500
Total	**254**	**4,754**	**4,754**	**4,754**	**4,754**	**4,754**

Table 5-24: Irrigation – Baylor County Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$2,794	$2,794	$2,794	$2,794	$2,794	$2,794
Managed Aquifer Recharge	$2.64 M		$205,000	$205,000	$19,000	$19,000	$19,000
Total	**$2.64 M**	**$2,794**	**$207,794**	**$207,794**	**$21,794**	**$21,794**	**$21,794**

Baylor County Summary

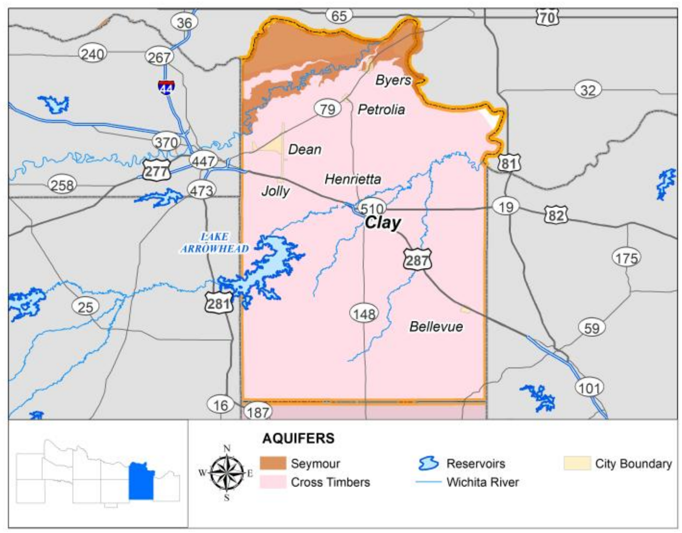
Water supply needs for Baylor County begin in 2080 when there is a 308 ac-ft/yr need for irrigation. This need is associated with limited MAG availability in the Seymour Aquifer in 2080. The recommended strategies to meet this need in 2080 include conservation and Managed Aquifer Recharge. A summary of the recommended strategies for Baylor County is shown in Table 5-25.

Table 5-25: Baylor County Recommended Strategies Summary

Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Irrigation	Water Conservation	254	$0.03	2030
	Managed Aquifer Recharge	4,500	$0.14	2040
TOTAL		**4,754**		
ALTERNATE STRATEGIES – NONE IDENTIFIED				

5.5.3 Clay County

Clay County is located in the eastern portion of the Region B planning area. The water supply in Clay County is supplied from a variety of sources including the Seymour Aquifer, Cross-Timbers Aquifer, run-of-river supplies, stock ponds, and contracts with Wichita Falls. The total water supply need in Clay County is 108 ac-ft in 2030 increasing to 189 ac-ft by 2080. The only WUG with identified needs in Clay County is Red River Authority (RRA). The recommended strategies for RRA in Clay County are listed below.



Red River Authority

RRA purchases treated water from Wichita Falls and provides distribution to rural Clay County customers adjacent to Lake Arrowhead. RRA is expected to have a need of 108 ac-ft in 2030 increasing to 189 ac-ft by 2080. RRA has a contract to purchase up to 417 ac-ft/yr of treated water from Wichita Falls. RRA previously purchased raw water from Wichita Falls and treated the water at their own water treatment plant (WTP) but no longer uses the WTP after negotiating their contract to purchase treated water from Wichita Falls. The recommended strategies for RRA include water conservation, water loss reduction through pipeline replacement, and fulfillment of the existing contract from Wichita Falls. More information about the RRA pipeline replacement projects can be found in Section 5.5.12.

<u>Recommended Strategies:</u>

- Water Conservation
- Water Loss Reduction
- Fulfillment of Existing Contract from Wichita Falls - This strategy would provide the full contracted supply from Wichita Falls.

Summary of Recommended Strategies for RRA – Clay County

The recommended strategies for RRA of water conservation, water loss reduction, and fulfillment of the existing contract with Wichita Falls are sufficient to meet the supply shortages. Table 5-26 shows the need and recommended strategies to meet that need. Since RRA has an existing contract with Wichita Falls and the existing infrastructure is sufficient to deliver the full contracted amount, there are no capital costs or annual costs associated with fulfillment of the contractual obligations. However, there will be annual costs associated with water conservation and water loss reduction through pipeline replacement. Table 5-27 shows capital cost and the annual cost for the recommended strategies.

Table 5-26: Red River Authority – Clay County Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	108	125	142	159	175	189
Recommended Strategies						
Water Conservation	42	60	68	76	83	91
Water Loss Reduction	103	103	103	103	103	103
Fulfillment of Existing Contract with Wichita Falls		54	73	91	108	124
Total	**145**	**217**	**244**	**270**	**294**	**318**

Table 5-27: Red River Authority – Clay County Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$16,800	$24,000	$27,200	$30,400	$33,200	$36,400
Water Loss Reduction	$426,000	$33,000	$33,000	$3,000	$3,000	$3,000	$3,000
Total	**$426,000**	**$49,800**	**$57,000**	**$30,200**	**$33,400**	**$36,200**	**$39,400**

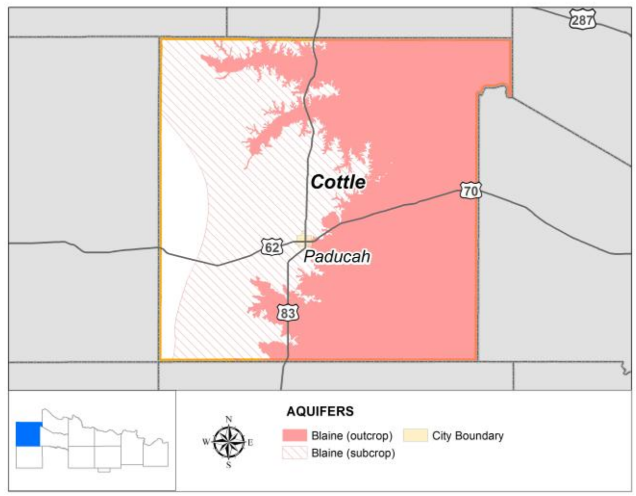
Clay County Summary

The total supply need in Clay County is 108 ac-ft in 2030 increasing to 189 ac-ft by 2080. These needs are associated with insufficient water supplies from Wichita Falls to meet demands for RRA – Clay County. The projected needs will be met through water conservation, and fulfillment of the existing contract from Wichita Falls. A summary of the recommended strategies for Clay County is shown in Table 5-28.

Table 5-28: Clay County Recommended Strategies Summary

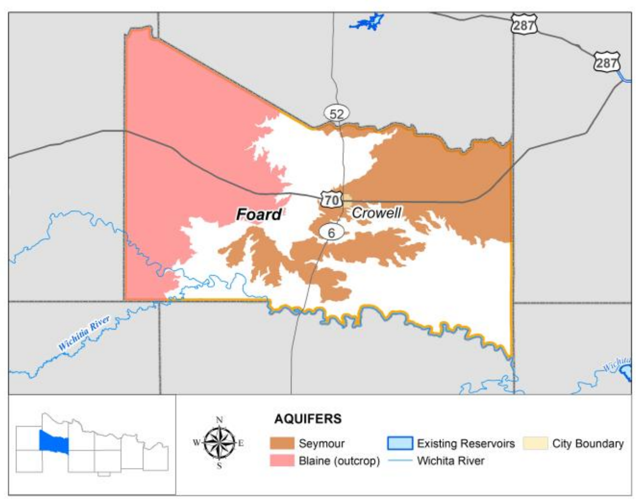
Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Red River Authority	Water conservation	91	$2.15	2030
	Water Loss Reduction	103	$0.99	2030
	By Contract	124	#N/A	2040
TOTAL		**318**		
ALTERNATE STRATEGIES – NONE IDENTIFIED				

5.5.4 Cottle County



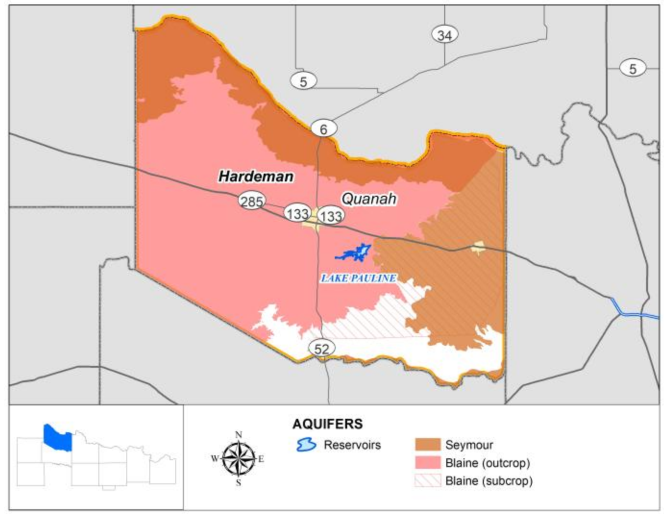
Cottle County is located in the far western portion of the Region B planning area. The water supply in Cottle County is primarily groundwater from the Blaine Aquifer and other local aquifers. Some supplies for irrigation and livestock are from run-of-river supplies or stock ponds. There are no identified needs in Cottle County during the planning period.

5.5.5 Foard County



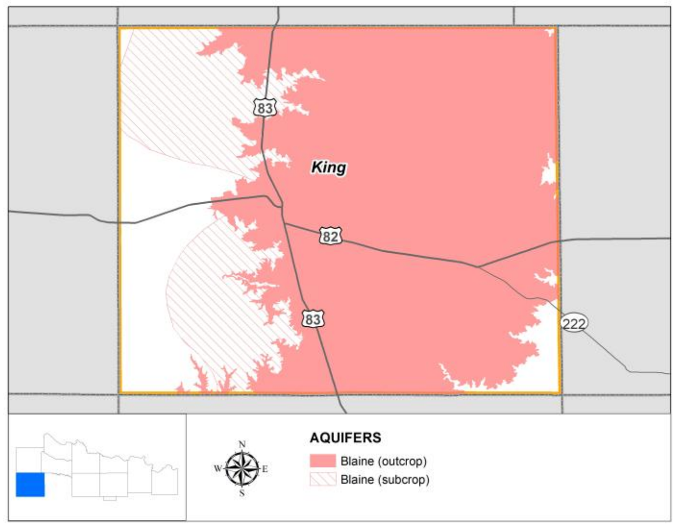
Foard County is located in the central portion of the Region B planning area. The water supply in Foard County is obtained from a variety of sources including Greenbelt Reservoir, the Seymour aquifer, the Blaine aquifer, the Ogallala Aquifer, other local aquifers, and stock ponds. There are no identified needs in Foard County during the planning period.

5.5.6 Hardeman County



Hardeman County is located in the northeastern portion of the Region B planning area. The water supply in Hardeman County is supplied from a variety of sources including Greenbelt Reservoir, the Seymour aquifer, the Blaine aquifer, the Ogallala Aquifer, other local aquifers, run-of-river, and stock ponds. There are no identified needs in Hardeman County during the planning period.

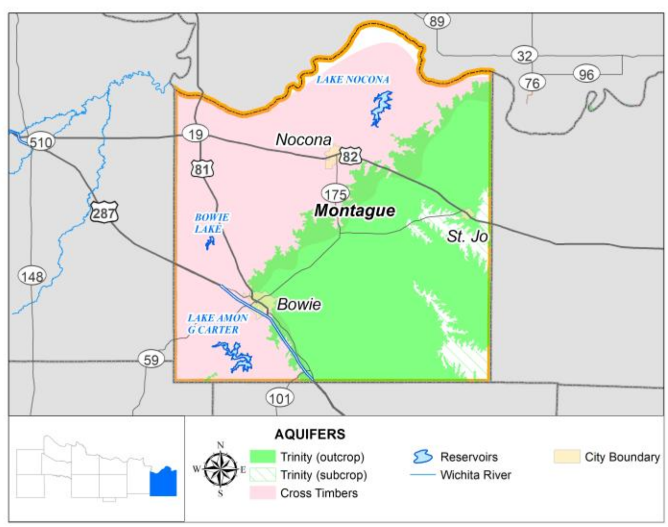
5.5.7 King County



King County is located in the southwestern portion of the Region B planning area. The water supply in King County is supplied from the Blaine aquifer, other local aquifers, and stock ponds. There are no identified needs in King County during the planning period.

5.5.8 Montague County

Montague County is located in the northeast portion of the Region B planning area. The water supply in Montague County is from a variety of sources including Lake Amon Carter, Lake Nocona, the Trinity Aquifer, the Cross-Timbers Aquifer, run-of-river, stock ponds, and direct reuse. The county is projected to experience the highest population growth in the region over the planning period (66%). For several WUGs in the county, projected demand exceeds available supplies, resulting in supply shortages. The total water supply need in Montague County is 874 ac-ft in 2030 increasing to 3,723 ac-ft by 2080. Individual water user groups and their strategies are listed below.



Bowie

Bowie is expected to have water supply needs beginning in 2030 and continuing through 2080. Bowie's sole waters supply source is Lake Amon Carter and their projected need is due to insufficient safe water supply availability in the reservoir to meet their projected demands. The recommended strategies for Bowie are municipal conservation, and indirect potable reuse (IPR).

Recommended Strategies:

- Water Conservation
- Indirect Potable Reuse

Summary of Recommended Strategies for Bowie

Table 5-29 shows the projected water supply need and recommended strategies to meet that need. Along with conservation, an indirect wastewater reuse project is proposed which could provide up to 700 ac-ft/yr of additional water supply from their wastewater treatment plant location north of Lake Amon Carter. The projected IPR supply for each decade was estimated as 40% of the projected municipal demand, which is a widely accepted method for estimating available wastewater return flow volumes for reuse strategies. The indirect reuse project includes an 8-inch pipeline from the existing wastewater treatment plant to Lake Amon Carter where it will be blended in the lake. Additional water treatment will be needed with a 0.63 MGD water treatment plant expansion. Treated water will then be provided using the existing distribution system. Table 5-30 shows the capital cost and the annual cost for the recommended strategies.

Table 5-29: Bowie Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	363	536	714	894	1,073	1,251
Recommended Strategies						
Water Conservation	92	123	152	189	230	263
Indirect Potable Reuse	510	550	590	620	660	700
Total	**602**	**673**	**742**	**809**	**890**	**963**
Unmet Needs				*85*	*183*	*288*

Table 5-30: Bowie Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$36,800	$49,200	$60,800	$75,600	$92,000	$105,200
Indirect Potable Reuse	$13 M	$1.47 M	$1.47 M	$526,000	$526,000	$526,000	$526,000
Total	**$13 M**	**$1.51 M**	**$ 1.52 M**	**$586,800**	**$601,600**	**$618,000**	**$631,200**

Montague County-Other

Montague County-Other includes five public water systems that do not qualify as individual WUGs and the remaining municipal water users in Montague County that are not supplied by a public water system. The five systems include: Forestburg WSC, Custom Water - Montague Water System, Custom Water - Oak Shores System, Amon Carter Lake WSC, and Patterson Water Supply – Sunset Water System. Montague County-Other uses water supply from various sources including Lake Amon Carter, Lake Nocona, the Trinity Aquifer, and the Cross-Timbers Aquifer. Supplies from Lakes Amon Carter and Nocona are limited by their projected safe yields. Montague County-Other is expected to have water supply needs beginning in 2030 and continuing through 2080. Some of these needs can be met through conservation efforts. The remaining needs can be met through the development of additional groundwater supplies from both the water systems included in County-Other and individual residential wells. This strategy would include each of the five water systems developing up to two new wells with associated infrastructure to store, transport, and connect the additional water to their existing distribution systems. To meet the needs of the remaining County-Other population that is not supplied by an existing water system, individual residential water supply wells will be developed as needed. It is estimated that a total of approximately 1,100 individual wells will need to be developed. Between the new public water supply wells and individual residential wells, this strategy would provide a sufficient amount of new water supply to meet the projected needs for Montague County-Other.

Recommended Strategies:

- Water Conservation
- Develop additional groundwater supplies

Summary of Recommended Strategies for Montague County-Other

Table 5-31 shows the projected water supply need and recommended strategies to meet that need. Along with conservation, a strategy to develop additional groundwater supplies is proposed which could provide over 1,600 ac-ft/yr of additional water supply in 2080. Table 5-32 shows the capital cost and the annual cost for the recommended strategies.

Table 5-31: Montague County-Other Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	511	725	948	1,170	1,392	1,614
Recommended Strategies						
Water Conservation	39	79	131	186	248	319
Additional Groundwater Supplies	474	649	822	989	1,156	1,305
Total	**513**	**728**	**953**	**1,175**	**1,404**	**1,624**

Table 5-32: Montague County-Other Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$15,600	$31,600	$52,400	$74,400	$99,200	$127,600
Additional Groundwater Supplies	$97 M	$394,000[1]	$525,000	$475,000	$502,000	$555,000	$582,000
Total	**$97 M**	**$409,600**	**$556,600**	**$527,400**	**$576,400**	**$654,200**	**$709,600**

[1] Only annual costs for public water supply wells are included. UCM is not appropriate for estimating annual costs of individual residential wells.

Nocona

Nocona is expected to have water supply needs beginning in 2040 and continuing through 2080. Nocona's primary water supply source is Lake Nocona where they hold a water right for up to 1,080 ac-ft/yr. They also have a groundwater well that is used as a backup water supply that is permitted for up to 92 ac-ft/yr. Supplies from Lake Nocona and groundwater are sufficient to meet Nocona's water supply needs through 2030, but there is an expected water supply shortage beginning in 2040. To meet these needs, the recommended strategies for Nocona are water conservation and development of additional groundwater supplies. Water conservation can meet the projected water supply needs in 2040, but additional water supply would needed beginning in 2050. Additional groundwater wells could be developed along Nocona's existing raw water line connecting Lake Nocona to the City. This additional water supply could be blended with the water supply from Lake Nocona and treated at the City's existing WTP. One new well could be developed in 2050, a second new well in 2060, and a third new well in 2080. Each well could provide approximately 145 ac-ft/yr for a combined supply of approximately 436 ac-ft/yr in 2080.

Recommended Strategies:

- Water Conservation
- Develop additional groundwater supplies

Summary of Recommended Strategies for Nocona

Table 5-33 shows the projected water supply need and recommended strategies to meet that need. Along with conservation, a project to develop additional groundwater supplies is proposed which could provide up to 436 ac-ft/yr of additional water supply.

Table 5-34 shows the capital cost and the annual cost for the recommended strategies.

Table 5-33: Nocona Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	0	58	199	340	482	623
Recommended Strategies						
Water Conservation	45	101	132	172	216	257
Additional Groundwater Supplies			145	290	290	436
Total	**45**	**101**	**277**	**462**	**506**	**693**

Table 5-34: Nocona Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$18,000	$40,400	$52,800	$68,800	$86,400	$102,800
Additional Groundwater Supplies	$4.17 M			$118,000	$236,000	$139,000	$159,000
Total	**$4.17 M**	**$18,000**	**$40,400**	**$170,800**	**$304,800**	**$225,400**	**$261,800**

Saint Jo

Saint Jo is expected to have water supply needs beginning in 2040 and continuing through 2080. Saint Jo uses water supply from the Trinity Aquifer. The total production capacity of their current wells is estimated to be 308 ac-ft/yr. This current supply is sufficient to meet their projected water demands through 2030, but there is an expected water supply shortage beginning in 2040. To meet these needs, the recommended strategies for Saint Jo are water conservation and development of additional groundwater supplies. Conservation can meet the projected needs in 2040, but additional groundwater supplies are needed to meet the remaining needs after conservation in 2050 and beyond. The recommended strategy would be to drill one additional well in 2050 which would supply approximately 145 ac-ft/yr, then drill an additional well in 2080 to provide another 145 ac-ft/yr for a total of 290 ac-ft/yr in 2080. The strategy would include the associated infrastructure to store, transport, and connect the additional water to their existing distribution system.

Recommended Strategies:

- Water Conservation
- Develop additional groundwater supplies

Summary of Recommended Strategies for Saint Jo

Table 5-35 shows the projected water supply need and recommended strategies to meet that need. Along with conservation, a project to develop additional groundwater supplies is proposed which could provide up to 290 ac-ft/yr of additional water supply. Table 5-36 shows the capital cost and the annual cost for the recommended strategies.

Table 5-35: Saint Jo Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	0	15	70	125	180	235
Recommended Strategies						
Water Conservation	13	22	33	46	62	80
Additional Groundwater Supplies			145	145	145	290
Total	**13**	**22**	**178**	**191**	**207**	**370**

Table 5-36: Saint Jo Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$5,200	$8,800	$13,200	$18,400	$24,800	$32,000
Additional Groundwater Supplies	$4.47 M			$196,000	$196,000	$39,000	$235,000
Total	**$4.47 M**	**$5,200**	**$8,800**	**$209,200**	**$214,400**	**$63,800**	**$267,000**

Montague County Summary

The total water supply need in Montague County is 874 ac-ft in 2030 increasing to 3,723 ac-ft by 2080. A summary of the recommended strategies for Montague County is shown on Table 5-37.

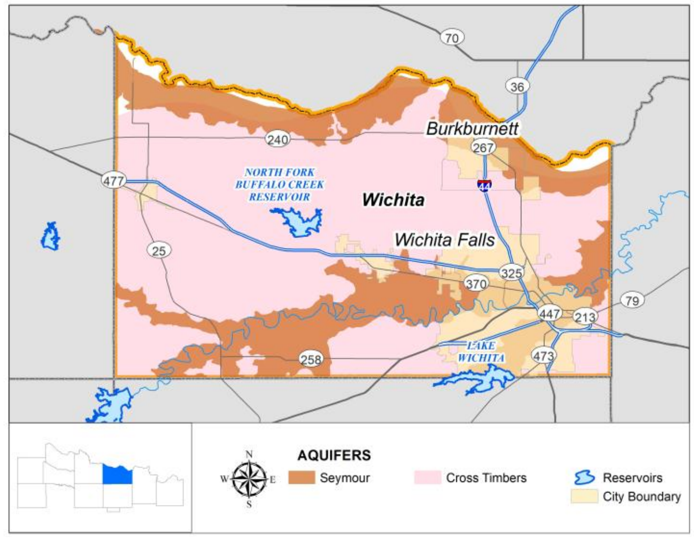
Table 5-37: Montague County Recommended Strategies Summary

Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Bowie	Water Conservation	263	$1.23	2030
	Indirect Potable Reuse	700	$8.85	2030
County-Other	Water Conservation	319	$1.23	2030
	Additional Groundwater Development	1,305	N/A[1]	2030
Nocona	Water Conservation	257	$1.23	2030
	Additional Groundwater Development	436	$1.50	2050
Saint Jo	Water Conservation	80	$1.23	2030
	Additional Groundwater Development	290	$4.16	2050
TOTAL		**3,650**		
ALTERNATE STRATEGIES – NONE IDENTIFIED				

[1]Cost for Montague County-Other additional GW development strategy includes both public supply and residential wells which have different annual cost assumptions. Therefore, it is not applicable to estimate a combined annual cost per 1,000 gal for this strategy.

5.5.9 Wichita County

Wichita County is located in the north central portion of the Region B planning area. Most of the municipal water supply in Wichita County is supplied by Wichita Falls. Irrigation supplies are provided from Lakes Kemp/Diversion through a series of canals and pipelines owned and operated by WCWID#2. Some Seymour Aquifer and Cross-Timber Aquifer supplies are used by municipal users, irrigation, livestock, manufacturing and mining. Direct non-potable reuse supplies are used by the City of Burkburnett for municipal irrigation and by manufacturing. The total water supply need in Wichita County is 6,781 ac-ft in 2030 increasing to 19,773 ac-ft by 2080. Individual water user groups and their strategies are listed below.



Electra

Electra has a pass-through contract with Iowa Park to receive 841 ac-ft/yr of treated water from Wichita Falls. It also has a groundwater well field in the Seymour aquifer, which is used during drought. Electra is expected to have water supply needs beginning in 2030 and continuing through 2080. The recommended strategies for Electra include water conservation, fulfillment of the existing contract from Wichita Falls, and voluntary transfer of additional water from Wichita Falls.

<u>Recommended Strategies:</u>

- Water Conservation
- Fulfillment of Existing Contract from Wichita Falls - This strategy would provide the full contracted supply from Wichita Falls.
- Voluntary Transfer from Iowa Park (Wichita Falls contract)

Summary of Recommended Strategies for Electra

The recommended strategies for Electra of water conservation, fulfillment of the existing contract with Wichita Falls, and voluntary transfer of additional water from Wichita Falls through Iowa Park, are sufficient to meet the supply shortages. Table 5-37 shows the need and recommended strategies to meet that need. Since Electra has an existing contract with Wichita Falls and the existing infrastructure is sufficient to deliver the full contracted amount, there are no capital costs or annual costs associated with fulfillment of the contractual obligations. However, there will be annual costs associated with voluntary water transfers at a rate of $4.23 per 1,000 gallons. Table 5-39 shows capital cost and the annual cost for the recommended strategies.

Table 5-38: Electra Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	152	187	224	260	294	327
Recommended Strategies						
Water Conservation	16	31	45	59	72	86
Fulfillment of Existing Contract with Wichita Falls		108	147	183	217	241
Voluntary Transfer from Iowa Park (Wichita Falls Contract)	136	48	32	18	5	
Total	**152**	**187**	**224**	**260**	**294**	**327**

Table 5-39: Electra Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$6,400	$12,400	$18,000	$23,600	$28,800	$34,400
Voluntary Transfer from Iowa Park (Wichita Falls Contract)	$0	$187,255	$66,090	$44,060	$24,784	$6,884	$0
Total	**$0**	**$193,655**	**$78,490**	**$62,060**	**$48,384**	**$35,684**	**$34,400**

Harrold WSC

Harrold WSC's service area includes portions of both Wichita and Wilbarger County. Since the service area is primarily in Wilbarger County, the discussion of their water supply needs, recommended strategies, and costs will be addressed as part of Wilbarger County.

Holliday

Holliday's service area includes portions of both Archer and Wichita County. Since the service area is primarily in Archer County, the discussion of their water supply needs, recommended strategies, and costs will be addressed as part of Archer County.

Iowa Park

Iowa Park has a treated water contract with Wichita Falls to supply 1,401 ac-ft/yr directly to Iowa Park, 841 ac-ft/yr to Electra, and 675 acre-feet to Wichita Valley WSC. Iowa Park also provides water to Horseshoe Bend Estates (included in Wichita County-Other) and manufacturing in Wichita County. Iowa Park is expected to have water supply needs beginning in 2050 and continuing through 2080. The recommended strategies for Iowa Park include water conservation and fulfillment of the existing contract from Wichita Falls.

<u>Recommended Strategies:</u>

- Water Conservation
- Fulfillment of Existing Contract from Wichita Falls - This strategy would provide the full contracted supply from Wichita Falls.

Summary of Recommended Strategies for Iowa Park

The recommended strategies for Iowa Park of water conservation and fulfillment of the existing contract with Wichita Falls are sufficient to meet the supply shortages. Table 5-40 shows the need and recommended strategies to meet that need. Since Iowa Park has an existing contract with Wichita Falls and the existing infrastructure is sufficient to deliver the full contracted amount, there are no capital costs or annual costs associated with fulfillment of the contractual obligations. Table 5-41 shows capital cost and the annual cost for the recommended strategies.

Table 5-40: Iowa Park Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	0	0	42	99	154	209
Recommended Strategies						
Water Conservation	23	47	65	88	111	135
Fulfillment of Existing Contract with Wichita Falls		179	246	305	363	420
Total	**23**	**226**	**311**	**393**	**474**	**555**

Table 5-41: Iowa Park Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$9,200	$18,800	$26,000	$35,200	$44,400	$54,000

Sheppard Air Force Base

Sheppard Air Force Base (AFB) is a United States Air Force Base located within the northern city limits of Wichita Falls. While Sheppard AFB is considered as a separate WUG for regional planning, the base is located within the Wichita Falls city limits and receives water from Wichita Falls. They do not have a set contract amount and Wichita Falls is obligated to meet their water demands similar to the City's other retail customers. Sheppard AFB is expected to have water supply needs beginning in 2030 and continuing through 2080. The recommended strategies for Sheppard AFB include water conservation and additional water supply from Wichita Falls.

Recommended Strategies:

- Water Conservation
- Additional water supply from Wichita Falls.

Summary of Recommended Strategies for Sheppard AFB

The recommended strategies for Sheppard AFB of water conservation and additional water supply from Wichita Falls are sufficient to meet the supply shortages. Table 5-42 shows the need and recommended strategies to meet that need. Since Sheppard AFB currently receives water from Wichita Falls and the existing infrastructure is sufficient to deliver the water supply required to meet their projected demands, there are no capital costs or annual costs associated with receiving additional water supply from Wichita Falls. Table 5-43 shows capital cost and the annual cost for the recommended strategies.

Table 5-42: Sheppard AFB Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	89	137	188	232	277	321
Recommended Strategies						
Water Conservation	20	36	50	70	90	110
Additional Water Supply from Wichita Falls	69	101	138	162	187	211
Total	**89**	**137**	**188**	**232**	**277**	**321**

Table 5-43: Sheppard AFB Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$8,000	$14,400	$20,000	$28,000	$36,000	$44,000

Wichita Falls

Wichita Falls supplies water to its municipal customers with the City's water service area and to their wholesale customers in the region. A detailed discussion of the recommended strategies for Wichita Falls is included in Section 5.4.1.

Irrigation – Wichita County

Irrigation in Wichita County is expected to have water supply needs beginning in 2030 and continuing through 2080. Much of this need is associated with limited safe supplies from the Lake Kemp/Diversion system. Strategies developed by the WCWID#2 to reduce losses through converting irrigation canals to pipelines will provide additional water to irrigation users of this system. Another strategy that would increase the availability of water supply in the Lake Kemp/Diversion System is the Red River Chloride Control Project (CCP). The recommended strategies for irrigation in Wichita County are agricultural conservation and the Red River CCP. Agricultural conservation is discussed in Section 5.4.2 as part of the recommended strategies for WCWID#2. Agricultural conservation for Irrigation in Wichita County includes WCWID#2 canal replacement and on-farm conservation savings. The Red River CCP is discussed in Section 5.5.12.

Recommended Strategies:

- Water Conservation
- Red River Chloride Control Project

Summary of Recommended Strategies for Irrigation – Wichita County

The recommended strategies for irrigation in Wichita County are agricultural conservation and the Red River CCP. Table 5-44 shows the need and recommended strategies to meet that need. The capital cost and the annual cost for the irrigation canal replacement project for WCWID#2 are shown in Section 5.4.2. Costs for the Red River CCP are discussed in Section 5.5.12.

Table 5-44: Irrigation – Wichita County Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	5,007	6,491	7,974	9,458	10,942	12,426
Recommended Strategies						
Water Conservation	3,496	5,659	7,822	9,958	12,149	12,149
Chloride Control Project	6,580	6,096	5,612	5,128	4,644	4,160
Total	**10,076**	**11,755**	**13,434**	**15,086**	**16,793**	**16,309**

Manufacturing – Wichita County

Water supplies for manufacturing in Wichita County come from several different sources including direct sales from Wichita Falls, sales from wholesale customers of Wichita Falls (Burkburnett and Iowa Park), the Seymour Aquifer, and direct reuse sales from both Wichita Falls and Iowa Park. Manufacturing in Wichita County is expected to have water supply needs beginning in 2050 and continuing through 2080. The projected water supply needs could be met through voluntary transfer of additional supplies from Wichita Falls. While there are site specific and unique opportunities for water conservation in the manufacturing sector, a specific water conservation goal is not established. The region encourages all water users to conserve water.

Recommended Strategies:

- Voluntary transfer from Wichita Falls.

Summary of Recommended Strategies for Manufacturing - Wichita County

Table 5-45 shows the need and recommended strategies to meet that need. The recommended strategies for manufacturing in Wichita County are fulfillment of existing contracts with Wichita Falls wholesale customers and voluntary transfer of additional water supply from Wichita Falls. There are no capital costs or annual costs associated with fulfillment of the contractual obligations with Wichita Falls wholesale customers. There will be annual costs associated with voluntary water transfers at a rate of $4.23 per 1,000 gallons. Table 5-46 shows capital cost and the annual cost for the recommended strategies.

Table 5-45: Manufacturing – Wichita County Needs and Recommended Strategies -Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	0	0	4	49	95	146
Recommended Strategies						
Voluntary Transfer from Wichita Falls			4	49	95	146

Table 5-46: Manufacturing – Wichita County Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Voluntary Transfer from Wichita Falls	$0			$5,508	$67,467	$130,803	$201,024

Steam Electric Power – Wichita County

Water supplies for Steam Electric Power (SEP) in Wichita County are provided by Wichita Falls. SEP in Wichita County is expected to have water supply needs beginning in 2040 and continuing through 2080. These needs are associated with limited water supply availability from Wichita Falls. These needs will be met by Wichita Falls once they develop the recommended strategies to meet their needs as a MWP. The recommended strategies for SEP in Wichita County are additional water supplies from Wichita Falls and water conservation. While a specific water conservation target for SEP is not established, it is recognized that this use category may be able to identify unique water conservation opportunities. The region encourages all water users to conserve water.

<u>Recommended Strategies:</u>

- Additional water supply from Wichita Falls.

Summary of Recommended Strategies for SEP - Wichita County

The recommended strategy for SEP - Wichita County of receiving additional water supply from Wichita Falls is sufficient to meet the supply shortages. Table 5-47 shows the need and recommended strategy to meet that need. Since SEP in Wichita County currently receives water from Wichita Falls and the existing infrastructure is sufficient to deliver the water supply required to meet their projected demands, there are no capital costs or annual costs associated with receiving additional water supply from Wichita Falls.

Table 5-47: SEP – Wichita County Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs		3	4	5	5	6
Recommended Strategies						
Additional Water Supply from Wichita Falls		3	4	5	5	6

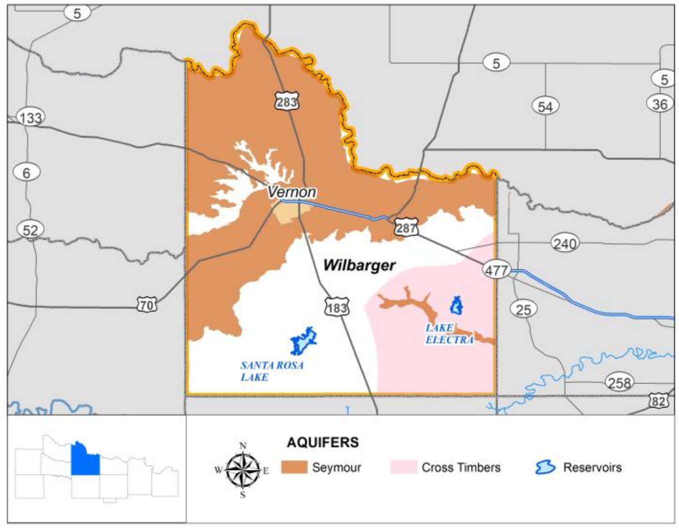
Wichita County Summary

The total water supply need in Wichita County is 6,781 ac-ft in 2030 increasing to 19,773 ac-ft by 2080. Most of the needs in the county will be met through strategies developed by Wichita Falls and WCWID#2. A summary of the recommended strategies for Wichita County is shown in Table 5-48.

Table 5-48: Wichita County Recommended Strategies Summary

Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Electra	Water Conservation	86	$1.23	2030
	By Contract	252	NA	2040
	Voluntary Transfer from Iowa Park	136	$4.23	2030
Iowa Park	Water Conservation	135	$1.23	2030
	By Contract	420	NA	2040
Sheppard AFB	Water Conservation	110	$1.23	2030
	Additional Supply from Wichita Falls	211	NA	2030
Wichita Falls	Water Conservation	1,883	$1.23	2030
	Lake Ringgold	22,300	$5.27	2040
Irrigation	Water Conservation	12,149	$0.17	2030
	Chloride Control Project	6,580	N/A	2030
Manufacturing	Voluntary Transfer from Wichita Falls	146	$4.23	2030
Steam Electric Power	Additional Supply from Wichita Falls	6	NA	2040
TOTAL		**44,414**		
ALTERNATE STRATEGIES – NONE IDENTIFIED				

5.5.10 Wilbarger County



Wilbarger County is located in the north central portion of the Region B planning area. The water supply in Wilbarger County comes from a variety of sources including the Seymour Aquifer, Lake Kemp for SEP, other local aquifers, run-of-river, stock ponds, and Santa Rosa Lake. The total water supply need in Wilbarger County is 10 ac-ft in 2030 increasing to 697 ac-ft by 2080. Most of the projected need is associated with existing or planned SEP facilities supplied by Lake Kemp water. Individual water user groups and their strategies are listed below.

Harrold WSC

Harrold WSC's service area includes portions of both Wichita and Wilbarger County. Since the service area is primarily in Wilbarger County, the discussion of their water supply needs, recommended strategies, and costs will be addressed here as part of Wilbarger County. Harrold WSC purchases water supply from the City of Electra, who receives water through a contract with Wichita Falls. Harrold WSC is expected to have water supply needs beginning in 2030 and continuing through 2080. The recommended strategies for Harrold WSC include water conservation and voluntary transfer of additional water from Electra.

Recommended Strategies:

- Water Conservation
- Voluntary transfer from Electra

Summary of Recommended Strategies for Harrold WSC

The projected needs Harrold WSC are associated with limited water supply availability in the Wichita Falls system through Electra. Once Wichita Falls develops strategies for additional water supply to fulfill their existing contracts with their wholesale customers, Electra will be able to sell additional water supply to Harrold WSC to meet any remaining projected needs after savings from water conservation. Table 5-49 shows the need and recommended strategies to meet that need. There will be annual costs associated with voluntary water transfers at a rate of $4.23 per 1,000 gallons. Table 5-50 shows capital cost and the annual cost for the recommended strategies.

Table 5-49: Harrold WSC Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	10	13	15	17	18	21
Recommended Strategies						
Water Conservation	1	2	3	4	5	5
Voluntary Transfer from Electra	9	11	12	13	13	16
Total	**10**	**13**	**15**	**17**	**18**	**21**

Table 5-50: Harrold WSC Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Water Conservation	$0	$400	$800	$1,200	$1,600	$2,000	$2,000
Voluntary Transfer from Electra	$0	$12,392	$15,146	$16,523	$17,899	$17,899	$22,030
Total	**$0**	**$12,792**	**$15,946**	**$17,723**	**$19,499**	**$19,899**	**$24,030**

Steam Electric Power – Wilbarger County

SEP water use in Wilbarger County has historically been associated with the Oklaunion Power Station (OPS) facility, which received raw water supply from Lakes Kemp/Diversion, but has been inactive since 2020. The water rights in Lakes Kemp/Diversion for industrial use and the contract to supply water to OPS are jointly shared between Wichita Falls and WCWID#2. The contract with OPS is for up to 20,000 ac-ft/yr, but the available supply for planning purposes is limited by the safe yield of the reservoir system. Water demands projections for SEP in Wilbarger County were developed based on historical demands for the OPS facility when it was still active. Based on these demand projections, SEP in Wilbarger County is expected to have water supply needs beginning in 2050 and continuing through 2080. The recommended strategy for SEP in Wilbarger County is water conservation through the implementation of alternative cooling technology at the OPS facility. If the OPS facility resumes operation in the future, it is estimated that alternative cooling technology could potentially reduce water demands by 3,000 ac-ft/yr, which is enough to meet the projected water supply needs for SEP in Wilbarger County.

Recommended Strategies:

- Alternative Cooling Technology

Summary of Recommended Strategies for SEP in Wilbarger County

The recommended strategy for SEP in Wilbarger County of water conservation through alternative cooling technology is sufficient to meet the projected water supply needs. Table 5-51 shows the need and recommended strategy to meet that need. Table 5-52 shows capital cost and the annual cost for the recommended strategy.

Table 5-51: SEP – Wilbarger County Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	0	0	62	564	1,066	1,567
Recommended Strategies						
Alternative Cooling Technology			3,000	3,000	3,000	3,000

Table 5-52: SEP – Wilbarger County Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Alternative Cooling Technology	$61.3 M			$5.97 M	$5.97 M	$1.57 M	$1.57 M

Vernon

Vernon receives water supply from wells in the Seymour Aquifer. Based on MAG availability in the Seymour Aquifer and their current infrastructure capacity, Vernon is not expected to have water supply needs over the planning period. Vernon is planning to develop additional groundwater wells in the Seymour Aquifer to increase their supply availability for the future. This strategy would include the development of two additional wells by 2030 which would provide a total additional supply of approximately 730 ac-ft/yr.

Recommended Strategies:

- Develop additional groundwater

Summary of Recommended Strategies for Vernon

Although Vernon is not projected to have water supply needs during the current planning period, the recommended strategy of additional groundwater development will bolster the City's existing water supply and improve drought resiliency. Table 5-53 shows the recommended supply strategy over the planning period. Table 5-54 shows capital cost and the annual cost for the recommended strategy.

Table 5-53: Vernon Needs and Recommended Strategies
-Values in ac-ft/yr-

	2030	2040	2050	2060	2070	2080
Water Needs	0	0	0	0	0	0
Recommended Strategies						
Additional Groundwater Supplies	730	730	730	730	730	730

Table 5-54: Vernon Recommended Strategy Capital and Annual Cost

Recommended Strategies	Capital Cost	Annual Cost					
		2030	2040	2050	2060	2070	2080
Additional Groundwater Supplies	$529,000	$49,000	$49,000	$12,000	$12,000	$12,000	$12,000

Wilbarger County Summary

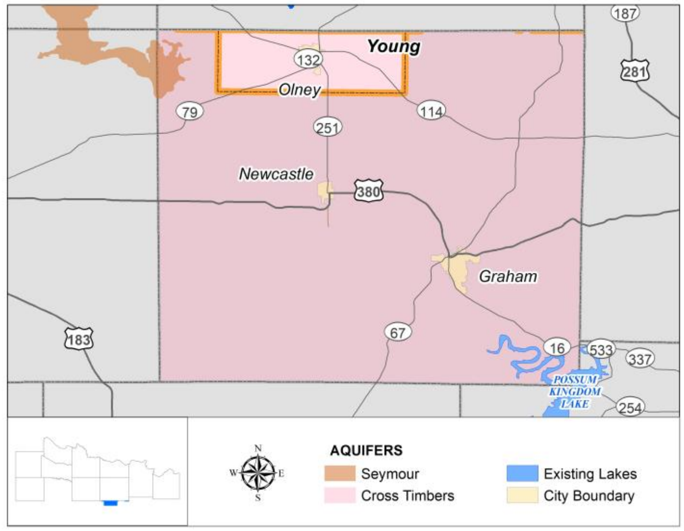
The total water supply need in Wilbarger County is 6 ac-ft in 2030 increasing to 1,580 ac-ft by 2080. Most of this need is associated with SEP water demand on the Lake Kemp/Diversion system. A summary of the recommended strategies for Wilbarger County is shown in Table 5-55.

Table 5-55: Wilbarger County Recommended Strategies Summary

Water User	Strategy Description	Max Supply (ac ft/yr)	Max Cost/ 1,000 gal	Implementation Decade
Harrold WSC	Conservation	5	$1.23	2030
	Voluntary Transfer (Electra)	16	$4.23	2030
Steam Electric	Alternative Cooling	3,000	$5.97	2060
Vernon	Additional Groundwater	730	$0.21	2030
TOTAL		**3,751**		
ALTERNATE STRATEGIES – NONE IDENTIFIED				

5.5.11 Young County

Young County is located in the south-central portion of the Region B planning area. Only a small portion of the county, which includes the City of Olney, is included in Region B while the remainder of the county is located in the Brazos G Planning Area. The water supply in Young County comes from Lake Olney/Cooper, Wichita Falls, the Seymour Aquifer, Cross-Timbers Aquifer, City of Graham, and stock ponds for livestock. There are no identified needs in the Region B portion of Young County during the planning period.



5.5.12 Regional Strategies

Red River Authority Pipeline Replacement Projects

RRA is planning to complete several pipeline replacement projects across several of their systems within Region B over the next five years. Water line replacement can reduce overall water demand by reducing water loss due to leaks and other issues caused by aging infrastructure. Based on data from recent water loss audits submitted by RRA water systems in Region B, it is anticipated that the pipeline replacement could reduce the overall water demand for RRA in Region B by up to 169 ac-ft/yr. Certain systems will see greater water loss reduction than others. The estimated capital cost for the pipeline replacement projects in Region B is approximately $5 million dollars. The estimated annual cost with debt service is approximately $400,000/yr, and $38,000/yr after debt service.

Red River Chloride Control Project

The concentration of dissolved salts, particularly chloride, in some surface waters in Region B limits the use of these waters for municipal, industrial, and agricultural purposes. The RRA is the local sponsor and has been working in cooperation with the USACE for a number of years on a project to reduce the chloride concentration of waters in the Red River Basin. The successful completion of this project would result in an increase in the volume of water available for municipal and industrial purposes in Region B and water would be available for a broader range of agricultural activities. Therefore, the Chloride Control Project (CCP) is included in the Regional Water Plan as one of the feasible strategies for meeting the water supply needed in Region B. Following is a summary of the CCP that presents the background of the project, the components, and current status of the project, and an analysis of the CCP as a regional water resource strategy.

Background

In 1957, the U.S. Public Health Service initiated a study to locate the natural sources that contribute high concentrations of chloride to surface waters in the Red River Basin. It was determined that ten natural salt source areas in the basin contributed approximately 3,300 tons of chloride each day to the Red River. In 1959, the USACE performed a study to identify control measures for these salt sources. Subsequently, structural measures were recommended for eight source areas.

Description of the Chloride Control Project

The primary strategy to reduce the flow of highly saline waters to the Red River is to impound these flows behind low flow dams and pump the saline waters to off-channel brine reservoirs where the water evaporates or is disposed of by deep-well injection. During high-flow periods, when the chloride concentration is lower, waters flow over the low dams and proceed downstream.

There are four saline inflow areas that impact water quality in Region B. Areas VII, VIII, and X affect the quality of water in the Wichita River including Lake Kemp and Lake Diversion. Area IX affects the quality of waters in the Pease River, including the proposed Pease River Reservoir. Figure 5-1 shows a map of the CCP areas and Red River tributaries within Region B.

Construction of the chloride control facilities at Area VIII on the South Fork of the Wichita River in King County and Knox County was authorized in 1974. These facilities include a low flow dam near Guthrie, Texas, with a deflatable weir to collect the saline inflows; the Truscott Brine Reservoir near Truscott, Texas; and a pump station and pipeline to transport the saline water from the impoundment at Guthrie to the Truscott Brine Reservoir. These facilities have been in operation since May 1987. Construction of the facilities at Area X was initiated in 1991, but they have not been completed due to a decision to modify the design of these facilities, a change to the brine disposal area, and a need to address environmental issues identified by the U.S. Fish and Wildlife Service (USFWS) and the Texas Parks and Wildlife Department. A Final Environmental Statement (FES) was prepared for the project and published in 1977. A supplement to the FES (SFES) and an Economic evaluation of the project were completed for the Wichita Basin in 2003. These studies found that the Wichita Basin CCP is economically and environmentally feasible and the Record of Decision was signed in March 2004. Construction of the facilities for Areas X and VII are waiting for budget approval. The effectiveness and environmental impacts of the project will be evaluated as the CCP facilities are completed and operating within the Wichita River Basin. The results of this effort will be used to determine if and, if so, how CCP facilities will be provided for Area IX on the Pease River. The potential Pease River Reservoir would not be viable for a municipal water supply without completion of the CCP for the Pease River Basin.

Because of the improved water quality resulting from implementation of the CCP, it has been identified as a feasible supply alternative for Region B. Following is an evaluation of the quantity and quality of water that would be provided; the reliability of the supply; the cost to distribute, treat, or convey the water; potential impacts on the environment and agriculture in the area; the regulatory and political acceptability of, and public support for, the project; and the extent to which this strategy could affect other strategies. This evaluation addresses the completion of the CCP in the Wichita Basin. When the scheduling for the Pease River Basin phase of the project is more certain, the regional plan should be amended to include an evaluation of the effects of the Pease River phase of the project on water resources in Region B.

Water Quantity, Reliability and Cost

While no additional water is directly made available through this strategy, there would be water savings realized through the reduction in water losses associated with advanced water treatment for municipal use and more efficient applications of irrigation water. The estimate of these water savings is approximately 6,580 ac-ft/yr in 2030 (20 percent of the Lake Kemp safe yield), reducing over time as supplies from Lake Kemp decline. In the 2013 fiscal year, USACE estimated the remaining construction cost to complete the project is $59,371,000 ($83,821,000 in September 2023 dollars). It should also be noted that the cost impacts of the CCP on residents of Region B and the State of Texas are different than the cost impacts of membrane treatment or other supply strategies. The capital costs of the CCP facilities will be funded with federal monies.

Environmental Factors

The project will improve the overall water quality in the Wichita River Basin, which is considered a benefit to the environment. As previously discussed, environmental impact studies have been for this project. The environmental issues that have been identified are summarized below:

- Selenium (Se) is a naturally occurring element in soils in the western United States and in the waters of the CCP project area. Se in trace amounts is an essential dietary component. However, it has been concluded that, in higher concentrations in water and sediment, Se adversely impacts aquatic birds in some areas of the country. Concern has been expressed that the concentration of Se in the brine disposal reservoirs will increase due to evaporation and pose a threat to local and migratory birds, fish, and wildlife. Data collected at the Truscott Brine Reservoir have found no increases in Selenium concentrations following 11 years of operation and Selenium is not expected to result in excessive risk at the Brine Lake.
- Small decreases in flows are projected to occur in the Wichita River and the Red River between the Wichita River confluence and Lake Texoma. These flow decreases will result from the diversion of low flows to the brine disposal reservoirs and increased use of the river flow for irrigation when the quality improves. Changes in water quality and quantity could impact the composition of vegetation along these river reaches and result in vegetative encroachment on the stream channel. There is a concern that decreased flows and changes in vegetative composition could adversely affect the habitat for aquatic life, birds, and wildlife. These changes are expected to be low to moderate and potential impacts are addressed in the monitoring and mitigation plan for the project.
- There is a concern that wetlands in the Red River flood plain will be adversely impacted as a result of both changes in the hydrologic regime and the conversion of land adjacent to the river to cropland and pasture. These potential impacts are also addressed in the monitoring and mitigation plan for the CCP.
- Concern has been expressed that the reduction in the TDS concentration in Lake Texoma, associated changes in physical characteristics of the lake (turbidity), a decrease in primary production rates due to a decrease in the depth of the eutrophic zone, and alterations in nutrient cycling will reduce the sport fish harvest in the lake, and may affect the aesthetic quality of the lake. Studies have shown

that the changes in TDS concentration in Lake Texoma associated with the Wichita River CCP are expected to have negligible adverse impacts to fisheries or aesthetics to the lake.

Each of these issues was addressed in the SFEIS, and the report concludes there will not be significant impacts in most cases. Where potential impacts have been identified, mitigation and monitoring measures are proposed.

Several state and federally listed threatened and endangered species are present in, or migrate through, the project area. To address concerns related to the bald eagle, whooping crane, and least tern, in 1994 the USFWS and USACE agreed upon a Biological Opinion that defines Reasonable and Prudent Measures to protect these species. These measures are described in Supplement I to the SFES.

Impacts on Water Resources and Other Water Management Strategies

The CCP should have a positive impact on water resources and other water management strategies. This strategy is considered a demand reduction strategy, which would result in lower demands on other water management strategies.

Impacts on Agriculture and Natural Resources

This project will have a positive impact on agriculture and natural resources by improving the water quality in the Wichita River Basin. The improvements in the quality of water will allow the water to be used to irrigate a wider variety of crops and reduce the potential for salt build-up in soils.

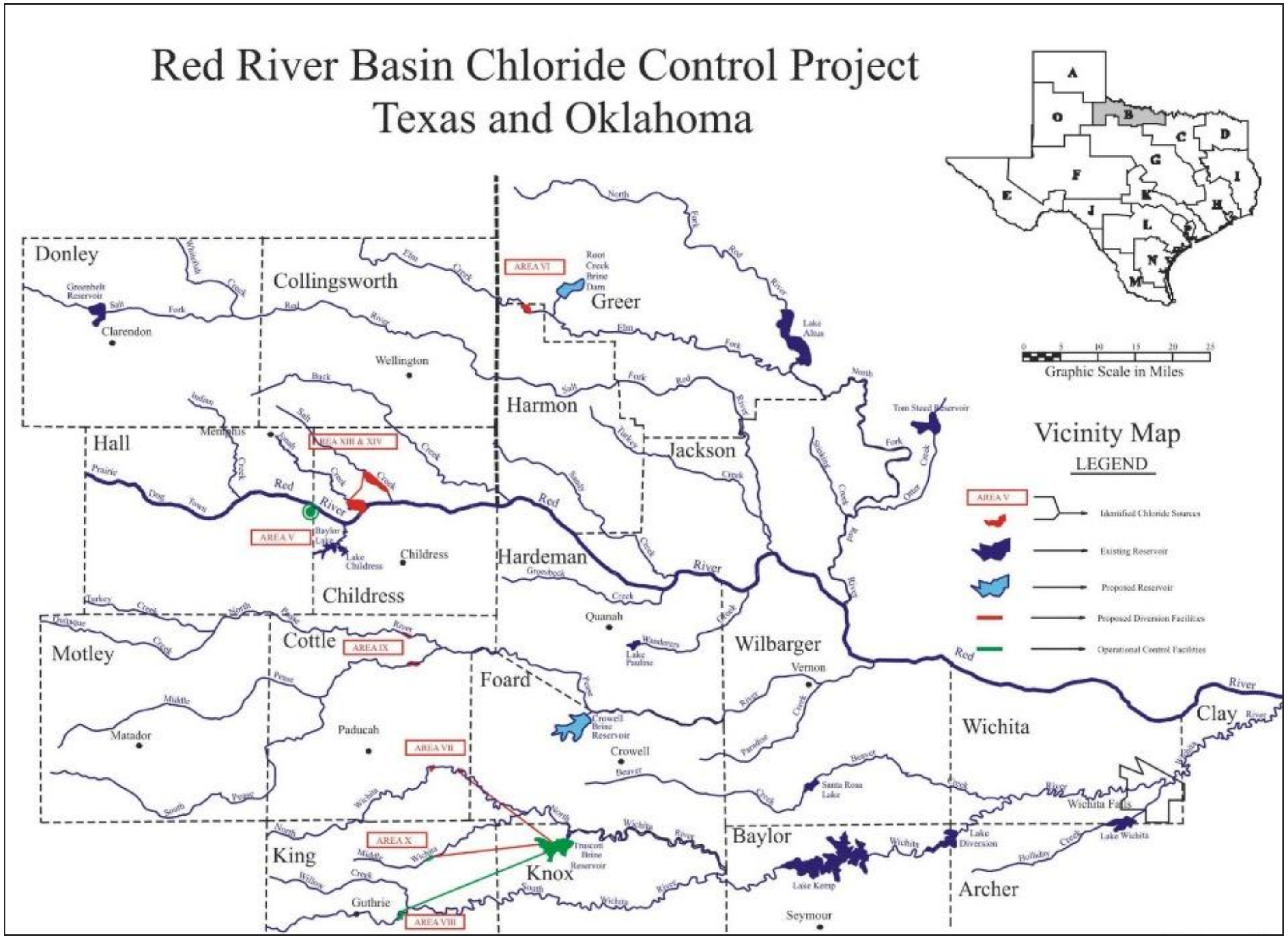
Other Relevant Factors

The brine will be stored in impoundment facilities similar to the Truscott Brine Lake. The water supply source that will be enhanced by the Wichita Basin CCP is the Lake Kemp/Diversion system. As previously described in Chapter 3 of the Region B Water Plan, the firm yield of this system is estimated at 46,500 ac-ft/yr in 2030, and 34,300 ac-ft/yr in 2080. The yield decrease, which is attributable to sedimentation, is expected to be mitigated through an increase in the water conservation elevation and use of a seasonal pool during the irrigation months. Benefits of the CCP would be applicable to all waters stored in the Lake Kemp/Diversion system.

The political acceptability of the project varies depending on the sector of the community. Municipalities, industries, and the agricultural community are supportive of the project. The degree of support for the project is evidenced by the congressional approval and funding of the project in bills enacted in 1962, 1966, 1970, 1974, 1976, and 1986. In 1988, a special panel created by the Water Resource Development Act of 1986 issued a report favorable to the project.

The natural resource agencies, Lake Texoma sport fishermen, and related lake businesses have expressed opposition to the project. However, substantial progress has been made in addressing the natural resource and fishing concerns.

Figure 5-1: Map of Red River Chloride Control Project



5.5.13 Strategies Potentially Providing Non-Trivial Flood Mitigation Benefits

The following recommended strategies were identified by the Region B consultants as potentially providing non-trivial flood mitigation benefits:

- **Managed Aquifer Recharge (Baylor County):** This strategy would capture stormwater runoff and potentially provide flood mitigation benefits.

5.5.14 Implementation Status and Timeline for Certain Recommended WMS

A new TWDB requirement for the 2026 regional water planning cycle is documentation of the implementation status of certain types of WMSs that are recommended in the plan. The following types of WMSs are subject to this new requirement:

- All reservoir strategies (including major and minor reservoirs)
- All seawater desalination strategies
- Direct potable reuse strategies that provide greater than 5,000 acre-feet per year (AFY) of supply in any planning decade
- Brackish groundwater strategies that provide greater than 10,000 AFY of supply in any planning decade
- Aquifer storage and recovery strategies that provide greater than 10,000 AFY in any decade
- All water transfers from out of state
- Any other innovative technology projects the RWPG considers appropriate

For Region B, the only recommended WMS that qualifies for this requirement is Lake Ringgold. Figure 5-2 shows the anticipated timeline for the project. Table 5-56 shows the implementation status of key milestones for the project.

Figure 5-2: Anticipated Timeline for Lake Ringgold WMS

TCEQ water right permit was issued in 2024

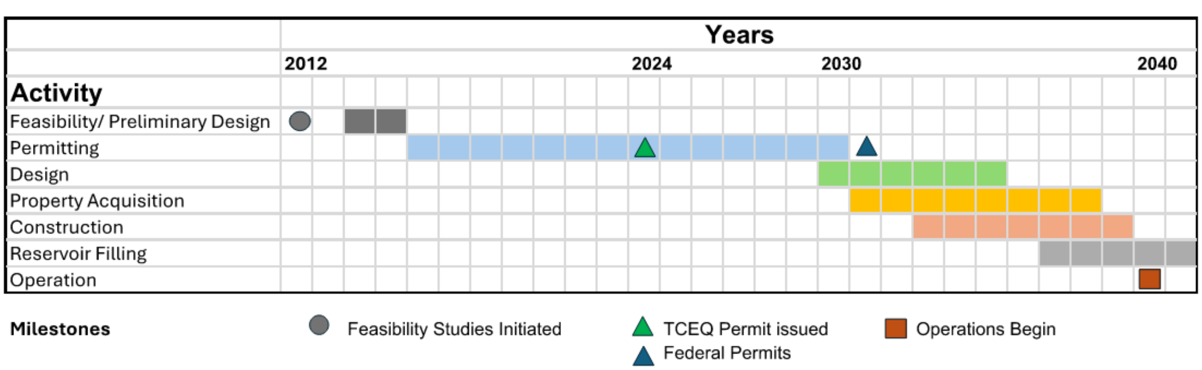


Table 5-56: Implementation Status Summary for Lake Ringgold WMS

REGIONAL WATER PLAN WMS/PROJECT DATA						ANTICIPATED/ESTIMATED (OR ACTUAL[1]) IMPLEMENTATION ACTIVITIES AND DATES						
						SPONSOR AUTHORIZATION	PERMITTING STATUS (as applicable)					
							STATE WATER RIGHT STATUS				FEDERAL 404 PERMIT STATUS (if applicable)	
Water Management Strategy	Project Sponsor	WMS Project Sponsor Region	Online Decade	Capital Cost	Anticipated Footprint Acreage (acres)	Date(s) that the sponsor took an affirmative vote or other action to make expenditures necessary to construct or file applications for state or federal permits (date(s))	Anticipated (or actual) TCEQ application filed (date)	Anticipated (or actual) State Water Right Permit Administratively Complete (date)	Anticipated (or actual) Draft State Water Right Permit Issued (date)	Anticipated (or actual) Date Final State Water Right Permit Issued (date)	Anticipated (or actual) application for permit filed (date)	Anticipated (or actual) permit issuance (date)
Lake Ringgold	Wichita Falls	B	2040	$560 M	15,500	February 2025	June 2017	August 2017	October 2019	May 2024	2026	2031

Table 5-56 (continued)

	ANTICIPATED/ESTIMATED (OR ACTUAL[1]) IMPLEMENTATION ACTIVITIES AND DATES						
	PLANNING, DESIGN, AND CONSTRUCTION STATUS						TOTAL FUNDS EXPENDED TO DATE
	GEOTECH/DESIGN	LAND ACQUISITION		CONSTRUCTION			
Water Management Strategy	Generally describe the types and amount (as %s) of geotechnical/ reconnaissance/ engineering feasibility or other technical, testing, and/or design work etc. performed to date (summary)	Percent Land Acquisition Completed (%)	Anticipated land acquisition completion (date)	Anticipated start of construction (Date)	Percent construction completed (%)	Anticipated construction completion (date)	Rough approximation of the total expenditures, to date, on ALL activities related to project implementation to date (millions of $s)
Lake Ringgold	Preliminary feasibility and geotechnical analysis (10%)	40%	2038	2033	0%	2039	$2.65 million[2]

[1]Any date entered that is prior to adoption of the regional water plan is assumed to be an 'actual' date.

[2]Includes legal fees and land acquisition.

5.6 List of References

Bureau of Economic Geology, University of Texas at Austin. Water Use by the Mining Industry in Texas. Prepared for the Texas Water Development Board. August, 2022.

Texas Water Development Board. DRAFT Non-Municipal Water Demand Projections for Livestock, Manufacturing and Steam Electric Power. January 2022.

Texas Water Development Board. DRAFT Non-Municipal Water Demand Projections for Irrigation and Mining. August 2022.

Texas Water Development Board. Summary of 2026 RWP Draft Non-Municipal Water Demand Projection Methodologies and Supporting Data.

ATTACHMENT 5-1

METHODOLOGY IDENTIFYING POTENTIALLY FEASIBLE WATER MANAGEMENT STRATEGIES

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

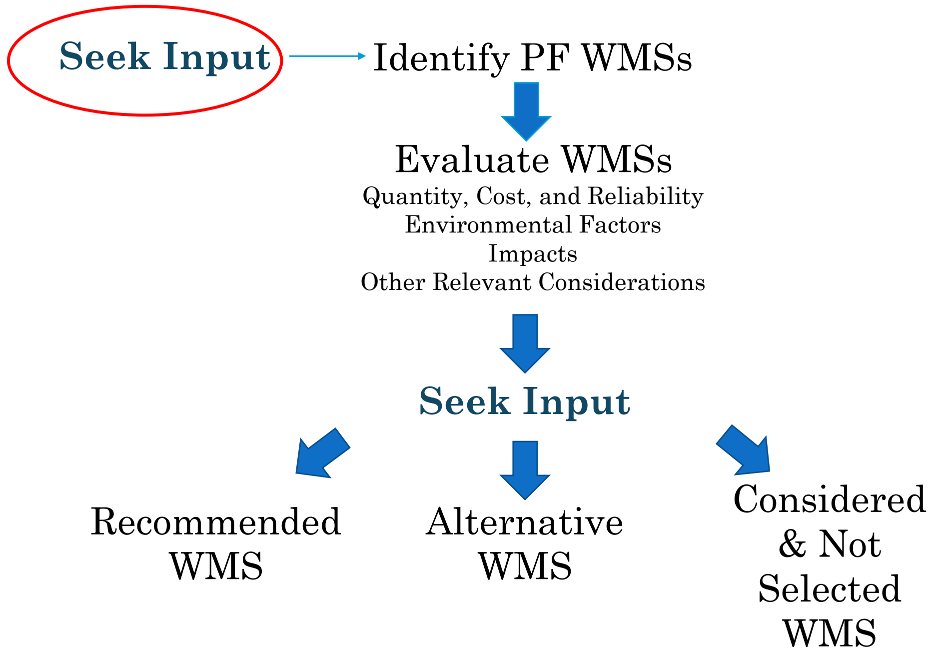
Methodology for Identifying Potentially Feasible WMS for 2026 Plan

Region B

Potentially Feasible WMS Review Requirements

From TAC 357.12(b):

"A RWPG shall hold a public meeting to determine the process for identifying potentially feasible water management strategies; the process shall be documented and shall include input received at a public meeting; …"



3

Proposed Methodology

1. Identify entities with needs
2. Review recommended strategies in 2021 plan
3. Review new studies/reports
4. Identify potential new or changed strategies
5. Review strategy types appropriate for Region B
6. Contact entities for input
7. Contact RWPG representatives for county-wide WUGs
8. Verify recommendations

4

Considerations for Feasible Strategies

- A strategy must use proven technology
- A strategy should have an identifiable sponsor
- Must consider end use. Includes water quality, economics, geographic constraints, etc.
- Must meet existing regulations
- 24 Water Management Strategy Types required to consider by TWDB
  - Not all are applicable to every situation
  - Not all are applicable to Region B

5

Additional Considerations for Feasible Strategies

- Is there available existing supply that is not already allocated to another user?
- Can new water be developed? If yes, identify the potential sources.
- Does the water quality meet the end use requirements? If not, can it be treated?
- Are there any technical considerations that would preclude the feasibility of the strategy type? For example, are there suitable geologic formations for aquifer storage and recovery (ASR)?

6

Feasible Strategy Types

- Strategy Types Likely Not Appropriate for Region B
  - Drought Management (not a long-term supply strategy)
  - Precipitation Enhancement
  - Rainwater Harvesting
- Strategy Types Not Appropriate for Region B
  - Marine Seawater Desalination
  - Cancellation of Water Rights

7

ATTACHMENT 5-2

WMS CONSIDERED AND EVALUATED

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

Every WUG Entity with an Identified Need			WMSs REQUIRED TO BE CONSIDERED BY STATUTE												ADDITIONAL					
Water User Group Name	County	Maximum Need 2030-2080 (ac-ft/yr)	Aquifer Storage and Recovery/Managed Aquifer Recharge	Conservation	Drought Management	Reuse	Reallocation of Storage	Voluntary Transfers	Conjunctive Use	Expansion of Existing	New Supplies	Regional Water Supply	Improvement of Water Quality	Emergency Transfer of Water	System Optimization, Subordination, and Enhancement	Brush Control	Precipitation Enhancement	Desalination	Cancellation of Water Rights	Interbasin Transfers
WUGs with Needs	Multiple	25,665																		
WUGs with Significant Needs	-	-																		
Archer City	Archer	0																		
Archer County MUD 1	Archer	0																		
Baylor County SUD	Archer, Baylor, Young	0																		
County-Other	Archer	0																		
Holliday	Archer, Wichita	72																		
Lakeside City	Archer	22																		
Scotland	Archer	0																		
Wichita Valley WSC	Archer, Wichita	0																		
Windthorst WSC	Archer, Clay	0																		
Irrigation	Archer	0																		
Livestock	Archer	0																		
Manufacturing	Archer	0																		
Mining	Archer	0																		
Steam Electric	Archer	0																		
County-Other	Baylor	0																		
Seymour	Baylor	0																		
Irrigation	Baylor	308																		
Livestock	Baylor	0																		
Manufacturing	Baylor	0																		
Mining	Baylor	0																		
Steam Electric	Baylor	0																		
County-Other	Clay	0																		
Dean Dale SUD	Clay, Wichita	0																		
Henrietta	Clay	0																		
Red River Authority	Clay	189																		
Irrigation	Clay	0																		
Livestock	Clay	0																		
Manufacturing	Clay	0																		
Mining	Clay	0																		
Steam Electric	Clay	0																		
County-Other	Cottle	0																		
Paducah	Cottle	0																		
Red River Authority	Cottle	0																		
Irrigation	Cottle	0																		
Livestock	Cottle	0																		
Manufacturing	Cottle	0																		
Mining	Cottle	0																		
Steam Electric	Cottle	0																		
County-Other	Foard	0																		
Crowell	Foard	0																		
Red River Authority	Foard	0																		
Irrigation	Foard	0																		
Livestock	Foard	0																		
Manufacturing	Foard	0																		
Mining	Foard	0																		
Steam Electric	Foard	0																		
County-Other	Hardeman	0																		
Quanah	Hardeman	0																		
Red River Authority	Hardeman	0																		
Irrigation	Hardeman	0																		
Livestock	Hardeman	0																		
Manufacturing	Hardeman	0																		
Mining	Hardeman	0																		
Steam Electric	Hardeman	0																		

Every WUG Entity with an Identified Need			WMSs REQUIRED TO BE CONSIDERED BY STATUTE												ADDITIONAL					
Water User Group Name	County	Maximum Need 2030-2080 (ac-ft/yr)	Aquifer Storage and Recovery/Managed Aquifer Recharge	Conservation	Drought Management	Reuse	Reallocation of Storage	Voluntary Transfers	Conjunctive Use	Expansion of Existing	New Supplies	Regional Water Supply	Improvement of Water Quality	Emergency Transfer of Water	System Optimization, Subordination, and Enhancement	Brush Control	Precipitation Enhancement	Desalination	Cancellation of Water Rights	Interbasin Transfers
County-Other	King	0																		
Red River Authority	King	0																		
Irrigation	King	0																		
Livestock	King	0																		
Manufacturing	King	0																		
Mining	King	0																		
Steam Electric	King	0																		
Bowie	Montague	1,251																		
County-Other	Montague	1,614																		
Nocona	Montague	623																		
Nocona Hills WSC	Montague	0																		
Red River Authority	Montague	0																		
Saint Jo	Montague	235																		
Irrigation	Montague	0																		
Livestock	Montague	0																		
Manufacturing	Montague	0																		
Mining	Montague	0																		
Steam Electric	Montague	0																		
Burkburnett	Wichita	0																		
County-Other	Wichita	0																		
Electra	Wichita	327																		
Harrold WSC	Wichita, Wilbarger	21																		
Iowa Park	Wichita	209																		
Wichita County WID 2 (Irrigation in Archer, Clay and Wichicita County)	Wichita	13,767																		
Sheppard Air Force Base	Wichita	321																		
Wichita Falls	Wichita	6,328																		
Irrigation	Wichita	12,426																		
Livestock	Wichita	0																		
Manufacturing	Wichita	146																		
Mining	Wichita	0																		
Steam Electric	Wichita	6																		
County-Other	Wilbarger	0																		
Red River Authority	Wilbarger	0																		
Vernon	Wilbarger	0																		
Irrigation	Wilbarger	0																		
Livestock	Wilbarger	0																		
Manufacturing	Wilbarger	0																		
Mining	Wilbarger	0																		
Steam Electric	Wilbarger	1,567																		
County-Other	Young	0																		
Olney	Young	0																		
Irrigation	Young	0																		
Livestock	Young	0																		
Manufacturing	Young	0																		
Mining	Young	0																		
Steam Electric	Young	0																		

ATTACHMENT 5-3

SUMMARY OF RECOMMENDED STRATEGIES

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

ATTACHMENT 5-3
SUMMARY OF RECOMMENDED STRATEGIES

Entity	County Used	Expected Online Date	Capital Cost	First Decade Unit Cost ($/ac-ft/yr)	Total Yield						Last Decade Unit Cost ($/ac-ft/yr)
					2030	2040	2050	2060	2070	2080	
Alternative Cooling											
Steam Electric Power	Wilbarger	2040	$61,310,000	$1,947			3,000	3,000	3,000	3,000	$510
Chloride Control											
Irrigation	Wichita	2030	$83,821,000	$1,024	6,580	6,096	5,612	5,128	4,644	4,160	$201
Groundwater											
County Other	Montague	2030	$97,000,000	$831	474	649	822	989	1,156	1,305	$446
Nocona	Montague	2050	$4,167,000	$813			145	290	290	436	$365
Saint Jo	Montague	2050	$4,474,000	$1,352			145	145	145	290	$810
Vernon	Wilbarger	2030	$529,000	$67	730	730	730	730	730	730	$16
Irrigation Conservation											
Wichita County WID 2	Wichita	2030	$7,975,000	$274	2,163	4,326	6,489	8,625	10,816	10,816	$0.5
Irrigation	Baylor	2030	$0	$11	254	254	254	254	254	254	$11
Irrigation	Clay	2030	$0	$11	68	68	68	68	68	68	$11
Irrigation	Cottle	2030	$0	$11	216	216	216	216	216	216	$11
Irrigation	Foard	2030	$0	$11	124	124	124	124	124	124	$11
Irrigation	Hardeman	2030	$0	$11	915	915	915	915	915	915	$11
Irrigation	King	2030	$0	$11	12	12	12	12	12	12	$11
Irrigation	Montague	2030	$0	$11	21	21	21	21	21	21	$11
Irrigation	Wichita	2030	$0	$11	1,333	1,333	1,333	1,333	1,333	1,333	$11
Irrigation	Wilbarger	2030	$0	$11	1,337	1,337	1,337	1,337	1,337	1,337	$11
Mining Conservation											
Mining	Baylor	2030	$27,000	$3,200	3	3	3	3	3	3	$3,200
Mining	Clay	2030	$11,000	$3,200	1	1	1	1	1	1	$3,200
Mining	Cottle	2030	$16,000	$3,200	2	2	2	2	2	2	$3,200
Mining	Hardeman	2030	$13,000	$3,200	1	1	1	1	1	1	$3,200
Mining	King	2030	$11,000	$3,200	1	1	1	1	1	1	$3,200
Mining	Montague	2030	$90,000	$3,200	9	9	9	9	9	9	$3,200
Mining	Wichita	2030	$119,000	$3,200	11	11	11	11	11	11	$3,200
Mining	Wilbarger	2030	$85,000	$3,200	8	8	8	8	8	8	$3,200
Municipal Conservation											
Holliday	Archer, Wichita	2030	$0	$400	11	15	19	23	26	29	$400
Lakeside City	Archer	2030	$0	$400	4	7	10	13	16	18	$400
Red River Authority	Clay	2030	$426,000	$343	145	163	171	179	186	194	$203
Bowie	Montague	2030	$0	$400	92	123	152	189	230	263	$400
County Other	Montague	2030	$0	$400	39	79	131	186	248	319	$400
Nocona	Montague	2030	$0	$400	45	101	132	172	216	257	$400
Saint Jo	Montague	2030	$0	$400	13	22	33	46	62	80	$400
Electra	Wichita	2030	$0	$400	16	31	45	59	72	86	$400
Harrold WSC	Wichita, Wilbarger	2030	$0	$400	1	2	3	4	5	5	$400
Iowa Park	Wichita	2030	$0	$400	23	47	65	88	111	135	$400
Sheppard Air Force Base	Wichita	2030	$0	$400	20	36	50	70	90	110	$400
Wichita Falls	Wichita	2030	$0	$400	190	471	760	1,127	1,502	1,883	$400
Reservoir											
Wichita Falls	Wichita	2040	$559,953,000	$1,718		22,300	21,613	20,925	20,238	19,550	$260
Reuse											
Bowie	Montague	2030	$13,000,000	$2,882	510	550	590	620	660	700	$751
Voluntary Transfer											
Holliday	Archer, Wichita	2030	$0	$1,377	23						
Electra	Wichita	2030	$0	$1,377	136	48	32	18	5	0	$1,377
Harrold WSC	Wichita, Wilbarger	2030	$0	$1,377	9	11	12	13	13	16	$1,377
Manufacturing	Wichita	2050	$0	$1,377			4	49	95	146	$1,377

ATTACHMENT 5-4

GPCD GOALS

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

Water User Group (WUG)	GPCD Goals					
	2030	2040	2050	2060	2070	2080
Archer City	137	137	137	137	137	137
Archer County MUD 1	164	164	164	164	164	164
Baylor SUD	197	197	197	197	197	197
Bowie	153	153	153	153	153	153
Burkburnett	120	120	120	120	120	120
Chillicothe	115	115	115	115	115	115
County-Other, Archer	157	157	157	157	157	157
County-Other, Baylor	119	119	119	119	119	119
County-Other, Clay	111	111	111	111	111	111
County-Other, Cottle	124	124	124	124	124	124
County-Other, Foard	166	166	166	166	166	166
County-Other, Hardeman	143	143	143	143	143	143
County-Other, King	235	235	235	235	235	235
County-Other, Montague	109	109	109	109	109	109
County-Other, Wichita	112	112	112	112	112	112
County-Other, Wilbarger	143	143	143	143	143	143
Crowell	126	126	126	126	126	126
Dean Dale WSC	69	69	69	69	69	69
Electra	294	294	294	294	294	294
Harrold WSC	254	254	254	254	254	254
Henrietta	155	155	155	155	155	155
Holliday	129	129	129	129	129	129
Iowa Park	122	122	122	122	122	122
Lakeside City	120	120	120	120	120	120
Nocona	210	210	210	210	210	210
Nocona Hills WSC	176	176	176	176	176	176
Olney	148	148	148	148	148	148
Paducah	217	217	217	217	217	217
Quanah	131	131	131	131	131	131
Red River Authority of Texas	220	220	220	220	220	220
Saint Jo	133	133	133	133	133	133
Scotland	315	315	315	315	315	315
Seymour	162	162	162	162	162	162
Sheppard Air Force Base	145	145	145	145	145	145
Vernon	144	144	144	144	144	144
Wichita Falls	145	145	145	145	145	145
Wichita Valley WSC	106	106	106	106	106	106
Windthorst WSC	267	267	267	267	267	267

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CHAPTER 6 IMPACTS OF THE REGIONAL WATER PLAN

6.1 Requirements

The development of viable strategies to meet the demand for water is the primary focus of regional water planning. However, another important goal of water planning is the long-term protection of resources that contribute to water availability, and to the quality of life in the State. The purpose of this chapter is to describe how the 2026 Plan is consistent with the long-term protection of the State's water resources, agricultural resources, and natural resources. The requirement to evaluate the impact of the regional water plan and its consistency with protection of resources is found in 31 TAC Chapter 357.40 & 41, which require the following:

- A description of the socioeconomic impacts of not meeting identified water needs in the region (§357.40(a));
- A description of potential impacts of the regional water plan regarding agricultural resources; other water resources including groundwater and surface water interrelationships; threats to agricultural and natural resources; third-party social and economic impacts resulting from voluntary redistributions of water including moving water from rural and agricultural areas; major impacts of recommended water management strategies on key parameters of water quality; and, effects on navigation (§357.40(b));
- A summary of identified water needs that remain unmet by the plan (§357.40(c));
- A description of how the 2026 Plan is consistent with the long-term protection of the state's water resources, agricultural resources, and natural resources (§357.41); and,
- A summary describing how the 2026 Plan is consistent with the guidelines for water planning as outlined in §357.20 (§357.60(a)).

Following are descriptions of the remaining sections of this Chapter.

- Section 6.2 addresses the socioeconomic impacts of not meeting identified water needs in Region B.
- Section 6.3 addresses impacts of the plan on agricultural resources.
- Section 6.4 addresses impacts of the plan on other water resources.
- Section 6.5 addresses threats to agricultural and natural resources.
- Section 6.6 addresses third-party social and economic impacts resulting from voluntary redistributions of water including moving water from rural and agricultural areas.
- Section 6.7 addresses major impacts of recommended water management strategies on key parameters of water quality.
- Section 6.8 addresses impacts on navigation and impacts on existing water contracts and option agreements.

- Section 6.9 provides a summary of identified water needs that remain unmet by the plan.

- Section 6.10 provides a description of how the 2026 Plan is consistent with the long-term protection of the State's water resources, agricultural resources, and natural resources.

- Section 6.11 provides a description of the plan's consistency with the guidelines for water planning.

6.2 Descriptions of the Socioeconomic Impacts of Not Meeting Identified Needs

The TWDB provided technical assistance to regional planning groups in the development of the potential socioeconomic impacts of failing to meet projected water needs. The TWDB's analysis calculated the impacts of a severe drought occurring in a single year at each decadal period in Region B. It was assumed that all of the projected shortage was attributed to drought. Under these assumptions, the TWDB's findings can be summarized as follows:

- Without any additional supplies, the projected water needs would reduce the region's projected 2030 employment by ______ jobs. This declines to ________ lost jobs by 2080. Most of this reduction occurs in the ________ sector.

- Without additional supplies, the projected water needs would reduce the region's projected annual income in 2030 by approximately $____ billion. This represents about ___ percent of the region's current income. The loss in income reduces to approximately $_____ million in 2080.

The complete socioeconomic study report by the TWDB is included in Appendix E.

6.3 Impacts of the Regional Water Plan on Agricultural Resources

Agriculture, which encompasses both farming and ranching, is an important economic driver within Region B. With over one million acres in cropland, irrigation is a critical input for sustaining agriculture in the region even when rainfall is normal or above normal, accounting for about 60 percent of all water used. The evaluation of water sources indicates that with the implementation irrigation district conservation combined with on-farm conservation there are no unmet needs for irrigation in Region B.

6.4 Impacts of the Regional Water Plan on Other Water Resources

The water resources in Region B include portions of three river basins providing surface water, and portions of four aquifers providing groundwater. The three river basins present in Region B are the Red River Basin, a small portion of the Trinity River Basin and a small portion of the Brazos River Basin. The respective boundaries of these basins are depicted in Figure 1-2, in Chapter 1.

Surface water accounts for approximately 37 percent of the total water supply in the region. Sources within the region include six major reservoirs that are used for water supply and several smaller reservoirs that were previously used for water supply or supply very small amounts of water. Currently, the majority of the available surface water supply used in Region B comes from the Red River Basin with one reservoir in the Trinity River Basin. Surface water supply also includes run-of-river supplies and local stock ponds use for livestock demand.

The region's groundwater resources include two major aquifers (Seymour and Trinity) and two minor aquifers (Blaine and Cross Timbers). The extents of these aquifers within the region are depicted in Figures 1-3 and 1-4, in Chapter 1. Groundwater is primarily supplied in Region B by the Seymour and the Blaine. The Seymour is found in the central and western portions of the region. It is currently used in Hardeman, Wilbarger, Wichita, Clay, Baylor, and Foard Counties. The Blaine is considered a minor aquifer and useable groundwater is limited to the westernmost portion of the region. These aquifers provide a large percentage of available supply in these counties. The upper portion of the Trinity Aquifer occurs in Montague County in the eastern part of the region. Limited quantities of groundwater are used from the Trinity for municipal and irrigation uses. There are several formations of the Cross Timbers aquifer across the region. The Cross Timbers is currently used in Archer, Baylor, Clay, Montague, Wichita, and Young Counties for both municipal and non-municipal uses.

There are also other formations within the region that are used for groundwater supply in limited areas. The TWDB identifies these sources as "Undifferentiated Other Aquifer". These formations generally are not well defined in the literature, but still provide substantial quantities of water in Cottle, Foard, King, and Wilbarger Counties.

To be consistent with the long-term protection of water resources, the 2026 Plan must recommend strategies that minimize threats to the region's sources of water over the planning period. The water management strategies identified in Chapter 5 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. The following sections describe the ways threats to water resources are minimized in the 2026 Plan.

6.4.1 Water Conservation

Strategies for water conservation have been recommended that will help reduce the demand for water, thereby reducing the impact on the region's groundwater and surface water sources. Water conservation practices are expected to save approximately 6,974 acre-feet (ac-ft) of water annually by 2030, reducing impacts on both groundwater and surface water resources. This savings includes 1,400 ac-ft of basic savings resulting from implementation of the plumbing code. No further increase in basic savings is included in subsequent decades. By 2080, the water conservation strategies will save a total of 21,407 acre-feet per year (ac-ft/yr) that also includes 1,400 ac-ft/yr of basic savings from the plumbing code implementation early in the planning period. Water conservation benefits the State's water resources by reducing the volumes of withdrawals from water sources that are needed to support human activity.

6.4.2 Water Reuse

Currently, the majority of reuse in Region B is through the City of Wichita Falls indirect potable water project that delivers 8 million gallons per day (MGD) of treated wastewater to Lake Arrowhead. The City of Wichita Falls also provides 0.25 MGD of cooling water to a plate glass manufacturing facility. The remaining reuse supplies within Region B are limited to municipal irrigation and/or use at the wastewater treatment facilities; however, the City of Bowie has sold nearly all its wastewater effluent for mining purposes in the recent past. The City of Bowie also has a proposed indirect potable reuse project expected to be online in 2030. Water reuse in general provides a means to more efficiently use the supplies available within the region, conserving the water resources in Region B. Other entities may be looking to develop reuse projects in the future.

6.4.3 Voluntary Transfers

This strategy involves the voluntary transfer of water resources from one entity that has a surplus during one or more decades to another entity that has a need. In most cases these transfers are handled directly through implementation of infrastructure that will facilitate a physical transfer of water instead of the transfer or lease of water rights that would constitute a paper transfer without connecting infrastructure. In Region B these voluntary transfers have become a necessary means of addressing water supply to overcome both water supply quantity limitations and water quality limitations. A major benefit of voluntary transfers is reduction of the potential to overuse, overdraft, or otherwise reduce the longevity of existing water resources. In addition, use of voluntary transfers has allowed for reduction of demand from some existing water sources.

6.4.4 Development of New and/or Expanded Use of Surface Water Supplies

Lake Ringgold

This strategy will increase surface water supplies available for cities, industry, and agriculture in Region B by 22,300 acre-feet per year in 2040 (safe yield). Lake Ringgold will impact approximately 100 acres of existing ponds and stock tanks and approximately 123 miles of streams. At the conservation elevation of 844 feet, approximately 418 acres of wetlands will be impacted. Lake Ringgold is near the confluence of the Little Wichita River and the Red River. The impoundment should have minimal impact on other water resources or other water management strategies. The WAM, a part of the regional planning process, assesses how the increased use of surface water resources will impact the Region's water resources. The evaluation of Lake Ringgold utilized the current Red River WAM to ensure that this project did not over allocate State water and respected the water supplies of other water resources.

6.4.5 New and/or Expanded Use of Groundwater

Groundwater Development

This strategy includes the construction and development of groundwater supply wells. Additional groundwater development is a recommended strategy for several WUGs in Montague County, including Nocona, Saint Jo, and Montague County-Other.

Aquifer Storage and Recovery/Managed Aquifer Recharge

Managed Aquifer Recharge (MAR) is a recommended strategy for Baylor County Irrigation. Rolling Plains Groundwater Conservation District (RPGCD) is planning to develop several MAR projects to capture stormwater runoff and allow it to recharge into the Seymour Aquifer. One of the identified MAR sites is located in Baylor County approximately 3.5 miles northwest of the City of Seymour. The proposed MAR would include construction of a large detention basin to capture stormwater runoff and an infiltration trench to facilitate infiltration into the aquifer. This would increase the availability of water supply in this area of the Seymour Aquifer.

6.4.6 Brush Control

Brush control is a strategy that is aimed at reducing the amount of water consumed by deep-rooted woody vegetation that has minimal economic or environmental value. This vegetation consumes water from a large area, robbing moisture from native grasses and parching the subsoil. The large leaf canopy also intercepts moisture that would otherwise land on the soil. As a result, the brush reduces the potential for runoff and for percolation of moisture into the subsoil that may contribute to aquifer recharge. Brush control removes this vegetation and potentially improves the hydrologic condition of the soil and increases potential for groundwater recharge, especially in water table aquifers like those found in Region B.

6.4.7 Conjunctive Use

Conjunctive use is a strategy that can effectively increase the overall water supply through balancing groundwater demand at critical times with surface water supplies. During times when surface water is plentiful, the groundwater system can recharge or recover. While this strategy may have short-term impacts on groundwater during drought conditions, the potential for extended recovery periods offsets the short-term impact. There are no conjunctive management strategies proposed for Region B.

6.4.8 Advanced Treatment

Advanced treatment typically involves removing salt from various marginal or somewhat brackish sources of water. When this process is implemented, the waste stream will contain concentrated salts. It is proposed that these wastes would be discharged in conjunction with existing wastewater discharges. There may be impacts on downstream water resources if the total daily salt load resulting from this strategy is increased over current levels. An alternative would be disposal in an injection well.

6.4.9 Chloride Control Project

The chloride control project is designed to capture water from the chloride seeps that would otherwise flow into the existing surface water sources. While the project structures would capture highly concentrated chloride, water resources would be improved downstream of the capture points. Therefore, this strategy would have little impact on other water resources.

6.5 Threats to Agricultural and Natural Resources

Region B contains many natural resources including threatened or endangered species; local, state, and other public land; and energy/mineral reserves. In addition, excessive concentrations of total dissolved solids, sulfate, and chloride are a general problem in most streams of the Red River Basin under low flow conditions. Following is a brief discussion of how the 2026 Plan may present threats to agricultural and natural resources.

6.5.1 Agricultural Resources

Region B includes over one million acres of cropland and over three million acres of rangeland. Agriculture is an important part of the economy, lifestyle, and history of Region B. Some entire communities were originally built around agricultural products, and lack of water could dramatically change the nature of these communities. When there is insufficient water to grow range grasses and fill stock tanks, there is a high probability that producers will cull or sell entire herds. If herds are not thinned then overgrazing and introduction of noxious grasses, forbes, and woody vegetation will occur.

6.5.2 Natural Resources

As mentioned in Section 6.4.4, construction of Lake Ringgold has the potential to impact natural resources through inundation of 123 miles of streams and 418 acres of wetlands. Environmental studies will need to be completed in order move forward with this project for federal permitting. Other natural resource impacts may be identified, but as part of the study portion for this project, impacts on natural resources will be evaluated and mitigation designed as needed to offset the impacts.

6.6 Impacts of Moving Water from Agricultural and Rural Areas

The implementation of water management strategies recommended in Chapter 5 of this regional plan is not expected to significantly impact water supplies that are currently in use for agricultural purposes. The voluntary transfer of groundwater from agricultural use to municipal use is predicated on a willing buyer, willing seller basis.

Most of the recommended water management strategies for municipal water users rely on conservation, reuse, voluntary transfers, and the development of Lake Ringgold and the Ogallala Aquifer. Conservation and reuse are protective of existing water supplies, which can delay or eliminate the need for new water. Voluntary transfers rely on existing infrastructure to redistribute water supplies from locations having surplus water to those with anticipated unmet water needs. The development of Lake Ringgold would impact some landowners within the footprint of the reservoir. It is assumed that these landowners would be fairly compensated for their property. When possible, Wichita Falls intends to purchase the lands on a willing buyer and willing seller basis. The Ogallala Aquifer is located within Region A. Thus, the impacts of developing the Ogallala are described in detail in the Region A water plan.

The methodology for assessing the available supply of water for strategies in this regional water plan protects the existing supplies of current users. The plan honors the MAG values adopted for groundwater such that groundwater is protected for current and future use. New surface water supplies were determined using the WAM that protects existing water right holders, including rural and agricultural users.

6.7 Impacts of Recommended Water Management Strategies on Key Water Quality Parameters

This section presents an assessment of the water quality parameters that could be affected by the implementation of water management strategies for Region B. This assessment includes an evaluation of specific water quality parameters that are routinely monitored through the Texas Clean Rivers Program and regulated by the U.S. Clean Water Act. Based on this assessment, the key water quality parameters for each type of strategies are identified. From this determination, the specific water management strategies selected for Region B were evaluated with respect to potential impacts to the key water quality parameters.

6.7.1 Water Conservation

Water conservation is a recommended strategy for irrigation, municipal water and steam electric power use in Region B. Recommended irrigation conservation measures include conversion of canals to pipelines and on-farm conservation. For steam electric power, alternative cooling technologies are recommended. These strategies are not expected to affect water quality adversely. The results should be beneficial because the demand on surface and groundwater resources will be decreased. Municipal conservation should have similar beneficial effects, but at a smaller scale.

6.7.2 Reuse

In general, there are three possible water quality effects associated with the reuse of treated wastewaters:

- There can be a reduction in instream flow if treated wastewaters are not returned to the stream, which could affect TDS, nutrients, and DO concentrations of the receiving stream.
- Conversely, in some cases, reducing the volume of treated wastewater discharged to a stream could have a positive effect and improve levels of TDS, nutrients, DO, and possibly metals in the receiving stream.
- Reusing water multiple times and then discharging it can significantly increase the TDS concentration in the effluent and in the immediate vicinity of the discharge in the receiving stream. Total loading to the stream (i.e. the amount of dissolved material in the waste stream) should not change significantly.

These impacts will vary depending on the quality and quantity of treated wastewater that has historically been discharged to the stream and the existing quality and quantity of the receiving stream.

6.7.3 Voluntary Transfers

Voluntary transfers generally involve the sale of water from one provider to another.

Voluntary transfers of groundwater sources will have minimal impacts on water quality parameters assuming there is no relative change in the amount of groundwater pumped. Impacts on key water quality parameters for large increases in groundwater pumpage to meet contractual sales are discussed in Section 6.7.4 (New and/or Expanded Use of Groundwater Resources).

Pending the location and use of the water under voluntary transfers, changes in locations of return flows (if applicable) could impact flows in receiving streams. Such impacts would be site specific and could be positive or negative, pending the changes.

Generally, these impacts are relative to the quantities of water that are diverted or redistributed. Small quantities are likely to have minimal to no impacts, while large quantities may have measured impacts.

6.7.4 New and/or Expanded Use of Groundwater Resources

The Region B Plan includes a proposal for new groundwater supply wells in the Seymour and Trinity Aquifers. Increased use of groundwater can decrease instream flows if the base flow is supported by spring flow. Increased use of groundwater has the potential to increase TDS concentrations in area streams if the groundwater sources have higher concentrations of TDS or hardness than local surface water and are discharged as treated effluent. However, this is regulated by the State under its wastewater discharge requirements. Generally, wastewater discharged to a state water course cannot exceed the stream standards of the receiving stream.

6.7.5 Development of New Surface Water Supplies

One proposed new surface water project is included in the Region B Plan. The construction of Lake Ringgold may include the modification of existing upstream wastewater plants to ensure protection of the water quality in the reservoir.

6.7.6 Brush Control

Brush control is a potentially feasible strategy for the Wichita River upstream of Lake Kemp and the Little Wichita River Watershed upstream of Lake Arrowhead. Impacts to the water quality of area streams will depend upon the methods employed to control the brush. It is assumed that chemical spraying will not be used near water sources. Mechanical removal, prescribed burns and use of the salt cedar beetle are the preferred methods near water sources. With these assumptions, the likelihood of contaminating water sources with chemicals is very low. Increases in stream flow due to reduced evapotranspiration associated with the removed brush should improve water quality in these watersheds.

6.7.7 Conjunctive Use

There are no conjunctive management strategies proposed for Region B.

6.7.8 Advanced Treatment

At this time, it is not anticipated that there will be any advanced treatment needed for strategies in Region B. Any potential amount of proposed discharge is not expected to have impacts to key water quality parameters.

6.7.9 Precipitation Enhancement

Precipitation enhancement is considered as part of the irrigation conservation strategies. These operations are already in progress, so there are no expected changes in water quality associated with this strategy.

6.7.10 Chloride Control Project

The Chloride Control Project is a recommended strategy for irrigation in Wichita County. The sole purpose of the project is to improve the overall water quality in the Wichita River Basin. This project would have a positive impact on the water quality within the region.

6.8 Impacts on Navigation, Existing Water Contracts, and Option Agreements

In accordance with Section 10 of the Rivers and Harbors Act of 1899, navigable waters are those waters that are subject to the ebb and flow of the tide and/or are presently being used or have been used in the past for use to transport interstate or foreign commerce. In Region B, the major river is the Red River. The Red River is not considered navigable within Region B. Therefore, the Region B Water Plan does not have an impact on navigation.

The Region B Water Plan protects existing water contracts and option agreements by reserving the contracted amount included in those agreements where those amounts were known. In some cases, there were insufficient supplies to meet existing contracts. In those cases, water was reduced proportionately for each contract holder. For entities with shortages, water management strategies were recommended to meet deficits in contractual obligations.

6.9 Summary of Identified Water Needs that Remain Unmet

Table 6-1 summarizes the unmet water needs by water use and county in Region B. The reported numbers represent the remaining quantity of water needed after implementing the recommended strategies described in Chapter 5.

While preliminary calculations also identified unmet municipal needs and irrigation needs, these needs were satisfied through water management strategies such as municipal conservation, irrigation conservation, voluntary transfers, and the development of Lake Ringgold and drilling additional wells to supply water from identified groundwater sources. Accordingly, only a small unmet need is identified early in the planning period before Lake Ringgold is constructed. These unmet needs are shown in Table 6-1. All potentially feasible WMSs were considered to meet these needs, including drought management. Conservation was considered and recommended as a strategy to help reduce the unmet needs and protect the human health and safety of the residents of Wichita Falls and Bowie. Drought management was also considered for all entities but was not considered feasible for meeting long-term growth in demands. Instead, it is intended and encouraged to be used as means to reduce water usage during drought emergencies, such as a repeat of the drought of record, through the implementation of the entity's Drought Contingency Plan.

Wichita Falls will have no unmet needs after Lake Ringgold is online in 2040. Wichita Falls will ensure public health, safety, and welfare of their customers in the 2030 planning decade through enhanced drought management measures as outlined in their Drought Contingency Plan. The City of Bowie has unmet needs beginning in 2060. The City currently has no plans to develop or implement any further WMSs to address this unmet need.

The Region B RWPG is unaware of any plans to amend the plan to address these unmet municipal needs. However, conditions may change and cause an entity to request such a change, or the entity may choose to wait to incorporate any new information in the 2031 Regional Water Plans.

Table 6-1: Summary of Unmet Water Needs by Water Use
-Values in ac-ft/yr-

COUNTY	WATER USE	2030	2040	2050	2060	2070	2080
Wichita	Municipal – Wichita Falls	1,338	0	0	0	0	0
Montague	Municipal - Bowie	0	0	0	85	183	288
Total		**1,338**	**0**	**0**	**85**	**183**	**288**

6.10 Consistency with Long-term Protection of the State's Water, Agricultural, and Natural Resources

The objective of this section is to address how the selected water management strategies are consistent with protection of water resources, agricultural resources, and natural resources within and beyond the boundaries of the Regional Planning Area.

In developing the Region B Water Plan, the RWPG balanced meeting water shortages with good stewardship of water, agricultural, and natural resources within the region. During the strategy selection process, long-term protection of the State's resources was considered through assessment of environmental impacts, impacts to agricultural and rural areas and impacts to natural resources. The identification and development of strategies considered the maintenance or improvement of the water quality of sources in Region B, which is consistent with the state water quality management plan. Existing in-basin or region supplies were utilized as feasible before recommendations for new water supply projects. The proposed conservation and reuse measures for municipalities, irrigators, mining and steam electric power operators will continue to protect and conserve the State's resources for future water use. Discussion of how the plan addresses threats and impacts to the State's resources within Region B is presented in Sections 6.3 through 6.5. The following sections discuss the consistency with these protections by resource.

6.10.1 Water Resources

The primary water management strategies that may have an impact beyond the boundaries of Region B are those that impact the surface water resources of a stream that flows well beyond the region. For this planning region that is the Red River. Strategies that may produce impacts beyond the limits of the region include:

- **Water reuse.** Potentially reduces downstream flows and may increase water quality concerns downstream.

- **Lake Ringgold.** Could reduce flows in the Red River downstream of the dam. Analyses conducted as part of the water rights indicated that impacts would be minimal.

- **Advanced treatment.** May produce a waste that flows downstream and potentially creates water quality concerns.

Potential impacts to surface water-groundwater interactions are minimized due to the lack of defined groundwater aquifers in areas of Region B where there are surface water projects. The Seymour Aquifer, which is a shallow alluvium formation, is known to have connectivity to adjacent surface waters. This interaction is dependent upon specific conditions at the project location. The following projects have the potential to impact the connectivity between surface water and groundwater:

- **Seymour Aquifer – Managed Aquifer Recharge Project.** The Rolling Plains Groundwater Conservation District is pursuing development of a managed aquifer recharge project to increase the availability of local groundwater supplies for irrigation in Baylor County. This strategy would capture local stormwater runoff in large detention basins and gradually recharge the water into the aquifer. The potential impacts would be small decreases in streamflow immediately following a storm event but would provide a significant increase in groundwater supply.

- **Wichita River Diversion.** Potential reductions in flows in the Little Wichita River downstream of the dam may reduce groundwater recharge. However, during drought it appears that the local aquifer is recharging the surface water and would help support this project. These potential impacts would be temporary as both stream flows and aquifer storage will be recharged during rain events.

6.10.2 Agricultural Resources

The selected water management strategies are not expected to create concerns for agricultural resources at the statewide level.

6.10.3 Natural Resources

The selected water management strategies are not expected to create concerns for natural resources at the statewide level. However, threatened and endangered species, parks and public lands, and energy/mineral resources are addressed individually below.

Threatened/Endangered Species

A list of species of special concern, including threatened or endangered species, located within Region B is contained in Table 1-13. Included are ten species of birds, four mammals, two reptiles, one amphibian, two fish, and one mollusk. In general, most WMSs planned for Region B will not affect threatened or endangered species. Development of a new reservoir in the region could affect threatened or endangered species and their habitats. However, the development of any reservoir requires extensive environmental impact studies that address potential effects on threatened or endangered species. Any such impacts indicated by these studies would need to be mitigated in accordance with federal and state environmental regulations in order for the reservoir project to be allowed.

Parks and Public Lands

The Copper Breaks State Park is located in Hardeman County and the Lake Arrowhead State Park is located in Clay County. In addition, there are numerous local (e.g., city or county parks) recreational facilities, and other local public lands located throughout the region. None of the water management strategies currently proposed for Region B is expected to adversely impact state or local parks or public land.

Energy/Mineral Reserves

The Texas Railroad Commission reports that Region B has approximately 14,954 regular producing oil wells and 1,283 regular producing gas wells. Table 1-11 provides a tabulation by county of the current oil and gas wells, as of February 2019. These wells are largely in the Barnett Shale. In addition, Georgia-Pacific Corporation operates a gypsum mine in Hardeman County. It is anticipated that the water management strategies will not adversely impact either the oil and gas exploration and production activity within the region or the gypsum mine.

6.11 Consistency with State Water Planning Guidelines

To be considered consistent with long-term protection of the State's water, agricultural, and natural resources, the Region B Water Plan must also be determined to be in compliance with provisions of 31 TAC Chapter 357. The information, data, evaluation, and recommendations included in Chapters 1 through 5 and, Chapters 7 through 9 of the 2026 Plan collectively demonstrate compliance with these regulations. To more clearly demonstrate compliance, Region B has developed a matrix addressing the specific recommendations contained in the referenced regulations. Appendix D contains a completed matrix or checklist highlighting each pertinent paragraph of the regulations. The content of the 2026 Plan has been evaluated against this matrix.

DRAFT

CHAPTER 7 DROUGHT RESPONSE INFORMATION, ACTIVITIES, AND RECOMMENDATIONS

7.1 Introduction

Drought response and management have long been important aspects of regional water planning. The extensive drought experienced in Texas during the 2010-2015 timeframe, however, served to re-focus attention on the need for comprehensive consideration of drought management measures. Requirements for improved drought planning in the State through the regional water planning process are found in Title 31 of the Texas Administrative Code (TAC), Part 10, Chapter 357, Subchapter D. Specifically §357.42 of Subchapter D includes requirements related to drought response information, activities, and recommendations. This chapter of the regional plan addresses the requirements found in §357.42.

This chapter also addresses the recommendations of the Drought Preparedness Council (DPC) in a letter dated February 8, 2024. This Chapter of the Regional Plan generally follows the outline template provided by the TWDB for Chapter 7, satisfying the first recommendation of the DPC. The DPC also recommended that region specific model drought contingency plans be developed for all water use categories in the region that account for more than 10 percent of water demands in any decade. For Region B the water use categories that satisfy this requirement include municipal use and irrigation use. Region B specific model drought contingency plans were developed for municipal use and irrigation use and are discussed in Section 7.7.2.

Region B was significantly impacted by drought during 2010-2015, and although the drought subsided during the late spring and summer of 2015 as major water supply reservoirs were filled, the region can rapidly return to a drought status with seasonal or longer periods of drought occurring frequently.

7.2 Droughts of Record

A central principle of regional water planning is that the availability of water sources is determined for drought-of-record conditions. State-wide, the drought of the 1950's is often considered the drought of record, but on regional or sub-regional basis, other periods of time may be demonstrated to have been more severe. Chapter 7 includes a detailed examination of preparations for and responses to drought conditions in the region, as required by §357.42. Such an examination begins with identification of significant recent droughts within the region.

Numerous definitions of drought have been developed to describe drought conditions based on various factors and potential consequences. In the simplest of terms, drought can be defined as "a prolonged period of below-normal rainfall." However, the State Drought Preparedness Plan provides more specific and detailed definitions:

- Meteorological Drought. A period of substantially diminished precipitation duration and/or intensity that persists long enough to produce a significant hydrologic imbalance.

- Agricultural Drought. Inadequate precipitation and/or soil moisture to sustain crops, livestock, or forage production systems. The water deficit results in serious damage and economic loss to plant and animal agriculture. Agricultural drought usually begins after meteorological drought but before hydrological drought and can also affect livestock and other agricultural operations.

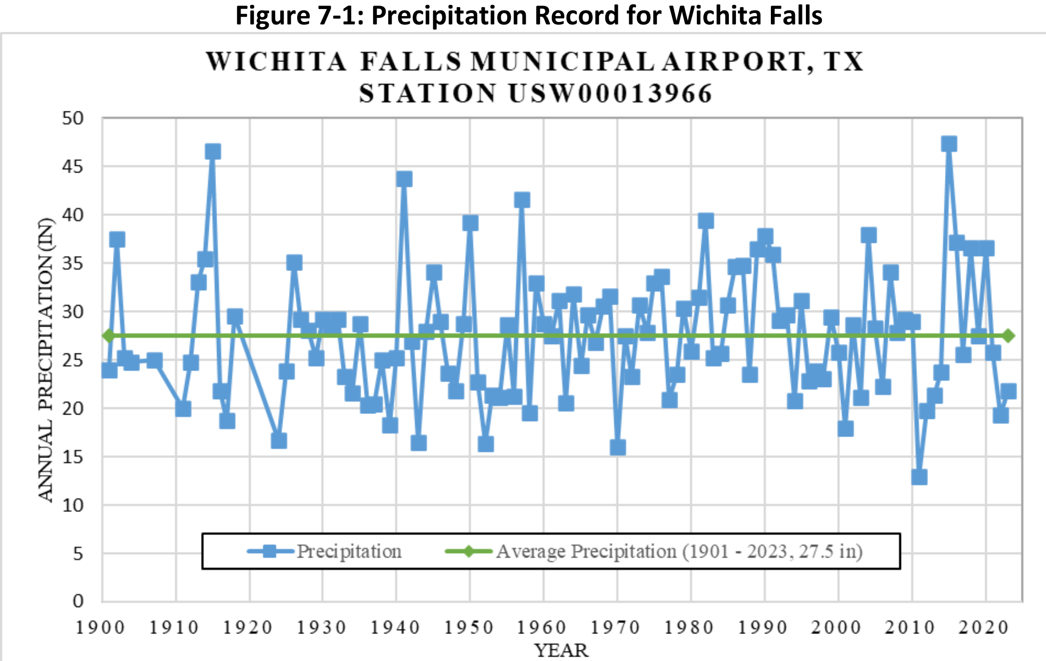
- Hydrological Drought. Refers to deficiencies in surface and subsurface water supplies. It is measured as streamflow, and as lake, reservoir, and groundwater levels. There is usually a lack of rain or snow and less measurable water in streams, lakes, and reservoirs. Hydrological measurements are not the earliest indicators of drought.

- Socioeconomic Drought. Occurs when physical water shortages start to affect the health, well-being, and quality of life of the people, or when the drought starts to affect the supply and demand of an economic product.

These definitions are not mutually exclusive and provide valuable insight into the complexity of droughts and their impacts. They also help to identify factors to be considered in the development of appropriate and effective drought preparation and contingency measures.

Regional water planning primarily addresses meteorological, agricultural, and hydrological drought and response to these conditions to avoid socioeconomic drought. Figure 7-1 shows the long-term precipitation for Wichita Falls. This data set shows that the average precipitation in the area is 27.5 inches. The minimum annual rainfall documented during this period was 13.0 inches in 2011. The maximum annual rainfall recorded was 47.4 inches during 2015, which allowed the area to recover from the drought of record (2011) for this sub-region of the state.

Figure 7-1: Precipitation Record for Wichita Falls



Source: https://www.ncdc.noaa.gov/cdo-web/datasets#GSOY, Accessed November 2024.

It can be noted that there were significant periods of low and high rainfall from 1905 to 1930, but this was prior to development of many of the current water supply sources. The minimal rainfall that occurred in 2011 is also less than any annual rainfall total since 1901.

7.2.1 Current Droughts of Record

As described in Chapter 3, the surface water supplies for the regional water plans were determined using the TCEQ-approved Water Availability Models (WAM).[1] For example, the firm yield of a reservoir is the greatest amount of water a reservoir can supply on an annual basis without shortage during a repeat of historical hydrologic conditions, particularly the drought of record. The WAMs that cover the majority of surface water resources in Region B (Brazos and Red River Basins) have been updated to incorporate historical hydrologic conditions that occurred between 1940 and 2018. However, the Trinity River WAM has not been updated to incorporate recent hydrologic condition beyond 1996. The droughts of record that were used to evaluate currently available water supplies (Chapter 3) are provided in Table 7-1.

The drought of record can be different for different geographic locations. Based on the current data it appears there have been two primary droughts of record in Region B:

- The drought of the 1950s in the southeastern portion of the region.
- The more recent drought with initiation dates varying from 1993 to 2010 depending upon the location within the remainder of the region.

Table 7-1: Current Droughts of Record for Water Supply Reservoirs

Reservoir Name	Date Last Full [1]	Date of Minimum Content	Drought of Record
Amon Carter [2]	June 1951	March 1957	1951 - 1957
Arrowhead	May 2010	February 2015	2010 - 2015
Kemp	November 2010	March 2015	2010 - 2016
Kickapoo	May 2010	June 2014	2010 - 2015
Olney/Cooper	June 1993	April 2015	1993 - 2015
Nocona	March 2001	February 2015	2001 - 2015

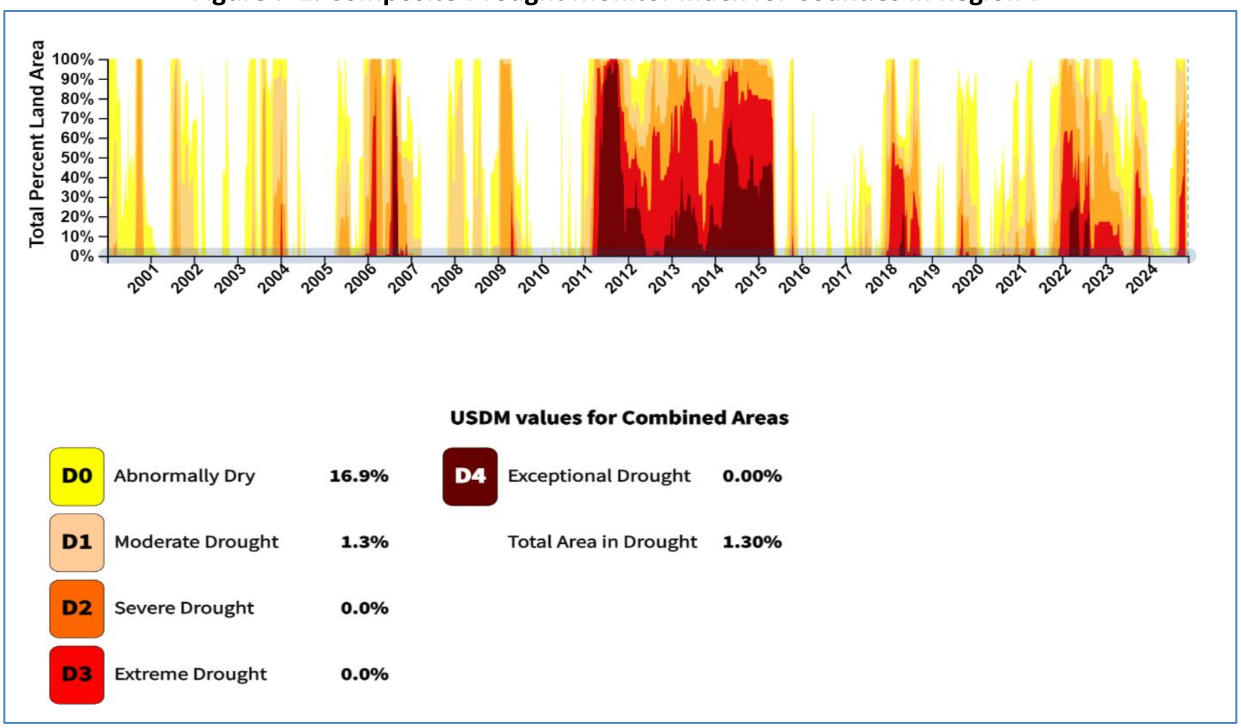
[1] The Date Last Full is based on the safe yield analyses. (Note: Safe yield analyses assume the reservoir is full at the beginning of the simulation.)
[2] Hydrology for Amon Carter is based on the Trinity WAM period of record (1940-1996) and was not extended.

7.2.2 Recent Droughts in the Region

There are many ways to measure drought, including the U.S. Drought Monitor index, the Palmer Hydrological Drought Index, and reservoir water levels. These three indicators were reviewed to identify significant droughts in Region B since the mid-1990's.

The Drought Monitor is a composite index that is calculated weekly based on measurements of climatic, hydrologic, and soil conditions, as well as reported impacts and observations from more than 350 contributors around the country.[2] The Drought Monitor was initiated in 2000, and data can be obtained for each county in the United States. Figure 7-2 shows a composite Drought Monitor index calculated for the counties in Region B over the period of record. This composite index shows the percentage of the land area in the affected counties that experienced different levels of drought. The Drought Monitor index indicates that about 50 percent of region continued with Extreme Drought or Exceptional Drought conditions from early 2011 through the start of 2015. Over 95 percent of the region experienced Exceptional Drought conditions from late July through early October 2011 with about 25 percent of the region being in Extreme or Exceptional Drought continuously from July 2011 through May 2015. Shorter periods of Severe or Extreme drought have occurred since May 2015 with about 60 percent of the region experiencing Severe Drought in 2022.

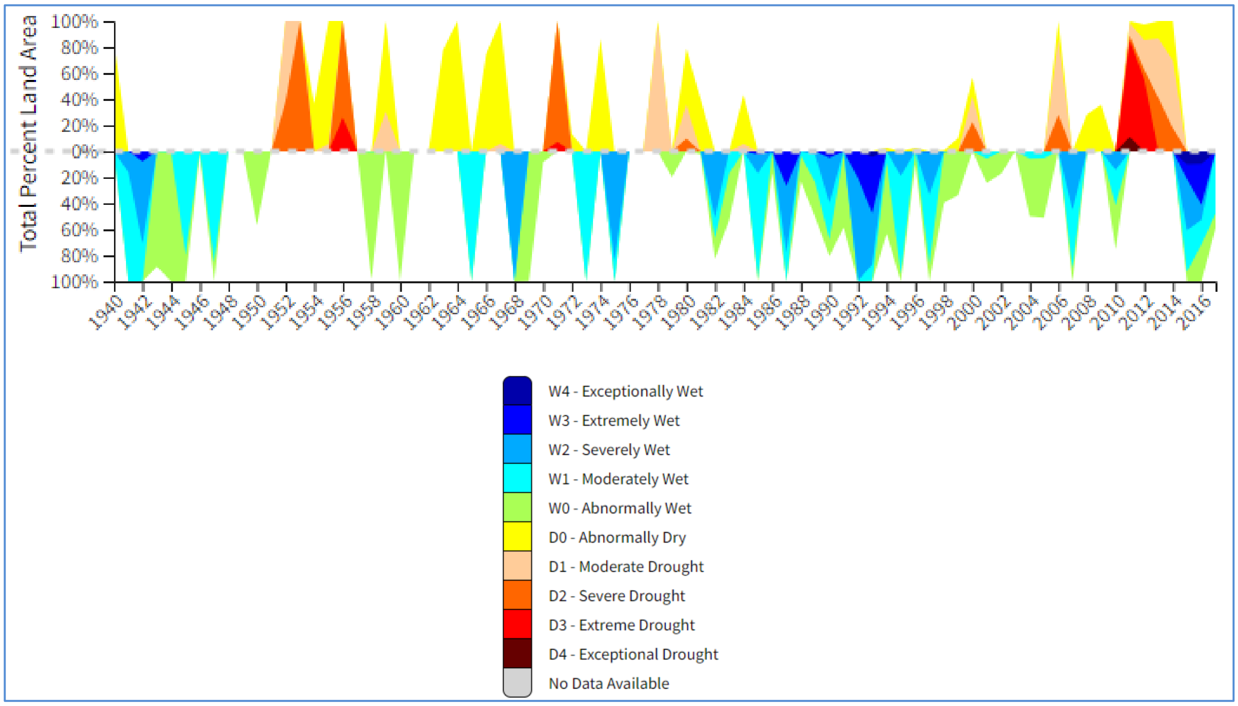
Figure 7-2: Composite Drought Monitor Index for Counties in Region B



Source: National Integrated Drought Information System.
URL: https://www.drought.gov/historical-information?dataset=0&selectedDateUSDM=20241126&state=Texas,Texas,Texas,Texas,Texas,Texas,Texas,Texas,Texas,Texas,Texas&countyFips=48009,48023,48077,48101,48155,48197,48269,48337,48485,48487,48503; accessed November 2024.

Compared to climatic effects of drought, the hydrological effects, such as lower reservoir and groundwater levels, take longer to develop and longer still for recovery. The Palmer Modified Drought Index (PMDI) was developed as an indicator of the long-term cumulative moisture supply. The PMDI is available for a much longer term through correlation to tree ring and other paleo data. The PMDI can be developed specifically for the counties in Region B. Figure 7-3 shows the PMDI for Region B.

Figure 7-3: Palmer Modified Drought Index for Region B



Source: National Integrated Drought Information System, URL: https://www.drought.gov/historical-information?dataset=2&selectedDateUSDM=20241126&selectedDateSpi=20240901&selectedDatePaleo=20170101&state=Texas,Texas,Texas,Texas,Texas,Texas,Texas,Texas,Texas,Texas&countyFips=48009,48023,48077,48101,48155,48197,48269,48337,48485,48487, accessed November 2024.

The PMDI reflects extended droughts during the 1950s and 2010-2015 with many shorter-term droughts occurring during the period of record. According to the PMDI, the peak (largest and darkest red spike) of the 2010-2015 drought was slightly more severe in Region B than the drought in the 1950s. The drought in the 1950s was actually two drought periods close together or a longer drought interrupted by a period of near normal conditions.

7.2.3 Uncertainty and Drought Worse than the Drought of Record

The water user groups in Region B have previously experienced a drought worse than the drought of record (DWDOR). During the period 1993-2015 a new drought of record (DOR) occurred. This drought of record is now incorporated in modeling and planning data for most water supplies in the region. Since the Trinity River WAM has not yet been updated to include this hydrologic period the supplies within the Trinity basin have not been evaluated against the new DOR.

There is a level of uncertainty associated with any type of modeling and using historical conditions to predict future conditions. The Region has taken steps through this planning process and with individual WUGs to address this uncertainty and enhance resilience in case of a DWDOR. Those steps include:

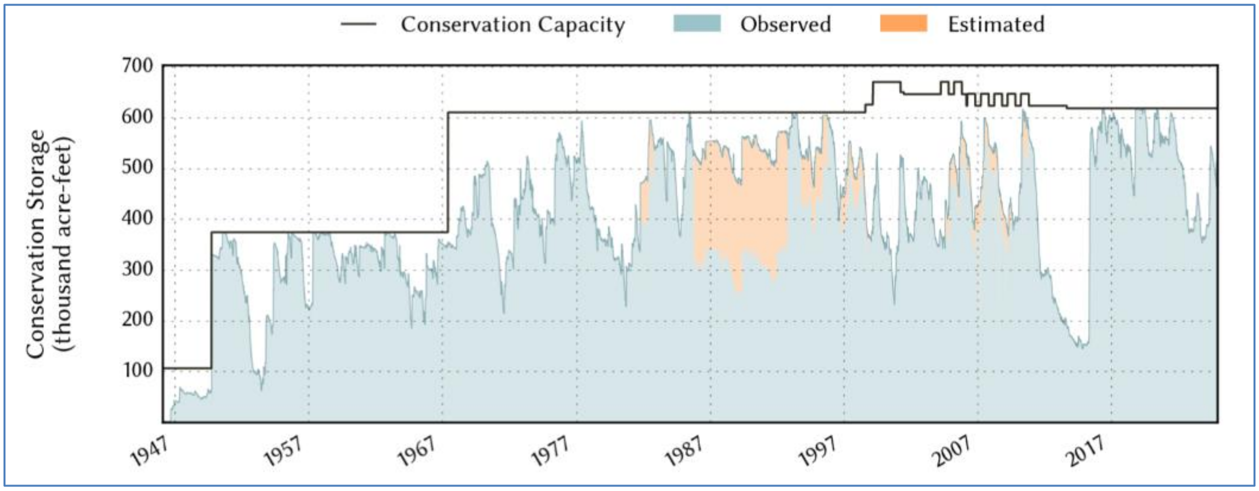
1. Using a defined Safe Yield for modeling surface water supplies. This approach considers maintaining some water in reserve to help endure just such an occurrence. A firm yield analysis would essentially drain surface water supplies to empty just as refilling rains begin to occur, and this approach does not provide a safety factor for an occurrence such as a DWDOR.
2. As it became apparent that the region may be entering a DWDOR, the WUGs within the region took immediate steps to implement emergency water supplies. This included actions by the major water providers to protect and extend existing supplies. WCWID#2 curtailed irrigation and the City of Wichita Falls undertook a direct potable reuse project to supplement supply from the reservoirs.
3. All WUGS within the region implemented measures within drought contingency plans to the highest levels. The result was that water supplies were effectively extended to meet needs through the end of the DWDOR.

It is expected that all WUGS within the region will take similar actions to address a DWDOR in the future.

Another means of considering the drought is the impact on specific water sources. The total reservoir storage in Region B over the period of record is presented in Figure 7-4.[4] This figure indicates that the total conservation storage available within the region has increased as the result of constructing additional reservoirs. However, the available water supply dropped to about 150,000 acre-feet during the recent drought (2010-2015). During the drought of the 1950s, less than 100,000 acre-feet remained in storage, but with much less total available reservoir storage capacity.

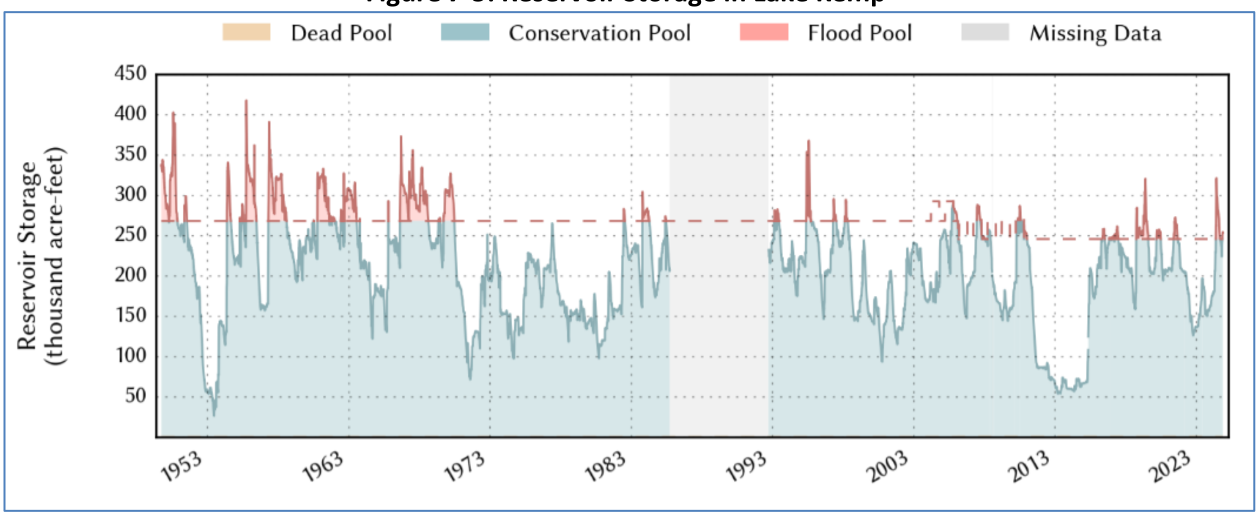
Figure 7-5 provides the reservoir storage volume for Lake Kemp, which is one of the oldest and largest reservoirs serving Region B. Since about 1970, the reservoir has seldom been filled above the conservation pool level. The recent drought (2010-2015) caused a significant prolonged reduction in available water supply stored in Lake Kemp.

Figure 7-4: Composite Reservoir Storage in Region B



Source: Texas Water Development Board: Region B Planning Region Reservoirs, URL: http://waterdatafortexas.org/reservoirs/region/region-b, accessed November 2024.

Figure 7-5: Reservoir Storage in Lake Kemp



Source: Texas Water Development Board: Region B Planning Region Reservoirs, URL: http://waterdatafortexas.org/reservoirs/individual/kemp, accessed November 2024.

All drought indicators discussed in this section support a determination that the 2010-2015 period is the most significant drought, and established the new drought of record for Region B.

7.3 Summary of Current Drought Triggers

The majority of the drought contingency plans in Region B use trigger conditions based on the state of water supply sources. For surface water sources the drought triggers are specific reservoir levels or volumes. For groundwater sources, the drought triggers are based on groundwater production capacity. Drought triggers for each of the surface water sources and information regarding the managing entity for each source follows. Where appropriate, the RWPG recommended retaining the triggers by stage currently in place in drought contingency plans adopted by entities responsible for managing the water source.

7.3.1 Lake Kickapoo and Lake Arrowhead

The City of Wichita Falls operates Lake Kickapoo and Lake Arrowhead. The following describes the existing drought stages triggers in these lakes under the City's DCP:

- Stage 1 – "Drought Watch" combined storage reaches 65% of conservation capacity.
- Stage 2 – "Drought Warning" combined storage reaches 50% of conservation capacity.
- Stage 3 – Drought Emergency" combined storage reaches 40% of conservation capacity.
- Stage 4 – "Drought Disaster" combined storage reaches 30% of conservation capacity.
- Stage 5 – "Drought Catastrophe" combined storage reaches 25% of conservation capacity.

7.3.2 Lake Kemp

The Wichita County Water Improvement District No. 2 operates Lake Kemp. The following describes the existing drought stages triggers for this lake under the District's DCP:

- Stage 1 – Voluntary Water Conservation
Lake elevation: 1,144 ft to 1,139.5 ft msl (100% to 75%)
- Stage 2 – Severe Water Shortage
Lake elevation: 1,139.35 ft to 1,132.25 ft msl (74% to 50%)
- Stage 3 – Critical Water Shortage
Lake elevation: 1,131.90 ft to 1,126.55 ft msl (49% to 36%)
- Stage 4 – Emergency Water Shortage
Lake elevation: 1,126.10 ft to 1109.85 ft msl (35% to 10%)
- Stage 5 – City of Wichita Falls
Lake elevation: below 1,109.65 ft (9.7%)

7.3.3 Petrolia City Lake

The City of Petrolia operates Petrolia City Lake. The following describes the existing drought stages triggers for this lake under the City's DCP:

- Stage 1 – Lake storage drops below 60% capacity
- Stage 2 – Lake storage drops below 50% capacity
- Stage 3 – Lake storage drops below 35% capacity

7.3.4 Lakes Olney and Cooper

The City of Olney operates Lakes Olney and Cooper which are adjoining reservoirs. The following describes the existing drought stages triggers for Lake Olney under the City's DCP:

- Stage 1 – Lake elevation drops below 1,141.4 ft msl

- Stage 2 – Lake elevation drops below 1,139.4 ft msl
- Stage 3 – Lake elevation drops below 1,136.4 ft msl
- Stage 4 – Lake elevation drops below 1,133.4 ft msl
- Stage 5 – when the City Council determines that a water supply emergency exists due to a system failure or contamination of the water source.

7.3.5 North Fork Buffalo Creek Lake

The City of Iowa Park operates North Fork Buffalo Creek Lake. The lake is no longer used for municipal water supply and there are no longer trigger conditions identified for this reservoir. The City of Iowa Park has adopted a DCP that follows the DCP triggers for Wichita Falls.

7.3.6 Lake Electra

The City of Electra operates Lake Electra. The lake is no longer used for municipal water supply and there are no longer trigger conditions identified for this reservoir. The City of Electra has adopted a DCP that follows the DCP triggers for Wichita Falls.

7.3.7 Lake Amon G. Carter

The City of Bowie operates Lake Amon G. Carter. The following describes the existing drought stages triggers in this lake under the City's DCP:

- Stage 1 – Lake elevation drops below 917 feet msl
- Stage 2 – Lake elevation drops below 913 feet msl
- Stage 3 – Lake elevation drops below 909 feet msl
- Stage 4 – Lake elevation drops below 905 feet msl.
- Stage 5 – Emergency, major water production or distribution limitations.

7.3.8 Greenbelt Reservoir

The Greenbelt Municipal and Industrial Water Authority (GMIWA) operates Greenbelt Reservoir, which is located in Region A. Several of the water suppliers in Region B obtain water from Greenbelt Reservoir and have adopted DCPs based on the GMIWA DCP. The following describes the existing drought stages triggers under the GMIWA's DCP:

- Stage 1 – Mild water shortage, lake elevation reaches 2,634.0 ft msl
- Stage 2 – Moderate water shortage, lake elevation drops below 2,631.0 ft msl
- Stage 3 – Severe water shortage, lake elevation drops below 2,628.0 ft msl
- Stage 4 – Emergency water shortage, lake elevation drops below 2,625.0 ft msl

7.3.9 Groundwater Sources

Drought contingency plans are addressed for the following groundwater conservation districts:

- Gateway Groundwater Conservation District
- Rolling Plains Groundwater Conservation District
- Upper Trinity Groundwater Conservation District

Gateway Groundwater Conservation District

The Gateway Groundwater Conservation District has adopted rules that indicate the district will provide drought severity information to all groundwater users in the district. The Palmer Drought severity index value will updated on the District's web site on a bi-monthly basis.

Rolling Plains Groundwater Conservation District

The Rolling Plains Groundwater Conservation District primarily serves an agricultural area and has adopted a philosophy that water conservation is a continuous operating principle, and that all agricultural producers are to make every effort to conserve groundwater. Due to the significant impact that drought can have on agricultural producers, the district has adopted an operating policy that it will not limit groundwater use during drought periods beyond the limits provided by district rules.

Upper Trinity Groundwater Conservation District

The Upper Trinity Groundwater Conservation District has adopted the objective of performing a monthly review of drought conditions as posted by the TWDB on the Board's web site. In addition, the District will complete an annual review of drought conditions within the district and include this information in the Annual Report to the Board of Directors and will post the information on the District's web site.

7.4 Current Drought Preparations and Response

In 1997, the Texas Legislature directed the TCEQ to adopt rules establishing common drought plan requirements for water suppliers in response to drought conditions throughout the state. Since 1997, the TCEQ has required all wholesale public water suppliers (TAC §288.30.6), retail public water suppliers serving 3,300 connections or more (TAC §288.30.5.A), and irrigation districts (TAC §288.30.7) to submit drought contingency plans.[5] All drought contingency plans should be updated every five years and be available for inspection upon request. The most recent updates were to be submitted to the TCEQ by May 1, 2019.

All wholesale water providers and larger retail municipalities in Region B have taken steps to prepare for and respond to drought through the preparation of individual Drought Contingency Plans and by taking the necessary steps to implement the Drought Contingency Plans. The plans are required to specify quantifiable targets for water use reductions for each stage, and a means and method for enforcement.

7.4.1 Entities Required to Have DCPs

Table 7-2 is a list of all entities required to have DCPs, indicates which water suppliers are required to submit the DCP to Region B, and which suppliers have voluntarily provided a copy of the DCP to the Region B.

Table 7-2: Region B Water Suppliers Required to Maintain Drought Contingency Plans

REGULATED ENTITY	COUNTY	REQUIRED TO SUBMIT DCP TO REGION B	DCP SUBMITTED TO REGION B
Amon G Carter Lake WSC	Montague		
Archer County MUD 1	Archer		
Baylor SUD	Baylor	Yes	Yes
Bluegrove WSC	Clay		
Charlie WSC	Clay		
City of Archer City	Archer	Yes	Yes
City of Bellevue	Clay		
City of Bowie	Montague	Yes	Yes
City of Burkburnett	Wichita	Yes	Yes
City of Byers	Clay	Yes	No
City of Chillicothe	Hardeman		
City of Crowell	Foard		
City of Electra	Wichita	Yes	Yes
City of Henrietta	Clay	No	Yes
City of Holliday	Archer	Yes	Yes
City of Iowa Park	Wichita	Yes	Yes
City of Lakeside City	Archer	Yes	Yes
City of Megargel	Archer		
City of Nocona	Montague	Yes	Yes
City of Olney	Young		
City of Paducah	Cottle	Yes	No
City of Petrolia	Clay		
City of Quanah	Hardeman		
City of Saint Jo	Montague	Yes	No
City of Scotland	Archer		
City of Seymour	Baylor	Yes	Yes

REGULATED ENTITY	COUNTY	REQUIRED TO SUBMIT DCP TO REGION B	DCP SUBMITTED TO REGION B
City of Vernon	Wilbarger	Yes	Yes
City of Wichita Falls	Wichita	Yes	Yes
Dean Dale SUD	Clay	Yes	Yes
Forestburg WSC	Montague		
Friberg-Cooper WSC	Wichita		
Gateway GWCD	Hardeman		
Greenbelt Municipal & Industrial Water Authority	Montague	Yes	Yes
Harrold WSC	Wilbarger	Yes	No
Horseshoe Bend Estates	Wichita		
King Cottle WSC	Cottle		
Montague Water System	Montague		
Nocona Hills WSC	Montague		
North Montague County WSD[1]	Montague	Yes	Yes
Northside WSC	Wilbarger		
Oak Shores Water System	Montague		
Oklaunion WSC	Wilbarger		
Red River Authority of Texas	Multiple	Yes	Yes
RRA Arrowhead Lake Lots	Clay		
RRA Box Community Water System	Wilbarger		
RRA Farmers Valley Water System	Wilbarger		
RRA Foard County Water System	Foard		
RRA Goodlett Water System	Hardeman		
RRA Guthrie Dumont Water System	King		
RRA Hinds Wildcat Water System	Wilbarger		
RRA Lockett Water System	Wilbarger		
RRA Medicine Mound Water System	Hardeman		

REGULATED ENTITY	COUNTY	REQUIRED TO SUBMIT DCP TO REGION B	DCP SUBMITTED TO REGION B
RRA New Goodlett Water System	Hardeman		
RRA Northeast Quanah Water System	Hardeman		
RRA Ringgold	Montague		
RRA Southwest Quanah Water System	Hardeman		
Rolling Plains GCD	Baylor		
Sheppard Air Force Base	Wichita	Yes	No
Sunset Water System	Montague		
Thalia WSC	Foard		
Town Of Pleasant Valley	Wichita		
Upper Trinity GCD	Montague		
Wichita County WID#2	Wichita	Yes	Yes
Waterco	Montague		
Wichita Valley WSC	Wichita		
Windthorst WSC	Archer		

1. The State Legislature is dissolving this district by the end of 2019. The City of Nacona will take over their responsibilities in 2020.

7.4.2 Water Use Reduction Targets

Stage 1 water use reduction targets range from 5 to 20 percent of total water use. Water use reduction targets in the final stage range from 30 to 60 percent of total water use. In some cases the final stage includes water rationing or reduction to a specific water production limit, which results in even greater water savings. Some WUGs do not list a reduction target for the final stage, but these plans indicate that water use limits will be based on the available supply. Table 7-3 includes a summary of the basis for drought triggers, the drought triggers for each stage and the conservation goals for each stage included in the DCPs for entities in Region B that have provided copies to the RWPG. This table also indicates the first stage where mandatory measures are required.

Table 7-3: Drought Trigger Conditions and Goals Documented in Drought Contingency Plans

ENTITY	TRIGGER BASED ON:		FIRST STAGE WITH MANDATORY MEASURES	DROUGHT STAGE TRIGGERS BY STAGE (S. SUPPLY; D. DEMAND) / *PERCENT REDUCTION GOAL*					
	SUPPLY	DEMAND		STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6
City of Archer City	Arrowhead & Kickapoo	Demand	1	S. <= 60% D. >= 105%	S <= 50% D. >= 110%	S. <= 40% D. >= 115%	S. <= 30% D. >= 120%	S. <= 25% D. >= 120%	-
				N/A	*Surcharge*	*Surcharge*	*Surcharge*	*Surcharge*	-
City of Bowie	Lake Amon G. Carter	Demand	2	S. <= 917 ft D. >= 85%	S. <= 913 ft D. >= 90%	S. <= 909 ft D. >= 100%	S. <= 905 ft D. >= 110%	Source Contamination	-
				5%	*15%*	*25%*	*35%*	*As Needed*	-
City of Burkburnett	Notice from Wichita Falls	Total Demand	2	May 1-Sept 30 Annually	D. >= 21 MG for 10 days	D. >= 24 MG for 10 days	D. >= 27 MG for 10 days	D. >= 30 MG for 10 days	Public Health Threat
				5%	*15%*	*35%*	*45%*	*50%*	*Rationing*
City of Electra	Arrowhead & Kickapoo	Demand	1	S. <= 60% D. >= 90%	S. <= 50% D. >= 90%	S. <= 40% D. >= 90%	S. <= 30% D. >= 100%	S. <= 25%	-
				5%	*15%*	*35%*	*45%*	*55%*	
City of Henrietta	Arrowhead Volume	Demand	2	S. <= 60% D. >=1.2 MGD	S. <= 50% D. >=1.3 MGD	S. <= 40% D.>=1.35MGD	S. <= 30% and D.>=1.38MGD	S. <= 25%	-
				-	-	-	-	-	
City of Iowa Park		Demand	2	WF @ Stg 1 or D.>= 90% for	WF @ Stg 2 or D.>= 90% for	WF @ Stg 3 or D.>= 90% for	WF @ Stg 4 or D.>= 100%	WF @ Stg 5	-

ENTITY	TRIGGER BASED ON:		FIRST STAGE WITH MANDATORY MEASURES	DROUGHT STAGE TRIGGERS BY STAGE (S. SUPPLY; D. DEMAND)					
				PERCENT REDUCTION GOAL					
	SUPPLY	DEMAND		STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6
	Notice from Wichita Falls (WF)			3 days	3 days	3 days			
				5%	*15%*	*35%*	*45%*	*55%*	
City of Nocona	Lake Nocona Levels	Treatment Capacity	2	May1 to Sep30 Annually	Lake 824 ft or D: >=85%	Lake 822 ft or D: >=70%	Lake 819 ft or D: >=50%	Lake 817 ft or D: >=40%	As Needed
				30%	*15%*	*30%*	*50%*	*60%*	*As Needed*
City of Olney	Lake Cooper & Wichita Falls Stage	-	2	S. <= 1141.4 ft	S. <= 1139.4 ft	S. <= 1136.4 ft	S. <= 1133.4 ft	-	-
				Use Limits	*Use Limits*	*Use Limits*	*Use Limits*	-	-
City of Seymour	Seymour Water Storage Tank	-	2	S. <= 80%	Water Table <= 9 feet	Water Table <= 6 feet	Failures or Contamina-tion	-	-
				10%	*10%*	*20%*	*Cease Water System Operation*		
City of Vernon	Seymour Aquifer	-	3	S. <= 41ft or 15% loss of prod. capacity	S. <= 38.5ft or 20% loss of prod. capacity	S. <= 37.5ft or 25% loss of prod. capacity	S. <= 36ft or 30% loss of prod. capacity	S. <= 34ft or 50% loss of prod. capacity	-
				15%	*20%*	*25%*	*30%*	*50%*	-
City of Wichita Falls	Arrowhead & Kickapoo	-	1	S: <= 65%	S: <= 50%	S: <= 40%	S: <= 30%	S: <= 25%	-
				5%	*15%*	*35%*	*45%*	*14 MGD limit*	-

ENTITY	TRIGGER BASED ON:		FIRST STAGE WITH MANDATORY MEASURES	DROUGHT STAGE TRIGGERS BY STAGE (S. SUPPLY; D. DEMAND) *PERCENT REDUCTION GOAL*					
	SUPPLY	DEMAND		STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6
Dean Dale SUD	Arrowhead & Kickapoo	-	2	S: <= 60%	S: <= 50%	S: <= 40%	S: <= 30%	-	-
				5%	*15%*	*20%*	*30%*	-	
North Montague County Water Supply District	Lake Nocona	Total Demand	3	May1 to Sep30 Annually	S. <= 824 ft. D. >= 0.66 mgd	S. <= 822 ft. D. >= 0.88 mgd	S. <= 819 ft. D. >= 1.1 mgd	S. <= 817 ft. Major Interrupt	S. <= 815 ft. Major Interrupt
				30% of Peak	*15%*	*30%*	*50%*	*Alt. Wtr. Src.*	*Ration*
RRA Dodson Water System	GW Capacity	-	3	20% loss in prod. capacity	36% loss in prod. capacity	49% loss in prod. capacity	59% loss in prod. capacity	-	-
				20%	*30%*	*40%*	*As Needed*	-	-
RRA Farmers Valley Water System	GW Capacity	-	3	20% loss in prod. capacity	36% loss in prod. capacity	49% loss in prod. capacity	59% loss in prod. capacity	-	-
				20%	*30%*	*40%*	*As Needed*	-	-
RRA Guthrie Dumont Water System	GW Capacity	-	3	20% loss in prod. capacity	36% loss in prod. capacity	49% loss in prod. capacity	59% loss in prod. capacity	-	-
				20%	*30%*	*40%*	*As Needed*	-	-
RRA Howardwick Water System	GW Capacity	-	3	20% loss in prod. capacity	36% loss in prod. capacity	49% loss in prod. capacity	59% loss in prod. capacity	-	-
				20%	*30%*	*40%*	*As Needed*	-	-
RRA Preston and Lake	GW Capacity	-	3	20% loss in prod. capacity	36% loss in prod. capacity	49% loss in prod. capacity	59% loss in prod. capacity	-	-

ENTITY	TRIGGER BASED ON:		FIRST STAGE WITH MANDATORY MEASURES	DROUGHT STAGE TRIGGERS BY STAGE (S. SUPPLY; D. DEMAND) *PERCENT REDUCTION GOAL*					
	SUPPLY	DEMAND		STAGE 1	STAGE 2	STAGE 3	STAGE 4	STAGE 5	STAGE 6
Arrowhead Water Systems				*20%*	*30%*	*40%*	*As Needed*	-	-
RRA Ringgold WSC	GW Capacity	-	3	20% loss in prod. capacity	36% loss in prod. capacity	49% loss in prod. capacity	59% loss in prod. capacity	-	-
				20%	*30%*	*40%*	*As Needed*	-	-
RRA Samnorwood Water System	GW Capacity	-	3	20% loss in prod. capacity	36% loss in prod. capacity	49% loss in prod. capacity	59% loss in prod. capacity	-	-
				20%	*30%*	*40%*	*As Needed*	-	-
RRA Truscott-Gilliland Water System	GW Capacity	-	3	20% loss in prod. capacity	36% loss in prod. capacity	49% loss in prod. capacity	59% loss in prod. capacity	-	-
				20%	*30%*	*40%*	*As Needed*	-	-

Drought response measures vary somewhat across drought contingency plans. In general, retail water suppliers have a wider range of drought response measures available to them compared to wholesale water suppliers. One of the main drought response measures for retail water suppliers is restricting irrigation. Many plans include the following progression of irrigation limits:

- Stage 1: Voluntary limits on irrigation days (maximum of twice per week, odd/even schedule, etc.) and hours (no irrigation in the middle of the day).
- Stage 2: Mandatory limits on irrigation days and hours with irrigation limited to two days per week
- Stage 3: Irrigation limited to one day per week. Hand-held hoses may be used.
- Stage 4: Hand-held hoses or watering cans only may be used on the designated day and within the allowable hours.
- Stage 5: No outdoor water use.

The majority of Region B was in some stage of drought status from late 2010 until May of 2015. Wichita Falls and most of the other water suppliers in Region B moved to Stage 5 or the highest stage of the DCPs in May 2014. The utilities and customers operated in Stage 5 for approximately one full year with no outdoor watering from the public water supplies allowed. The region experienced relief from the drought in May 2015, lasting through the end of 2017. Drought conditions reappeared for a short term in the first half of 2018.

7.4.3 Unnecessary or Counterproductive Variation in Drought Response Strategies

In reviewing the drought response strategies presented in Table 7-3 there are some inconsistencies between drought triggers and the number of stages in drought contingency plans. There are generally drought contingency plans that have adopted five stages of drought that are consistent with the City of Wichita Falls drought trigger conditions and drought reduction goals for each drought stage. This allows for consistency in providing information to the public within the vicinity of Wichita Falls. The groundwater systems have generally adopted 4-stages of drought conditions consistent with the goals in the Red River Authority Drought Contingency Plans for groundwater supplies. There are a limited number of plans that depart from these two general types of drought contingency plans, having a different number of drought stages, drought triggers, and reduction targets.

Region B has identified that having variation between the number of drought stages, trigger conditions, and water use reduction targets can create some uncertainty for users in the event of a drought if the messages communicated in the region do not match the local drought contingency plan requirements. All WUGs in Region B should consider the "Region-Specific Drought Response Recommendations and Model Drought Contingency Plans" identified in Section 7.7 of this Chapter.

7.5 Existing and Potential Emergency Interconnects

According to Texas Statute §357.42(d),(e) regional water planning groups are to collect information on existing major water infrastructure facilities that may be used in the event of an emergency shortage of water. Pertinent information includes identifying the potential user(s) of the interconnect, the potential supplier(s), the estimated potential volume of supply that could be provided, and a general description of the facility. Texas Water

Code §16.053(c) requires information regarding facility locations to remain confidential.

This section provides general information regarding existing and potential emergency interconnects among water user groups within Region B.

7.5.1 Existing Emergency Interconnects

Much of Region B has dealt with drought conditions repeatedly over the last 20 years. As a result many of the local supplies derived from smaller reservoirs or from groundwater systems have been limited. In addition water quality has limited use of some supplies. Therefore, interconnects between water systems have become routine with many of the systems now relying on supplies from neighboring systems. In fact, the drought between 2011 and 2015 required implementation of almost all feasible interconnects. The existing interconnects are shown in Table 7-4.

Table 7-4: Existing Interconnects Between Region B WUGS

RECEIVER PUBLIC WATER SYSTEM	PROVIDER WUG
Amon G Carter Lake WSC	City of Bowie
Archer County MUD 1	City of Wichita Falls
Baylor WSC	City of Seymour
Charlie WSC	City of Byers, Dean Dale WSC, City of Wichita Falls
City Of Burkburnett	City of Wichita Falls
City Of Byers	Dean Dale WSC City of Wichita Falls
City Of Chillicothe	Greenbelt MIWA
City Of Crowell	Greenbelt MIWA
City Of Electra	City of Iowa Park City of Wichita Falls
City Of Holliday	City of Wichita Falls
City Of Iowa Park	City of Wichita Falls
City Of Lakeside City	City of Wichita Falls
City of Megargel	Baylor WSC City of Seymour
City Of Quanah	Greenbelt MIWA
City Of Scotland	City of Wichita Falls
City Of Seymour	Baylor WSC
Dean Dale SUD	City of Wichita Falls
Friberg Cooper WSC	City of Wichita Falls
Harrold WSC	City of Electra City of Iowa Park City of Wichita Falls
Horseshoe Bend Estates	City of Wichita Falls
Northside WSC	City of Vernon
Oklaunion WSC	City of Vernon
RRA Lockett Water System	City of Vernon

RECEIVER PUBLIC WATER SYSTEM	PROVIDER WUG
RRA Box Community Water System	City of Vernon
RRA Farmers Valley Water System	Greenbelt MIWA
RRA Foard County Water System	Greenbelt MIWA
RRA Goodlett Water System	Greenbelt MIWA
RRA Hinds Wildcat Water System	City of Vernon
RRA Medicine Mound Water System	Greenbelt MIWA
RRA New Goodlett Water System	Greenbelt MIWA
RRA Northeast Quanah Water System	Greenbelt MIWA
RRA Southwest Quanah Water System	Greenbelt MIWA
Sheppard Air Force Base	City of Wichita Falls
Thalia WSC	City of Crowell Greenbelt MIWA
Town Of Pleasant Valley	City of Wichita Falls
TPWD Copper Breaks State Park	Greenbelt MIWA
Wichita Valley WSC	City of Archer City City of Iowa Park City of Wichita Falls

Source: Texas Commission on Environmental Quality: Water Utility Database, URL: https://dww2.tceq.texas.gov/DWW/

7.5.2 Potential Emergency Interconnects

The existing water systems within the region were evaluated for potential to implement additional emergency interconnects. Due to the number of interconnects that have already been implemented, limited opportunity for additional interconnects are feasible.

7.6 Emergency Responses to Local Drought Conditions or Loss of Municipal Supply

Texas Statute §357.42(g) requires regional water planning groups to evaluate potential temporary emergency water supplies for all County-Other WUGs and municipalities with 2010 populations less than 7,500 that rely on a sole source of water. The purpose of this evaluation is to identify potential alternative water sources that may be considered for temporary emergency use in the event that the existing water supply sources become temporarily unavailable due to extreme hydrologic conditions such as emergency water right curtailment, unanticipated loss of reservoir conservation storage, or other localized drought impacts.

This section provides potential solutions that should act as a guide for municipal water users that are most vulnerable in the event of a loss of supply. This review was limited and did not require technical analyses or evaluations following in accordance with 31 TAC §357.34.

7.6.1 Emergency Responses to Local Drought Conditions

Table 7-5 presents temporary responses that may or may not require permanent infrastructure. It was assumed in the analysis that the entities listed would have approximately 180 days or less of remaining water supply. Table 7-5 is followed by a discussion of the alternative drought water supply strategies.

Table 7-5: Emergency Responses to Local Drought Conditions in Region B

ENTITY											IMPLEMENTATION REQUIREMENTS		
WATER USER GROUP NAME	COUNTY	2020 POPULATION	2030 DEMAND (AF/YEAR)	DRILL ADDITIONAL GROUNDWATER WELLS	BRACKISH GROUNDWATER LIMIT TREATMENT	BRACKISH GROUNDWATER	EMERGENCY INTERCONNECT	OTHER NAMED LOCAL SUPPLY	TRUCKED IN WATER	VOLUNTARY TRANSFER FROM IRRIGATION	TYPE OF INFRASTRUCTURE REQUIRED	ENTITY PROVIDING SUPPLY	EMERGENCY AGREEMENTS ALREADY IN PLACE
Archer City	Archer	2,022	263	*	*		*		*			Wichita Falls	*
Holliday	Archer	1,786	231	*	*		*		*			Wichita Falls	*
Lakeside City	Archer	1,077	125	*	*		*		*			Wichita Falls	*
Scotland	Archer	501	194	*	*		*		*			Wichita Falls	*
Wichita Valley WSC	Archer	2,994	221	*	*		*		*			Wichita Falls	*
Windthorst WSC	Archer	1,266	294	*	*		*		*			Bowie	*
Seymour	Baylor	2,692	490	*	*		*		*			Baylor WSC	*
Dean Dale WSC	Clay	2,151	163	*	*		*		*			Wichita Falls	*
Henrietta	Clay	3,374	664	*	*		*		*				
Windthorst WSC	Clay	227	140	*	*		*		*			Bowie	*
Paducah	Cottle	1,458	290	*	*		*		*				

ENTITY											IMPLEMENTATION REQUIREMENTS		
WATER USER GROUP NAME	COUNTY	2020 POPULATION	2030 DEMAND (AF/YEAR)	DRILL ADDITIONAL GROUNDWATER WELLS	BRACKISH GROUNDWATER LIMIT TREATMENT	BRACKISH GROUNDWATER	EMERGENCY INTERCONNECT	OTHER NAMED LOCAL SUPPLY	TRUCKED IN WATER	VOLUNTARY TRANSFER FROM IRRIGATION	TYPE OF INFRASTRUCTURE REQUIRED	ENTITY PROVIDING SUPPLY	EMERGENCY AGREEMENTS ALREADY IN PLACE
Crowell	Foard	1,137	138	*	*		*		*			Greenbelt	*
Quanah	Hardeman	2,981	396	*	*		*		*			Greenbelt	*
Bowie	Montague	5,305	995	*	*		*		*				
Nocona	Montague	3,321	740	*	*		*		*				
Saint Jo	Montague	898	155	*	*		*		*				
Dean Dale WSC	Wichita	1,248	81	*	*		*		*			Wichita Falls	*
Electra	Wichita	3,206	884		*		*		*			Wichita Falls	*
Iowa Park	Wichita	6,678	884		*		*		*			Wichita Falls	*
Wichita Valley WSC	Wichita	3,159	370	*	*		*		*			Wichita Falls	*
Olney	Young	3,429	556	*	*		*		*				*
County Other													
Windthorst	Archer	409		*	*				*				

ENTITY											IMPLEMENTATION REQUIREMENTS		
WATER USER GROUP NAME	COUNTY	2020 POPULATION	2030 DEMAND (AF/YEAR)	DRILL ADDITIONAL GROUNDWATER WELLS	BRACKISH GROUNDWATER LIMIT TREATMENT	BRACKISH GROUNDWATER	EMERGENCY INTERCONNECT	OTHER NAMED LOCAL SUPPLY	TRUCKED IN WATER	VOLUNTARY TRANSFER FROM IRRIGATION	TYPE OF INFRASTRUCTURE REQUIRED	ENTITY PROVIDING SUPPLY	EMERGENCY AGREEMENTS ALREADY IN PLACE
Byers	Clay	534		*	*		*		*			Dean Dale WSC	*
Petrolia	Clay	808		*	*		*		*				
Chillicothe	Hardeman	796		*	*		*		*			Greenbelt	*
RRA Goodlett Water System	Hardeman	58		*	*				*			Greenbelt	*
RRA New Goodlett Water System	Hardeman	50		*	*				*			Greenbelt	*
RRA Northeast Quanah Water System	Hardeman	199		*	*				*			Greenbelt	*
RRA Southwest Quanah Water System	Hardeman	51		*	*				*			Greenbelt	*
RRA Foard County Water System	Foard	225		*	*				*			Crowell/ Greenbelt	*
City Of Lakeside City	Wichita			*	*				*			Wichita Falls	*

ENTITY											IMPLEMENTATION REQUIREMENTS		
WATER USER GROUP NAME	COUNTY	2020 POPULATION	2030 DEMAND (AF/YEAR)	DRILL ADDITIONAL GROUNDWATER WELLS	BRACKISH GROUNDWATER LIMIT TREATMENT	BRACKISH GROUNDWATER	EMERGENCY INTERCONNECT	OTHER NAMED LOCAL SUPPLY	TRUCKED IN WATER	VOLUNTARY TRANSFER FROM IRRIGATION	TYPE OF INFRASTRUCTURE REQUIRED	ENTITY PROVIDING SUPPLY	EMERGENCY AGREEMENTS ALREADY IN PLACE
RRA Lockett Water System	Wilbarger	638		*	*				*			Vernon	*
RRA Box Community Water System	Wilbarger	127		*	*				*			Vernon	*
RRA Hinds-Wildcat	Wilbarger	160		*	*				*		Pipeline and pump station	Vernon	

7.6.2 Voluntary Transfer of Irrigation Rights

An additional evaluation was conducted which considered voluntary transfer of irrigation rights as an emergency response to local drought conditions. Voluntary transfer of irrigation rights is the payment for temporary transfer of local irrigation supplies for other uses. Voluntary transfer or "irrigation suspension" programs have been implemented successfully in Edwards Aquifer near San Antonio. Similar strategies are not considered viable in Region B, as during drought the WCWID#2 has already curtailed water use, conserving the remaining surface water quantities for municipal use. In addition there are not groundwater systems that would allow for such a water transfer because the groundwater sources are not as regionally connected as the Edwards Aquifer.

7.6.3 Brackish Groundwater

Brackish groundwater was evaluated as a temporary source during an emergency water shortage. Some brackish groundwater is found in various locations throughout the region. Due to water quality concerns many system have abandoned or limited use of existing brackish groundwater sources. In some cases these could be utilized during severe drought and blended with other sources. Required infrastructure would include some additional wells, potential treatment facilities, and conveyance facilities.

7.6.4 Drill Additional Local Groundwater Wells and Trucking in Water

In the event that the existing water supply sources become temporarily unavailable, drilling additional groundwater wells and trucking in water are optimal solutions. Table 7-5 presents this option as viable for all entities listed.

7.7 Region-Specific Drought Response Recommendations and Model Drought Contingency Plans

As required by the TWDB, Region B shall develop drought recommendations regarding the management of existing groundwater and surface water sources. These recommendations must include factors specific to each source as to when to initiate drought response and actions to be taken as part of the drought response. These actions should be specified for the manager of a water source and entities relying on the water source. Region B has defined the manager of water sources as the entity that controls the water production and distribution of the water supply from the source. For purposes of this assessment, a manager must also meet the TCEQ requirements for development of Drought Contingency Plan. Entities that rely on the water sources include customers of the water source manager and direct users of the water sources. A list of each surface water source in Region B and the associated drought triggers was provided in Section 7.3.

7.7.1 Drought Trigger Conditions for Groundwater Supplies

In general, groundwater supplies are somewhat localized to the users of these sources. As noted in Section 7.4, some public water providers utilize groundwater and have developed DCPs that are specific to their water supplies. However, there are many individual groundwater users not connected to a public water system or located within a groundwater conservation district. To convey drought conditions to all users of these resources in Region B, the RWPG proposes to use the Drought Monitor. This information is easily accessible and updated regularly. It does not require a specific entity to monitor well water levels or stream gages. It is also geographically specific so that drought triggers can be identified on a sub-county level that is consistent with the location of use. Region B adopted the nomenclature from the Drought Monitor for corresponding drought triggers. Table 7-6 shows the drought stages adopted by the U.S. Drought Monitor and the associated Palmer Drought Index.

Table 7-6: Drought Severity Classification

CATEGORY	DESCRIPTION OR STAGE	POSSIBLE IMPACTS	PALMER DROUGHT INDEX
D0	Abnormally Dry	Going into drought: short-term dryness slowing planting, growth of crops or pastures. Coming out of drought: some lingering water deficits; pastures or crops not fully recovered	-1.0 to -1.9
D1	Moderate Drought	Some damage to crops, pastures; streams, reservoirs, or wells low, some water shortages developing or imminent; voluntary water-use restrictions requested	-2.0 to -2.9
D2	Severe Drought	Crop or pasture losses likely; water shortages common; water restrictions imposed	-3.0 to -3.9
D3	Extreme Drought	Major crop/pasture losses; widespread water shortages or restrictions	4.0 to 4.9
D4	Exceptional Drought	Exceptional and widespread crop/pasture losses; shortages of water in reservoirs, streams, and wells creating water emergencies	5.0 or less

U.S. Drought Monitor: https://droughtmonitor.unl.edu/About/WhatistheUSDM.aspx

For groundwater supplies, Region B recognizes that the initiation of drought response is the decision of the manager of the source and/or user of the source. Region B recommends the following actions based on each of the drought stages listed in Table 7-6:

- Abnormally Dry – Entities should begin to review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage is necessary.
- Moderate Drought – Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage is necessary.

- Severe Drought – Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point if the review indicates current supplies may not be sufficient to meet reduced demands the entity should begin considering alternative supplies.

- Extreme Drought – Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point if the review indicates current supplies may not be sufficient to meet reduced demands the entity should consider alternative supplies.

- Exceptional Drought – Entities should review their DCP, status of current supplies and current demands to determine if implementation of a DCP stage or changing to a more stringent stage is necessary. At this point if the review indicates current supplies are not sufficient to meet reduced demands the entity should implement alternative supplies.

7.7.2 Model Drought Contingency Plans

Model drought contingency plans were developed for municipal and irrigation entities in Region B and are available online through the Region B website under the Misc Documents tab within Publications (http://regionbwater.org/). Each plan identifies four drought stages: mild, moderate, severe and emergency. Some plans also include a critical drought stage. The recommended responses range from notification of drought conditions and voluntary reductions in the "mild" stage to mandatory restrictions during an "emergency" stage. Each entity will select the trigger conditions for the different stages and the appropriate response. Entities should use the TAC 228 rules mandated by the TCEQ as the guideline in development of these plans.

7.8 Drought Management Water Management Strategies

Drought management is a temporary strategy to conserve available water supplies during times of drought or emergencies. This strategy is not recommended to meet long-term growth in demands, but rather acts as means to minimize the adverse impacts of water supply shortages during drought. The TCEQ requires drought contingency plans for wholesale and retail public water suppliers and irrigation districts. A drought contingency plan may also be required for entities seeking State funding for water projects. Region B does not recommend specific drought management strategies. Region B recommends the implementation of DCPs by suppliers when appropriate to reduce demand during drought and prolong current supplies. Region B also recommends the implementation of conservation measures for all users to conserve water resources for the future.

7.9 Other Drought Recommendations

One of the challenges with drought in Region B is that the response to drought and associated impacts can vary depending upon the timing of the drought. Droughts that occur during the growing season can have a greater impact than drought occurring at other times. Since irrigated agriculture accounts for a large percent of the water use in the region, the impacts of agricultural droughts on water supplies can be significant.

To be better prepared for future droughts, Region B has the following recommendations:

- Municipal water users that rely on groundwater should consider protecting water supplies from competition through the acquisition of additional water rights and/or expansion of current well fields.

- To minimize potential catastrophic failure of an entity's water system, the entity should provide sufficient resources to maintain its infrastructure in good condition. Region B recognizes that water main breaks and system failures do occur, but with proper maintenance these may be able to be reduced.

- Water users should continue to use water efficiently to conserve limited resources on a year round basis, so that conservation becomes standard practice.

- Region B provides the following recommendations to the DPC and regarding the State Drought Preparedness Plan:

- The DPC information should be maintained in the Texas Division of Emergency Management (TDEM). As such, information on drought status should be provided at https://tdem.texas.gov/. In reviewing the information provided on this site there is no mention of drought as an emergency condition. This is an oversight that should be addressed. At a minimum, this internet site should provide a link to (https://www.drought.gov/drought/states/texas), which provides access to current drought status information. A link to the TWDB Drought Dashboard (https://waterdatafortexas.org/drought) should also be provided.

- The quarterly DPC reports are housed on the site of the State Climatologist (https://climatexas.tamu.edu/drought/index.html). However, there is no link between the TDEM site and the State Climatologist site that would provide quick access to these reports. In addition, the State Climatologist site does not provide DPC reports after the Fall, 2018, or two years before the date of this plan. It is not known whether these reports were not produced or if they have not been provided with links added to the site. The DPC should produce quarterly reports, as required.

- A comprehensive State Drought Preparedness Plan was not found at the TDEM web site, the State Climatologist web site, or the TWDB web site. The DPC shall develop and implement a comprehensive State Drought Preparedness Plan as required by the Texas Water Code, Section 16.0551 and it should be accessible through the TDEM web site.

7.10 List of References

[1] Drought Dashboard, Water Data for Texas, Texas Water Development Board, https://waterdatafortexas.org/drought .

[2] Drought page, Office of the Texas State Climatologist, https://climatexas.tamu.edu/drought/index.html .

[3] National Climatic Data Center: PHDI Divisional Data, URL: ftp://ftp.ncdc.noaa.gov/pub/data/cirs/climdiv/climdiv-phdidv-v1.0.0-20190604, accessed July 2019.

[4] National Drought Mitigation Center: U.S. Drought Monitor, URL: http://droughtmonitor.unl.edu/, accessed July 2019.

[5] Texas Administrative Code, Title 30, Chapter 288.

[6] Texas Commission on Environmental Quality: Water Availability Models, URL: http://www.tceq.texas.gov/permitting/water_rights/wam.html, accessed May 2014.

[7] Texas Department of Emergency Management, https://tdem.texas.gov/ .

[8] Texas Water Code, Section 16.0551.

[9] Texas Water Development Board: Region-B Planning Region Reservoirs, URL: https://www.waterdatafortexas.org/reservoirs/region/region-b, accessed July 2019.

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CHAPTER 8 SITES AND OTHER RECOMMENDATIONS

8.1 Introduction

As a part of the revised plan, this chapter identifies and makes recommendations that the Regional Water Planning Group (RWPG) deems vital to the management and conservation of the water resources in Region B. At each Region B RWPG meeting there was an agenda item to receive updates from the Interregional Planning Council. The RWPG considered all recommendations from Interregional Planning Council.

8.2 Discussion of Regional Issues

In addition to the specific water management strategies recommended for Region B in Chapter 5 of the plan, there were several other issues that the Regional Water Planning Group deemed to be significant water management concepts to be given further consideration as part of the Region B Plan. The Chloride Control Project on the Wichita and Pease Rivers is a water management strategy with high regional support. Other strategies that enhance and/or increase the existing supplies in the region, such as land stewardship (brush management), groundwater recharge enhancement, and increased conservation storage for Lake Kemp, are each potentially feasible management strategies throughout and perhaps beyond the 50 year planning horizon.

Senate Bill 1 (SB1) requires future projects to be consistent with the approved regional water plan to be eligible for TWDB funding and TCEQ permitting. However, it is the intention of the RWPG that surface water uses that will not have a significant impact on the region's water supply and water supply projects that do not involve the development of or connection to a new water source are deemed consistent with the regional water plan even though not specifically recommended in the plan.

8.2.1 Chloride Control Project

The chloride control project is designed to capture water from chloride seeps that would otherwise flow into the existing surface water sources. While the project structures would capture highly concentrated chloride, water resources would be improved downstream of the capture points.

Improvement in the quality of this substantial water source would increase the reliability of the City of Wichita Falls system and reduce their treatment costs. It could also facilitate more diverse and expanded agricultural use and more efficient industrial use.

Also, in the long term, as chloride control facilities are constructed on the Pease River the potential exists for another freshwater supply reservoir on the Pease River near Crowell in Foard County.

8.2.2 Land Stewardship

Land stewardship is the practice of managing land to conserve or enhance the ecosystem values of the land. It is a benefit to the state's natural resources by improving watershed productivity through increased surface water runoff and groundwater recharge. Land stewardship is a practice that is supported and encouraged by Region B.

Some land stewardship practices that are most applicable in Region B include managed grazing, water enhancement through brush control, erosion management, riparian management, and stream bank protection. One area of concern in Region B is the encroachment of brush in the watersheds of water supply reservoirs. The U.S. Natural Resource Conservation Service estimates that brush in Texas uses about 10 million acre-feet of water annually compared to the 15 million acre-feet per year currently required for human use.

Based on the results of the completed studies, the regional planning group will continue to evaluate the potential effects of land stewardship strategies, and in particular water enhancement through brush control. It is anticipated that the effectiveness of these strategies will be reflected through increased water flow and improved ecosystem components such as wildlife, livestock production, aesthetics and land values.

8.2.3 Recharge Enhancement

Recharge enhancement is the process in which surface water is purposefully directed to areas where permeable soils or fractured rock allow rapid infiltration of the surface water into the subsurface to increase localized groundwater recharge. This would include any man-made structure that would slow down or hold surface water to increase the probability of groundwater recharge.

In Region B, groundwater is a major source of water for much of the western portion of the region. The Seymour Aquifer, which is generally unconfined, is fairly responsive to local recharge and may benefit from enhanced recharge programs. Further study is needed to determine the applicability of such programs in Region B, the quantity of increased groundwater supplies that may result from enhanced recharge, and the potential impacts to existing surface water rights.

8.2.4 Sediment Control Structures

The Wichita River Basin in Region B could potentially benefit from sediment control structures and other land management practices that reduce sediment loading to streams. The Region B Planning Group recommends that the state support both federal and state efforts to rehabilitate existing sediment control structures and encourage funding and support for the construction of new structures and other land management practices in watersheds that would produce the greatest benefits.

8.3 Designation of Unique Stream Segments and Reservoir Sites

In accordance with TAC Section 357.8, the Regional Water Planning Group is not required, but may include in the adopted regional water plan recommendations for river and stream segments of unique ecological value, in addition to unique sites for reservoir construction. Such designation would provide for protection of these specific sites to the extent that a state agency or political subdivision may not obtain a fee title or an easement that would destroy the unique ecological value of the designated stream segment or significantly prevent the construction of a reservoir on a designated site.

8.3.1 Unique Stream Segments

Within Region B, the Texas Parks & Wildlife (TPWD) has suggested that certain stream segments of the Middle Pease River in Cottle County, the Pease River in Foard County, and the Red River from the Wichita/Clay County line upstream through Hardeman County be considered for recommendation as stream and/or river segments of unique value. The TPWD believes that each of these segments satisfy at least one of the designation criteria defined in SB1.

Of the stream segments suggested by the TPWD, two are located within areas that currently offer protection, and one segment lies in Oklahoma:

- Middle Pease River segment is in the Matador Wildlife Management Area
- Pease River segment is in Copper Breaks State Park
- The Red River segment is in Oklahoma

The Region B Water Planning Group is committed to the protection and conservation of unique and sensitive areas within the region. To that end, the consensus of the planning group is that a more comprehensive study with supporting data is necessary to accurately characterize and evaluate the listed stream/river segments or other stream segments in order to determine whether it is appropriate to recommend segment for designation as being unique.

There is still some concern as to the impact of the designation and it is not clear what governmental or private activities, other than reservoir construction, might be subject to additional constraints or limitations as a result of unique stream segment designation. It is also not clear what geographic extent might be impacted by the designation. For example, is the entire watershed of the designated stream subject to additional limitations, and how far upstream of the designated stream would limitations apply? The Region B Water Planning Group suggests that the Legislature may wish to clarify their intent regarding the designations.

8.3.2 Reservoir Sites

It is generally recognized that studies over the last 60 years have identified perhaps the last remaining reservoir site within Region B in which the water quality of the watershed is adequate for municipal use. This site, known as the Ringgold Reservoir site, is located on the Little Wichita River in Clay County, approximately one-half mile upstream from the confluence with the Red River.

This site is recognized as a site of unique value in the 2007 State Water Plan and is currently protected under the provisions of §16.051 of the Texas Water Code as amended by SB3 of the 80th Legislature. Lake Ringgold is a recommended water management strategy for Wichita Falls (Chapter 5) and the City has recently been issued the Water Rights to this reservoir, however, that issuance is being contested. With the passage of House Bill 1042, 84th Legislative Session and with the City of Wichita Falls continuing to pursue the necessary permits to construct the reservoir, this site should remain protected as a unique reservoir site within the region, until all applications and permits are filed and issued even though it may not be required until late in the planning period.

8.4 Discussion of Regulatory and Legislative Actions

To facilitate the orderly development, management, and conservation of water resources within the region, and to assist the region in preparing for and responding to drought conditions, the Region B Water Planning Group believes that the regulatory agencies and legislature should consider certain actions relating to water quality and funding issues which affect Region B.

8.4.1 Regulatory Review of Nitrate MCL

In Region B, there are several small user groups which utilize water with nitrate levels more than 10 mg/l. For the most part this supply is their only source of water, and advanced treatment for the removal of nitrates is very costly. Presently these systems employ bottled water programs for customers that may be sensitive to nitrate concentrations (pregnant women and infants).

It is the consensus of the Region B Water Planning Group that the regulatory agency reviews its MCL standards for smaller systems which have no cost-effective means to comply with the current nitrate MCL of 10 mg/l and consider funding new studies to determine the health effects of nitrates in drinking water.

8.4.2 Funding for Comprehensive Studies

In preparing the Region B Water Plan there are several regional water planning, management, and conservation related issues which will require additional funding for data collection and administrative activities in order to adequately assess their viability or feasibility as a cost-effective management strategy for Region B. For example, additional funds are needed to further evaluate and cost-share in the implementation of brush management programs to increase water yields, to identify and designate unique stream segments and/or reservoir sites for protection of these areas, and to implement various other chloride control measures and wastewater reuse programs throughout Region B.

8.4.3 Conservation

Region B supports the efforts of the State-appointed Water Conservation Task Force and encourages the practices of water conservation within the region and state. The Regional Water Planning Group also recognizes the differences in water use and needs among water users and different regions. Region B encourages the Legislature to allow each region to establish realistic, appropriate and voluntary water conservation goals for the region. These goals should only be established after sufficient data on water use have been collected using consistent data reporting requirements. The use of the measurement of gallons per capita per day is appropriate only for residential water use or as a guideline for historical trends for a single entity. Region B does not support the establishment of statewide standards for water use.

8.5 Summary of Regional Recommendations

In accordance with 31 TAC 357.7 (a)(9), 31 TAC 357.8, and 31 TAC 357.9, the following recommendations are proposed to facilitate the orderly development, management, and conservation of the water resources available within Region B:

- It is recommended that the Chloride Control Project on the Wichita River and the Pease River be made a regional priority to enhance the water quality of Lake Kemp and Lake Diversion and reclaim those lakes as a viable cost-effective short term and long-term regional water supply source. Furthermore, it is recommended that the State take responsibility for all the maintenance, operations, and future expansions of the Chloride Control Project.
- Based on the results of the Lake Kemp and Lake Arrowhead brush management studies, it is recommended that the State consider providing adequate funding to

implement brush management and other land stewardship programs to increase watershed yields.

- Region B recommends that the state support both federal and state efforts to rehabilitate existing sediment control structures and encourage funding and support for the construction of new structures and other land management practices in watersheds that would produce the greatest sediment control benefits.

- Region B recommends that no segments be designated as "Unique Stream/River Segments" at this time. Pending the results of comprehensive studies and clarification of the significance and impacts of designation, the Regional Water Planning Group may consider designations within the region in the future.

- Region B requests that the Legislature continue to extend the protections for unique reservoir sites to ensure that reservoir sites such as Lake Ringgold that are identified as water management strategies remain protected under the Texas Water Code until applications and permits are filed.

- It is recommended that the state fund the development, implementation, and evaluate the necessary management strategies adopted as part of this regional plan. This includes strategies identified to meet a specific need as well as general strategies to increase water supply in the region.

- It is recommended that the Legislature support the grass-roots regional water planning process enacted by SB1 and strongly encourages the process to be continued with adequate state funding for all planning efforts including administrative activities and data collection.

- It is recommended that the state continues to fund agricultural water use data collection and agricultural water use management/conservation projects.

- SB1 requires future projects to be consistent with the approved regional water plan to be eligible for TWDB funding and TCEQ permitting. It is recommended that surface water uses that will not have a significant impact on the region's water supply and water supply projects that do not involve the development of or connection to a new water source should be deemed consistent with the regional water plan even though not specifically recommended in the plan.

- With regards to conservation, it is recommended that the Legislature continue to allow each region to establish realistic, appropriate, and voluntary water conservation goals as opposed to the establishment of statewide standards.

- Region B recommends that the gallons per capita per day (gpcd) calculation of water use be based on residential water use only.

- Given a new drought of record, firm water availability from existing and new surface water supplies may be overstated. Therefore, it is recommended that funding be provided to update the hydrology for all Water Availability Models (WAMs) with additional funding for regular maintenance updates.

- With irrigation being such a large component of water use, it is recommended that the economic model be updated and that the future crop mix and base year irrigation demands be reevaluated.

- Region B recommends statewide restrictions on outdoor landscape watering, via sprinkler or irrigation systems, between the hours of 10 a.m. and 8 p.m. from May 1 through September 30.

- Region B recommends a statewide program requiring plugging of abandoned or deteriorating water wells, as these wells pose a direct threat to the long-term viability of the groundwater resources in many areas of the state

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CHAPTER 9 IMPLEMENTATION AND COMPARSION TO PREVIOUS REGIONAL WATER PLAN

9.1 Introduction

Chapter 9 provides a comparison of the current Regional Water Plan to the previous Plan, and a discussion of the differences between the two. This chapter includes a discussion on the differences between the two Plans and a description of strategies that have been implemented since the publication of the 2026 Plan. The RWPG encourages cooperation between water user groups for the purposes of achieving economies of scale through holding public meetings and posting planning group materials on the Region B website where all water user groups may obtain information on upcoming strategies that benefit the entire region.

9.2 Differences Between Previous and Current Regional Water Plan

The following sections will provide a discussion of changes from the 2021 Plan to the 2026 Plan. Specifically, these section address differences in:

- Removed and new water user groups
- Population projections
- Water demand projections,
- Drought of record and hydrologic modeling and assumptions,
- Groundwater and surface water availability,
- Existing water supplies for water users,
- Identified water needs for WUGs and WWPs, and
- Recommended and alternative water management strategies.

9.2.1 Removed and New Water User Groups

Municipal WUGs as defined by TWDB are discussed in Section 2.1 of Chapter 2. For the 2026 Plan, there are 39 WUGs, with one additional WUG added since the 2021 Plan. Table 9-1 shows the new WUG and notes on where the new WUG was included in the 2021 plan.

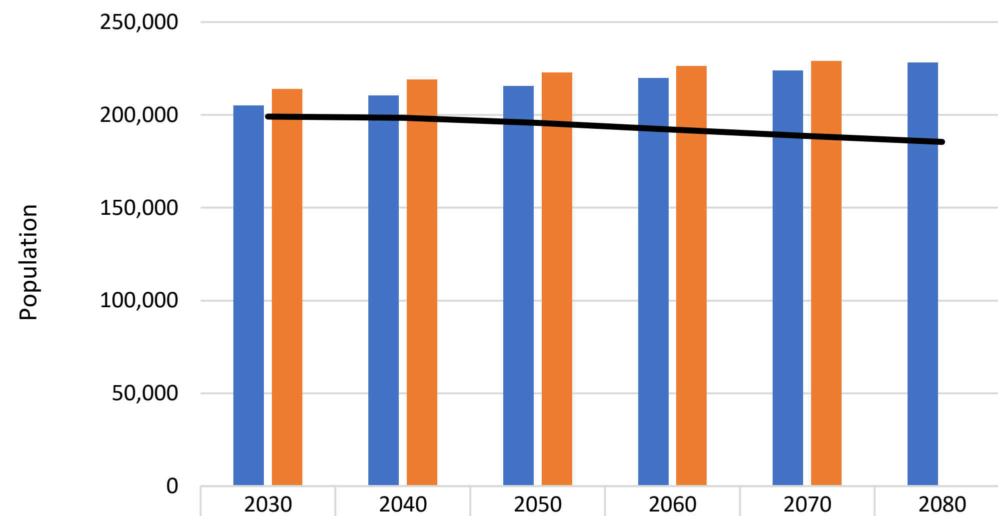
Table 9-1: New Water User Groups for the 2026 Plan

County	New Water User Group	Notes on Change from 2021 Plan
Hardeman	Chillicothe	Previously County-Other

9.2.2 Population Projections

The RWPG adopted population projections in the 2026 Plan are lower than the population projections from the 2021 Plan for all planning decades. The 2030 projected population decreased by approximately 4 percent while the 2070 projected population decreased by approximately 2 percent. The 2080 projected population for the 2026 Plan is approximately 0.4 percent lower than the 2070 projected population from the 2021 Plan. Figure 9-1 shows the change in projected population from the 2021 Plan to the 2026 Plan. The black line shows the TWDB Approved population projections which decline over the planning horizon and are lower than both the 2026 RWPG adopted and 2021 Plan projections. For the demands and needs, only the RWPG adopted projections are used in this chapter for comparison purposes.

Figure 9-1: Comparison of Region B Population in 2021 and 2026 Plans



	2030	2040	2050	2060	2070	2080
2026 RWP	205,160	210,369	215,625	219,737	223,827	228,068
2021 RWP	213,930	218,928	222,760	226,142	228,973	
2026 TWDB Adopted	199,116	198,526	195,661	192,041	188,649	185,480

Recently released data from the Texas Demographic Center (TDC) supports the overall trend in population growth shown in 2026 RWPG adopted population projections. Table 9-2 shows the change in population from the 2020 Census to the most recent TDC population estimates from January 2024 for each Region B county. Six out of eleven Region B counties showed increases in population over the four-year period, with the total population of all eleven counties increasing by over 2 percent, or about 0.5 percent per year. This growth rate is much more closely aligned with the RWPG adopted population projections, with a projected annual growth rate of 0.21 percent over the planning period, than the TWDB adopted population projections, with a projected annual rate of population decline of 1.4 percent. The resulting difference in the 2080 population between the RWPG adopted and TWDB adopted projections is approximately 42,600 people, or about 20% of current Region B population estimates.

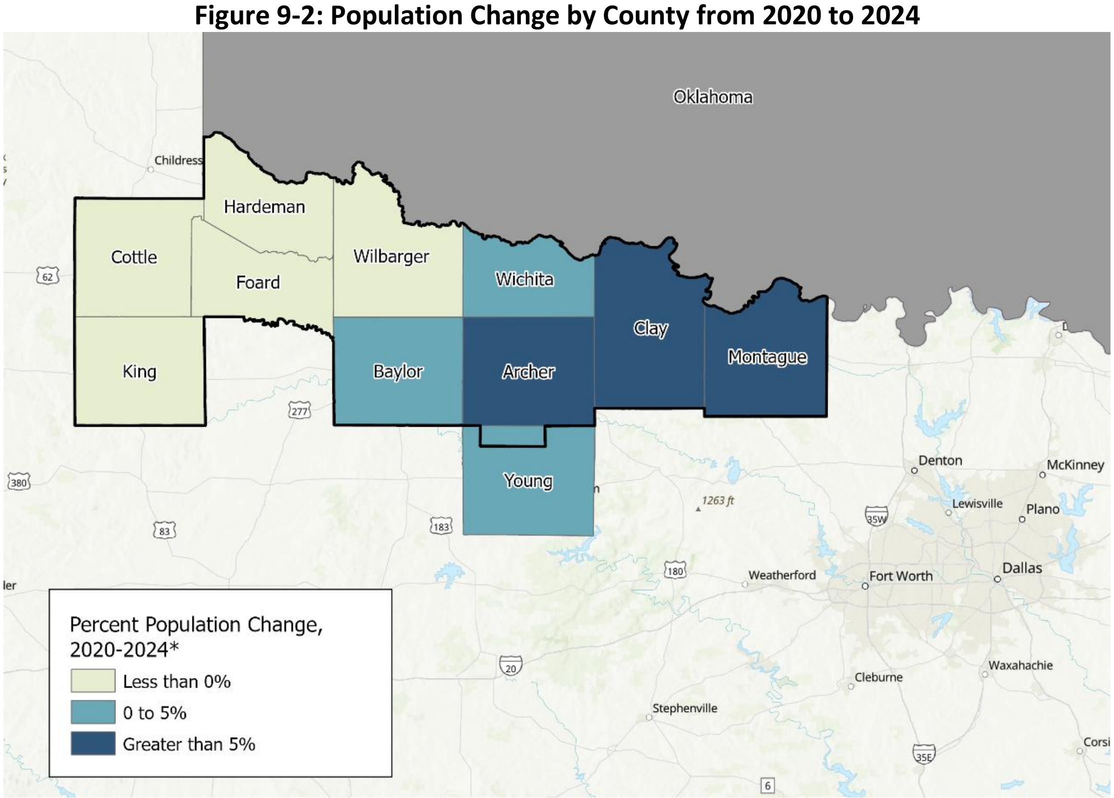
The recent population growth in certain Region B counties is likely due to their proximity to the Dallas-Fort Worth (DFW) Metroplex. Figure 9-2 shows percent change in population from 2020 to 2024 for the Region B counites. The three counties with the highest population growth (Archer, Clay, Montague) and the six counties with population increases from 2020 to 2024 are located closest to the DFW metro. The five counties that experienced population decline from 2020 to 2024 make up less than 10% of the current Region B population, while the remaining six counties that experienced population growth from 2020 to 2024 make up over 90% of the current Region B population. This data further supports the RWPG's decision to adopt an alternate set of population projections than TWDB that better represents the future water demands for the region.

Table 9-2: Population Change by County from 2020 to 2024

County	2020 Census	Jan 2024 TDC Est.	Percent Change
Archer	8,560	9,318	8.9%
Baylor	3,465	3,550	2.5%
Clay	10,218	11,030	7.9%
Cottle	1,380	1,338	-3.0%
Foard	1,095	1,068	-2.5%
Hardeman	3,549	3,498	-1.4%
King	265	222	-16.2%
Montague	19,965	21,813	9.3%
Wichita	129,350	130,200	0.7%
Wilbarger	12,887	12,597	-2.3%
Young[1]	17,867	18,450	3.3%
TOTAL	**208,601**	**213,084**	**2.1%**

[1]Population shown is for entirety of Young County, TDC does break out the Region B portion separately

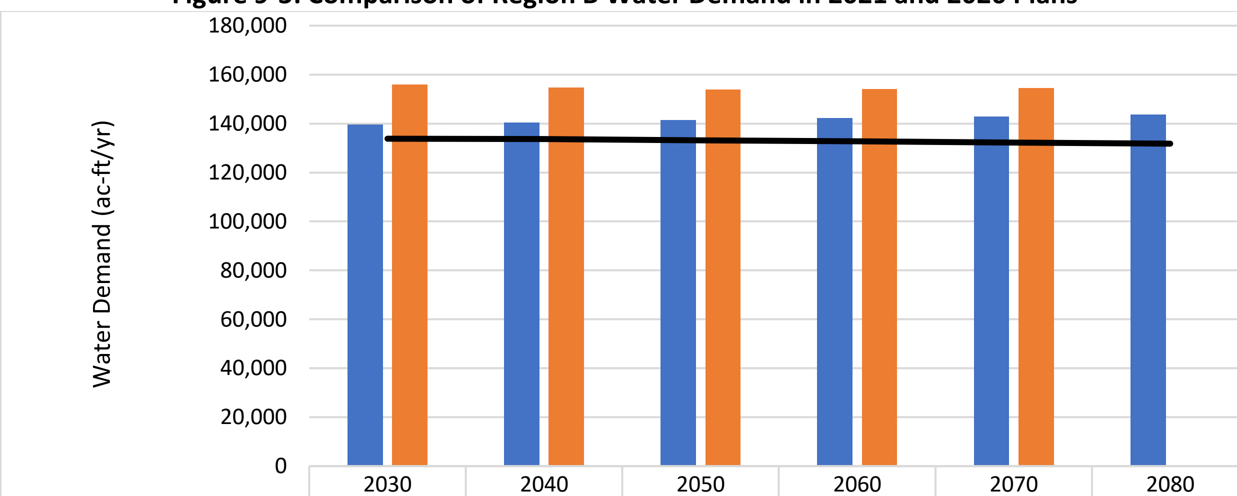
Figure 9-2: Population Change by County from 2020 to 2024



9.2.3 Water Demand Projections

In comparison to the 2021 Plan, the RWPG adopted projected water demands in the Region B 2026 Plan for 2030 decreased by approximately 11 percent, while the 2070 projected demands decreased by approximately 7.5 percent. The 2080 projected demands remain about 7 percent lower than the 2070 projected demands from the 2021 Plan. Demand projections for all five non-municipal water use types decreased from the 2021 Plan. The largest decrease in terms of total demand volume was irrigation which decreased by almost 11,000 ac-ft/yr over the planning period. The most significant decrease proportional to the previous plan was seen in the mining demand projections which decreased by over 90 percent for all decades in the planning period. Municipal demands were the only water use type where projected demands increased compared to the 2021 Plan. Projected municipal demands increased by approximately 10 percent in 2030 and 15 percent in 2070. This increase is primarily due to the addition of a 15 percent safety factor for municipal demand projections for the 2026 Plan to account for potentially higher than expected growth and provide a more conservative supply planning approach. Figure 9-3 shows the comparison of the water demands in the 2021 Plan and 2026 Plan and Table 9-3 shows the change in demands from the 2021 Plan to the 2026 Plan by use type.

Figure 9-3: Comparison of Region B Water Demand in 2021 and 2026 Plans



	2030	2040	2050	2060	2070	2080
2026 RWP	139,590	140,399	141,386	142,166	142,946	143,761
2021 RWP	156,083	154,727	153,806	154,108	154,535	
2026 TWDB Adopted	133,805	133,607	133,210	132,689	132,216	131,784

Table 9-3: Changes in Projected Demands from the 2021 Plan to the 2026 Plan by Use Type
-Values in ac-ft/yr-

Use Type	2030	2040	2050	2060	2070
Manufacturing	-419	-337	-251	-163	-72
Steam Electric	-1,844	-1,844	-1,844	-1,844	-1,844
Mining	-4,201	-2,837	-1,696	-1,560	-1,560
Irrigation	-10,903	-10,903	-10,903	-10,903	-10,903
Livestock	-2,531	-2,531	-2,531	-2,531	-2,531
Municipal	3,405	4,124	4,805	5,059	5,321
Total	**-16,493**	**-14,328**	**-12,420**	**-11,942**	**-11,589**

Note: Negative numbers indicate lower demand in the 2026 plan and positive numbers show higher demand in the 2026 plan.

9.2.4 Drought of Record and Hydrologic Modeling Assumptions

The region has not experienced a new drought of record since the 2021 Plan. The drought of record for the majority of Region B was the recent drought experienced from 2010-2015.

Hydrologic Modeling Assumptions

Since the 2021 Plan, the hydrology of the Brazos and Red River WAMs was extended from 1948 to 2018. The Trinity River WAM hydrology has yet to be extended beyond 1998. For the 2021 Plan, the historical hydrology for Lakes Arrowhead, Kemp, Kickapoo, Olney/Cooper, and Nocona were extended to include the period before and after the previous version of the Red River WAM (1940-1947, 1999-2015) to capture the end of the new drought of record. Reservoir yields were calculated using a Microsoft Excel model based on the WAM hydrology and extended hydrology.

In the 2026 Plan, the updated versions of each applicable WAM was used to model surface water resources within Region B. For the Wichita Falls system, a safe yield was calculated with a 20 percent reserve capacity. The other reservoirs were calculated based on a one-year safe yield. All run-of river supplies were estimated using the respective WAM.

9.2.5 Groundwater, Surface Water, and Reuse Availability

Total groundwater, surface water, and reuse availability (not considering infrastructure or permit constraints) in Region B is slightly higher in the 2026 Plan than in the previous plan. Groundwater supplies in Region B are approximately 2 percent greater than estimated for the 2021 Plan. This is due to higher Modeled Available Groundwater (MAG) estimates for the Seymour Aquifer in Hardeman County and the Trinity Aquifer in Montague County. In accordance with TWDB rules, the groundwater availability in the 2026 Plan is represented by the MAG estimate. Groundwater availability for aquifers where no MAG has been developed were estimated by a Groundwater Technical Committee appointed by the Region B Water Planning Group. This values did not change from the 2021 Plan. Table 9-4 shows the changes in groundwater by county from the 2021 Plan.

Table 9-4: Change in Groundwater Availability by County from the 2021 Plan to 2026 Plan -Values in ac-ft/yr-

County	2030	2040	2050	2060	2070	2080
Archer	0	0	0	0	0	N/A
Baylor	0	-15	0	-14	0	N/A
Clay	0	0	0	0	0	N/A
Cottle	0	-32	0	-32	0	N/A
Foard	-1,165	-1,197	-1,165	-1,204	-1,165	N/A
Hardeman	1,169	1,094	1,169	1,091	1,169	N/A
King	-351	-351	-351	-351	-351	N/A
Montague	2,229	2,218	2,229	2,218	2,229	N/A
Wichita	0	7	-3	0	0	N/A
Wilbarger	0	0	0	0	0	N/A
Young	0	0	0	0	0	N/A
Total	**1,882**	**1,724**	**1,879**	**1,708**	**1,882**	**N/A**

Total surface water supplies for Region B in the 2026 Plan are approximately 4 percent greater than in the 2021 in 2030, and approximately 18 percent greater in 2070. The majority of surface water supply in Region B comes from reservoirs. Table 9-5 shows the change in reliable reservoir supply in 2070 between the 2021 and 2026 Plans. The projected reliable supplies for most reservoirs have increased or remained the same compared to the 2021 Plan. The Lake Kemp/Diversion system shows the largest increase in projected supply in 2070 with over 8,700 ac-ft/yr more than the 2021 Plan. This is primarily due to switching from a spreadsheet based hydrologic modeling in the 2021 Plan to the updated Red River WAM for the 2026 Plan. Surface water supplies also include run-of-the-river supplies and local stock ponds used for livestock demands.

Table 9-6 shows the changes in run-of-the-river and local livestock supplies between the 2021 and 2026 Plans. For both Plans, run-of-the-river supplies were estimated using the latest available version of the TCEQ WAMs. Since the 2021 Plan, the hydrology for the Brazos and Red River WAMs was extended from 1998 to 2018 which included the recent drought of record for the region. This led to lower run-of-the-river firm yield volumes for these two basins, the majority of which occurs in the Red River basin. Local livestock supplies are set equal to the livestock demand projected to come from surface water supplies. Since livestock demands across Region B are lower for the 2026 Plan than the 2021 Plan, local livestock supplies are also lower for the 2026 Plan compared to the 2021 Plan.

Table 9-5: Projected Change in Reliable Reservoir Supply in 2070 from the 2021 to 2026 Plan
-Values in ac-ft/yr-

Reservoirs	2021 Plan	2026 Plan	Percent Change[1]
Lake Kemp/Diversion	14,500	23,220	60%
Lake Arrowhead	7,300	8,180	12%
Lake Kickapoo	3,700	4,040	9%
Amon Carter Lake	830	832	<0.1%
Lake Electra		230	
Lake Nocona	1,260	1,260	0%
Olney Lake	130	97	-25%
Santa Rosa Lake	50	920	1,740%[2]
North Fork Buffalo Cr.		790	
Greenbelt Reservoir[3]	2,256	2,383	6%
Total	**30,026**	**41,952**	**40%**

[1] Negative numbers indicate lower supply in the 2026 Plan and positive numbers show higher supply in the 2026 Plan.
[2]Reliable supplies for Santa Rosa Lake in the 2021 Plan were based on historical livestock use. For the 2026 Plan, reliable supplies were estimated using a one-year safe yield from the Red River WAM, leading to a significantly higher supply number.
[3]Greenbelt Reservoir is located in Region A but is used as water supply by several WUGs in Region B.

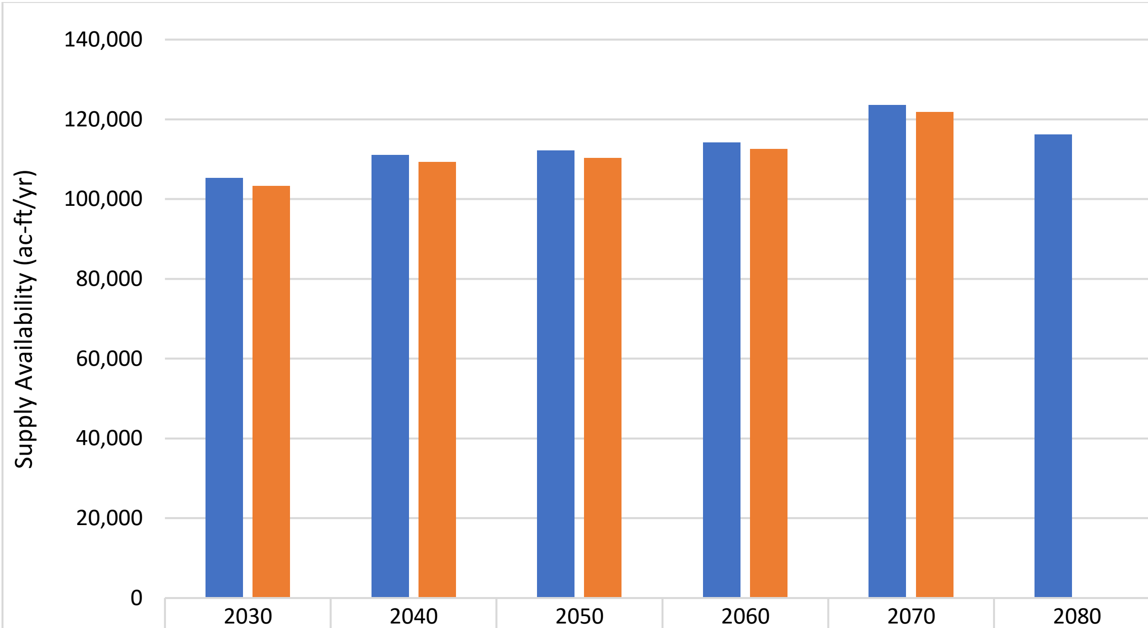
Table 9-6: Changes in Non-Reservoir Surface Water Supplies from the 2021 Plan to the 2026 Plan
-Values in ac-ft/yr-

Supply Type	2030	2040	2050	2060	2070	2080
Run-of-the-River Supplies	-4,360	-4,360	-4,360	-4,360	-4,360	N/A
Local Livestock Supplies	-2,506	-2,506	-2,506	-2,506	-2,506	N/A
Total	**-6,866**	**-6,866**	**-6,866**	**-6,866**	**-6,866**	N/A

There were very minimal changes to total reuse supplies in Region B from the 2021 Plan to the 2026 Plan. The City of Wichita Falls indirect potable reuse system is the only major potable reuse project that is currently operating in the region. This accounts for the majority of reuse supplies in the region and has not changed since the 2021 Plan. The remaining reuse supplies are for non-potable uses such as mining, manufacturing, or irrigation. Overall reuse supplies decreased slightly by approximately 3 percent in 2030 from the 2021 Plan to the 2026 Plan, and increased by approximately 2 percent in 2070.

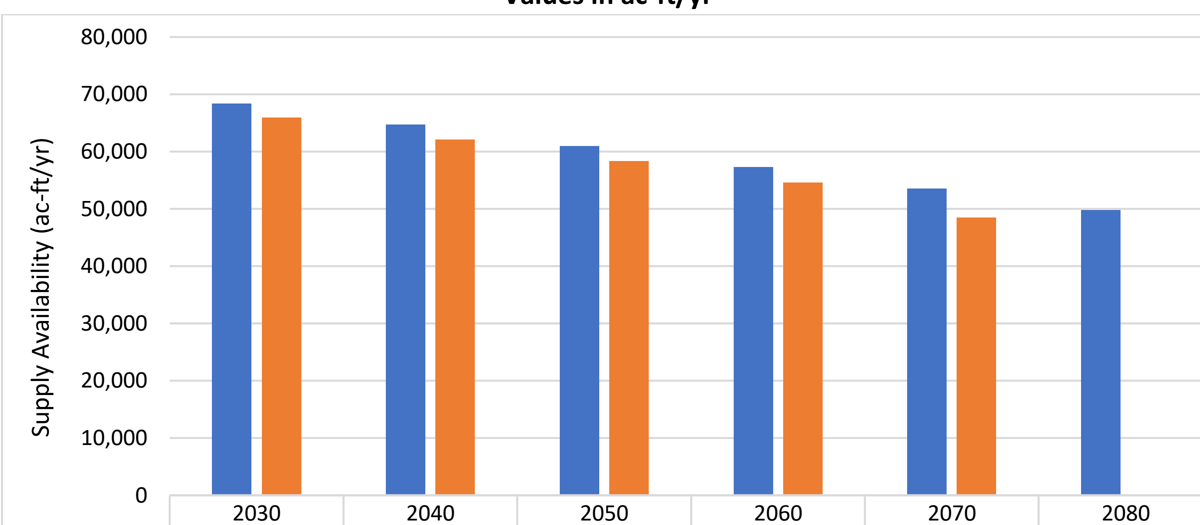
Overall, there was about a 6 percent increase in water availability in 2070 throughout the Region between the 2021 and 2026 Plans. Groundwater availability remained mostly consistent with the 2021 Plan. For surface water, reservoir reliable supplies increased while run-of-the-river and local livestock supplies decreased. Figure 9-4 and Figure 9-5 show the differences in groundwater and surface water availability respectively.

Figure 9-4: Comparison of Groundwater Availability in the 2021 and 2026 Plans
-Values in ac-ft/yr-



	2030	2040	2050	2060	2070	2080
2026 Plan	105,214	111,069	112,209	114,229	123,636	116,240
2021 Plan	103,332	109,345	110,330	112,521	121,754	

Figure 9-5: Comparison of Surface Water Availability in the 2021 and 2026 Plans
-Values in ac-ft/yr-



	2030	2040	2050	2060	2070	2080
2026 Plan	68,381	64,697	61,013	57,291	53,568	49,845
2021 Plan	65,915	62,143	58,372	54,600	48,507	

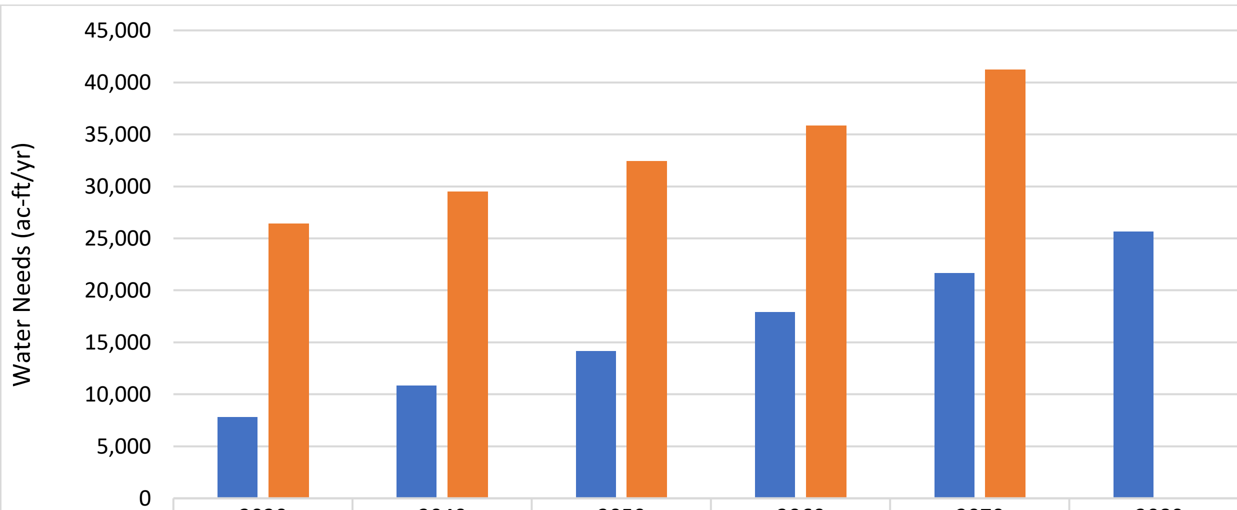
9.2.6 Existing Water Supplies of Water Users

Existing supplies to users are based on the source availability and infrastructure developed to provide the water. For the 2026 Plan, no new existing supply sources have been identified. Changes in existing supply availability from the 2021 Plan vary by source type. As shown in Table 9-4, some counties show decreased groundwater availability, while others show no change or an increase in availability compared to the 2021 Plan. For surface water, most reservoirs show either increased supply availability or no change due to the updated Red River WAM hydrology that was available for the 2026 Plan but not for the 2021 Plan. Lake Olney does show a slight decrease in 2070 safe yield availability, but this accounts for a very small amount of total reservoir supply. Total reservoir availability in 2070 increased by over 50 percent in the 2026 Plan compared to the 2021 Plan. Non-reservoir surface water supplies, including run-of-the river and livestock supplies, decreased from the 2021 Plan. This was due to decreased run-of-the-river safe yields based on the updated Red River WAM hydrology, and decreased livestock demands on surface water compared to the 2021 Plan.

9.2.7 Identified Water Needs

Projected water needs across Region B decreased by 70 percent in 2030 and by 48 percent in 2070, from the 2021 Plan to the 2026 Plan. Several factors contributed to the lower projected needs, including lower non-municipal demand projections and greater surface water availability from reservoirs in the 2026 Plan compared to the 2021 Plan. Figure 9-6 shows the comparison of the projected water needs in the 2021 Plan and 2026 Plan. Table 9-7 shows the individual WUGs with new needs for the 2026 Plan that did not have needs in the 2021, or WUGs with no needs in the 2026 Plan that had needs in the 2021 Plan. In the 2026 Plan, 15 water user groups with needs in the 2021 Plan were removed as they no longer are projected to have needs. There are four new WUGs with needs in the 2026 Plan that did not have needs in the 2021 Plan.

Figure 9-6: Comparison of Water Needs in the 2021 and 2026 Plans
-Values in ac-ft/yr-



	2030	2040	2050	2060	2070	2080
2026 Plan	7,803	10,830	14,181	17,900	21,630	25,665
2021 Plan	26,441	29,518	32,448	35,827	41,256	

Table 9-7: WUGs with New Needs or No Needs for the 2026 Plan

County with Need	Need Shown in 2026 Plan, No Need Shown in 2021 Plan	No Need Shown in 2026 Plan, Need Shown in 2021 Plan
Archer		Archer City
Archer		Archer County MUD 1
Archer		Scotland
Archer, Clay		Windthorst WSC
Archer		County-Other
Archer		Irrigation
Archer		Mining
Baylor	Irrigation	
Foard		Crowell
Hardeman		Quanah
Hardeman, Wilbarger		Red River Authority
Hardeman		Manufacturing
Montague	County-Other	
Montague	Nocona	
Montague	Saint Jo	
Montague		Mining
Wilbarger		Vernon
Wilbarger		Manufacturing
Young		Olney

Changes in water needs from the 2021 to 2026 Plans varied by water use type. Irrigation needs decreased by the greatest volume with approximately 64 percent less, over 19,200 ac-ft/yr, needs in 2070 for the 2026 Plan compared to the 2021 Plan. Steam Electric Power (SEP) needs also decreased by approximately 77 percent in 2070, or approximately 3,600 ac-ft/yr. There was also a decrease in mining needs as there are no mining needs in the 2026 Plan. Similar to the 2021 Plan, there are no livestock needs in the 2026 Plan. Manufacturing needs remained minimal with differences of 50 ac-ft/yr or less between the 2021 and 2026 Plans. Municipal was the only water use type for which needs increased in each planning decade. Municipal needs in 2070 for the 2026 Plan are approximately 58 percent greater than in the 2021 Plan. Table 9-8 below highlights the differences in need by use type in the two plans.

Table 9-8: Changes in Projected Water Needs by Use Type from the 2021 Plan to the 2026 Plan -Values in ac-ft/yr-

Use Type	2030	2040	2050	2060	2070	2080
Municipal	2,263	3,038	4,002	4,675	3,494	N/A
Irrigation	-17,972	-18,302	-18,632	-18,961	-19,291	N/A
Livestock	0	0	0	0	0	N/A
Manufacturing	0	0	4	36	-50	N/A
Mining	-627	-522	-201	-137	-137	N/A
SEP	-2,302	-2,902	-3,440	-3,540	-3,642	N/A
Total	**-18,638**	**-18,688**	**-18,267**	**-17,927**	**-19,626**	N/A

9.2.8 Recommended and Alternative Water Management Strategies and Projects

New Water Management Strategies

Due to various factors including reduction in reservoir storage over time from sedimentation, increasing water demand projections in Montague County, and limited MAG availability in Baylor County, there are remaining water needs across the region which require new strategies and projects. The majority of the new strategies and projects were necessary to meet the needs of customers served by the City of Wichita Falls which provides approximately 70 percent of the total Region B municipal water demands. These include both fulfillment of existing contractual obligation with Wichita Falls, and voluntary transfer of additional water from Wichita Falls. In the 2021 Plan there were 32 WUG's with needs and in the 2026 Plan that decreased to a total of 17 WUG's with needs. Shown in Table 9-9 are the new strategies and projects that were not in the 2021 Plan, not including strategies that involve customers of Wichita Falls receiving additional water.

Table 9-9: New Recommended Water Management Strategies and Projects in the 2026 Plan

Water User Group or Wholesale Provider	New Recommended Water Management Strategy
Irrigation - Baylor County	Managed Aquifer Recharge
Red River Authority	Water Loss Reduction
County-Other, Montague	Develop Additional Groundwater
Nocona	Develop Additional Groundwater
Saint Jo	Develop Additional Groundwater
Vernon	Develop Additional Groundwater

Municipal Conservation

A somewhat different approach was used to evaluate municipal conservation between the 2021 and 2026 plans. For the 2026 plans water conservation includes water loss mitigation and demand reduction, which are considered separately. Under the demand reduction category there are two elements: basic and advanced conservation. Basic conservation is included in the demand projections and advanced conservation is planned as conservation or demand reduction above the basic conservation.

Basic conservation for the 2026 plan includes conservation resulting from adoption of the water conserving plumbing code and the federal clothes washer rules. This level of conservation is expected to be fully implemented by the 2030 decade and no additional basic conservation is included for the 2040 - 2080 portion of the planning period.

Advanced conservation for the 2026 plan includes conservation derived from:

- Enhanced public school education,
- Water conserving rate structure that addresses price elasticity,
- Water waste ordinances,
- Setting time of day irrigation limits,
- And regional cooperation between utilities to address the need for water conservation.

It was assumed that water systems with a need would implement advanced conservation while those without needs would only implement basic conservation.

Water loss mitigation was considered for those WUGs that have water loss exceeding the thresholds established by HB 3605 [now in TAC, Title 31, Section 358.6 (e)].

No Longer Considered Water Management Strategies and Projects

There are no known WMSs from the 2021 Plan that are no longer considered for the 2026 Plan.

Cooperation Between WUGs to Achieve Economies of Scale

Many of the WMSs and WMSPs that were included in the 2021 plan and continue in the 2026 plan are designed to serve the needs of multiple WUGs, because of the interconnections between WUGs. Therefore, many of the WMSs and WMSPs that produce larger volumes of supply serve the entire region and include WMSs like:

- Voluntary Transfers between WUGs with some entities such as Wichita Falls providing water to other WUGs as described in Chapter 5.
- Lake Ringgold providing increased surface water supply, primarily to Wichita Falls, but also to other WUGs through fulfilment of existing contractual supplies and voluntary transfers.
- Many WMSs will continue to address local needs of WUGs, and include WMSs like:
    - Water conservation.
    - Further development of existing groundwater – new wells.
    - Local implementation of water reuses projects.

9.3 Implementation of Previously Recommended Water Management Strategies

The following sections discuss those WMSs that were recommended in the 2021 Regional Water Plan and have been partially or completely implemented since that plan was published. These WMSs are included in the 2026 Plan as currently available supply.

9.3.1 Red River Authority

In 2021, RRA installed a treated water line connecting their Lake Arrowhead Lots water system to the Wichita Falls water system. The 12" water line begins near the RRA office in Wichita Falls and extended south for approximately 7.5 miles to Lake Arrowhead. The treated water flows via gravity with pressure provided by a nearby City of Wichita Falls elevated storage tank until it reached a ground storage tank at the RRA Lake Arrowhead WTP, which is no longer in use. The treated water is then pumped to an elevated storage tank for distribution to customers in the Lake Arrowhead Lots system. The max capacity of the water line is about 2 MGD.

9.3.2 Wichita County Water Improvement District #2

Converting irrigation canals to pipelines to reduce water losses has been a recommended WMS for several Region B Plans, including both the 2021 Plan and the 2026 Plan. Since the 2021 Plan, WCWID#2 has converted about 4.25 miles of priority canal segments to pipeline, achieving an estimated 2,218 ac-ft/yr. In addition, they have replaced just over 1 mile of smaller lateral segments since 2018. There are still an estimated 6.85 miles of priority canal segments that are planned to be converted to pipeline.

9.4 List of References

Texas Demographic Center, Estimates of the Total Populations of Counties and Places in Texas for July 1, 2023 and January 1, 2024, November 2024

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CHAPTER 10 ADOPTION OF PLAN AND PUBLIC PARTICIPATION

10.1 Introduction

This chapter describes the plan approval process for the Region B Water Plan and the efforts made to encourage public participation in the planning process.

Special efforts were made in seeking input from the general public, water suppliers, and others with special interest regarding the water planning process for Region B.

10.2 Regional Water Planning Group

As required by Senate Bill 1 regional water planning groups were formed to guide the planning process. These groups were comprised of representatives of twelve specific interests:

- General Public
- Counties
- Municipalities
- Industry
- Agricultural
- Environmental
- Small Businesses
- Electric Generating Utilities
- River Authorities
- Water Districts
- Water Utilities
- Groundwater Management Areas

Table 10-1 below lists the 19 voting members of the Region B Water Planning Group, the interests they represent, their organizations, and their counties.

Table 10-1: Regional Water Planning Group - Area B

NAME	ORGANIZATION	INTEREST	COUNTY
Risa Tole	W.T. Waggoner Estate	Agricultural	Wilbarger
Keith Teichman	Teichman Dairy	Agricultural	Archer
Judge Mark Christopher	Foard County	Counties	Foard
Judge Jim Johnson	Wichita County	Counties	Wichita
Robert Zuchlewski	Oklaunion Industrial Park LLC	Electric Generating Utility	Wilbarger
J. K. (Rooter) Brite	J. A. Ranch	Environmental	Montague/All
Jerry Payne	Natural Resources Conservation Service (Retired)	Environmental	Clay
Jimmy Banks	Public	General Public	Wichita
Carrie Dodson	Gateway Groundwater Conservation District	Groundwater Management Area 6	Hardeman
Tracy Mesler – Vice Chair	Upper Trinity Groundwater Conservation District	Groundwater Management Area 8	Montague
Tamela Armstrong	Alliance Power Company	Industries	Wichita
Darell Kennon	City of Vernon	Municipalities	Wilbarger
Russell Schreiber	City of Wichita Falls	Municipalities	Wichita
Mayor Pro Tem Gayle Simpson	City of Crowell	Municipalities	Foard
Fabian Heaney	Red River Authority of Texas	River Authorities	All
Dean Myers - Secretary	Bowie Industries, Inc.	Small Business	Montague
Kyle Miller - Chair	Wichita County Water Improvement District No. 2	Water Districts	Wichita
Lynn Smith	Rolling Plains Groundwater Conservation District	Water Districts	Baylor
Tom Parker	Olney Economic Development	Water Utilities	Young

The RWPG-B Planning Board unanimously pledged to support the interest of the entire region as the primary objective in meeting the needs of the region as a whole. During the first round of planning there was an extensive public education and participation program that included drought contingency planning workshops with local water suppliers, numerous civic group and local presentations, surveys of water users in the region, as well as planning group meetings, public hearings, and an internet web site. For this update, the public education and participation program consists of:

- Planning Group Meetings and Hearings
- Internet Web Site
- Coordination with Wholesale Water Providers and Water User Groups
- Implementation of the Water Plan

10.3 Planning Group Meetings

The RWPG-B held 14 open public meetings and hearings from January 13, 2021 through February 5, 2025 with invitations going to each category of interest groups and water use entities within the region, including a current agenda for each meeting and encouraging attendance and participation in the process. The RWPG Board participated actively as a group during each meeting, relying upon information provided by its consultant group and was well informed on all matters concerning the regional planning area. Additionally, the RWPG-B held six various committee meetings during this time. A list of the public meeting dates and locations held is shown in Table 10-2.

Representatives from the Texas Water Development Board, the Texas Commission on Environmental Quality, the Texas Department of Agriculture, the Texas State Soil and Water Conservation Board, and the Texas Parks and Wildlife Department were regularly in attendance and other agencies were periodically represented and offered presentations. Some of these were agencies such as the U.S. Army Corps of Engineers, and State and Federal Legislators representing the local districts within the regional planning area. All meetings were posted and held in accordance with the Texas Open Meetings Act and the Public Information Act and 31 TAC § 357.12 and 357.21, with a copy of all materials presented or discussed available for public inspection prior to and following public meetings.

During each meeting, a presentation of materials, discoveries, and relevant issues were provided for discussion and deliberation prior to receiving a vote on any specific measures, action, or strategies to be taken on the part of the RWPG-B. Members of the public were given an opportunity to participate in discussions of individual agenda items, as well as to provide public comments prior to the close of each meeting. Minutes were prepared of all meetings and posted on the RWPG-B website and with the Texas Water Development Board.

Table 10-2: Region B Planning Group Meetings and Public Hearings

DATE	EVENT	LOCATION
January 13, 2021	RWPG-B Public Meeting	Virtual - Zoom
May 26, 2021	RWPG-B Public Meeting	Virtual - Zoom
August 11, 2021	RWPG-B Public Meeting	RRA Office – Wichita Falls
May 4, 2022	RWPG-B Public Meeting	RRA Office – Wichita Falls
November 16, 2022	RWPG-B Public Meeting	RRA Office – Wichita Falls
March 29, 2023	RWPG-B Public Meeting	RRA Office – Wichita Falls
June 21, 2023	RWPG-B Public Meeting	RRA Office – Wichita Falls
August 2, 2023	RWPG-B Public Meeting	RRA Office – Wichita Falls
November 15, 2023	RWPG-B Public Meeting	RRA Office – Wichita Falls
February 7, 2024	RWPG-B Public Meeting	RRA Office – Wichita Falls
May 15, 2024	RWPG-B Public Meeting	RRA Office – Wichita Falls
September 25, 2024	RWPG-B Public Meeting	RRA Office – Wichita Falls
December 4, 2024	RWPG-B Public Meeting	RRA Office – Wichita Falls
February 5, 2025	RWPG-B Public Meeting	RRA Office – Wichita Falls

10.4 Interregional Coordination

Memos were written to document coordination with Regions A, C, G, and O. Copies of the memos are included as Appendix I. At each RWPG meeting, an agenda item was included to provide interregional coordination updates from the Region A, C, G, O liaisons for the RWPG.

10.5 Rural Outreach Efforts

In accordance with the standard Regional Water Planning Contract Scope of Work, Task 10.A.4, the Region B Planning group has compiled a list of entities that meet the rural political subdivision definition per Texas Water Code 15.001(14). The entity and outreach measures performed are shown in Appendix J. Many of the systems are part of the Red River Authority or served through Wichita Falls and as such were represented in the planning process.

10.6 Media Communications

The RWPG-B Board members promoted numerous media coverage events before the board in an effort to encourage public involvement and heighten awareness of concerns vital to the regional planning area.

The Times Record News (TRN) was invited to each meeting and attended periodically, which produced good summary coverage of agenda items being considered together with actions taken by the RWPG-B Board.

10.7 Internet Web Page

An Internet Web Page was designed and is hosted by the RWPG's administrative agency, the Red River Authority of Texas. It is used to disseminate information about the water resources within the region and to publish notices of meetings, hearings, and issues being considered and addressed by the RWPG Planning Board.

The web pages are maintained and updated at least quarterly, or as needed, to publicize current information of interest and solicit input from the viewers. The web site is located under the Water Quality and Planning Section at www.rra.texas.gov. or at https://regionbwater.org/

The web site contains numerous links to other pages of common interest for the viewer and begins with a front page that includes a publications library, regional data inventories, names and contact information for the RWPG-B, public notices, maps of the region, and links to the regional water planning rules and statutes.

10.8 Regional Water Plan Implementation Issues

Implementation issues identified for the *Region B Water Plan* include: 1) financial issues associated with paying for the proposed capital improvements, 2) identification of the governing authorities for general regional strategies such as land stewardship, recharge enhancement and weather modification, 3) public acceptance of selected strategies, and 4) public participation in water conservation measures that were assumed in this plan.

Financial Issues

It is assumed that the entities for which strategies were developed will utilize existing financial resources, incur debt through bond sales and/or receive state-supported financial assistance. Most likely the funding of identified strategies will increase the cost of water to the customers. The economic feasibility to implement the strategies will depend on the cost increases the customer base can assume. Some strategies may not be able to be implemented without state assistance.

Governing Authorities

In Region B there is an identified governing authority for each of the recommended strategies discussed in Chapter 5. However, for general strategies, such as brush control, no governing authority has been identified. As part of the feasibility of these strategies for Region B, a governing authority will need to be identified to implement such strategies.

Public Acceptance

The public has expressed minor concerns regarding using wastewater effluent for municipal supplies. Reuse strategies are proposed to meet demands for the City of Bowie. While the final treated water supply from this strategy will meet or exceed the city's current water quality, the perception persists that the water would be of lesser quality. To gain public acceptance of wastewater reuse strategies for municipal use, additional public educational programs may be needed. The construction of Lake Ringgold has also received some negative comments from various interest groups.

Public Participation

The recommended strategies developed for this plan include a significant level of conservation to be implemented over the planning period.

These assumed demand reductions were applied to municipal water uses. Some of the demand reductions will occur simply through improvements in technology. However, a moderate level of public participation is required to fully realize the expected conservation. If the conservation is less than expected, then there may be additional shortages that were not identified in this plan.

10.9 Plan Adoption Process

In accordance with Texas Administrative Code Chapter 357 and the relevant rules governing the water planning process, the Region B RWPG conducted a formal process for the adoption of the Regional Water Plan. Activities under this section are primarily along two main lines. The first series of activities are directly related to the adoption of the Initially Prepared Plan (IPP) and the second series of activities are related to the final adoption of the completed Regional Water Plan.

10.9.1 Initially Prepared Plan Adoption

On February 5, 2025, the RWPG met at a public meeting for consideration and adoption of the IPP. Following discussions, comments, and questions, the RWPG voted to adopt the IPP and submit the IPP to the TWDB for their review and comments, and to set a Public Hearing date for the IPP.

10.9.2 Public Hearing

(To be included in Final Plan)

10.9.3 Response to Comments

(To be included in Final Plan)

10.9.4 Final Regional Water Plan Adoption

(To be included in Final Plan)

10.10 Conclusion

The Region B RWPG has attempted to maintain their commitment to public participation throughout the planning process and believes that the public information and participation activities are important to the success of the regional planning initiatives in addition to all the data that was accumulated and analyzed. Finally, the RWPG recommends that both funding and public information/participation be encouraged throughout all subsequent planning processes.

APPENDIX A

WATER AVAILABILITY MODELING

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

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APPENDIX A WATER AVAILABILITY MODELING

A-1 Water Availability Models

Surface water supplies in Region B are obtained mostly from the Red River basin. A small amount of surface water is also obtained from the Brazos and Trinity River basins. Reservoirs provide the majority of surface water supply, and about 95 percent of reservoir supply is from the Little Wichita and Wichita River supplies (Lake Kickapoo, Lake Arrowhead, Kemp/Diversion system). In accordance with regional planning rules and guidelines, Region B used the latest version of the TCEQ Water Availability Models (WAMs) with full authorization to determine surface water availability in each of the three river basins.

The RWPG requested hydrologic variances for all three river basins to use alternative availability assumptions other than firm yield for supply planning. The hydrologic variance for the Red River basin also included two additional variances. The first was a request to model Lakes Kemp and Diversion as a reservoir system rather than individual reservoirs in the WAM for supply planning. The second was a request for subordination of senior downstream water rights in Lake Texoma which caused an underestimation of Lake Arrowhead supply availability in the latest version of the Red River WAM. Further details regarding the subordination request are included in the Red River basin hydrologic variance request. These hydrologic variances were requested to reflect the current conditions and operations more accurately in the region.

These requested variances are detailed in a request letter to TWDB dated October 26, 2023, and an amended request letter dated November 27, 2023, both included as an attachment. TWDB approved the RWPG's variance request in a letter dated January 4, 2024, also included in attachment.

The use of a 20 percent reserve storage at the end of the drought of record as reliable supplies for all Region B reservoirs was approved by the RWPG and by TWDB as a part of the hydrologic variances. After modeling reservoir supplies using the Red and Trinity WAMs, it was determined that a 20 percent reserve storage could only be achieved for Lakes Arrowhead, Kickapoo, Kemp/Diversion, and Nocona. Current water rights on Lake Nocona have a diversion limit of 1,260 ac-ft/yr which is less than the reliable supplies with 20% reserve storage. The water right diversion limit was used as the reliable supplies for Lake Nocona. For Lakes Amon Carter, Electra, North Fork Buffalo Creek, Olney/Cooper, and Santa Rosa, the "one-year safe yield" was used for reliable supplies since a 20% reserve storage could not be achieved. The one-year safe yield is defined as the amount that can be diverted from the reservoir each year while leaving a one-year supply in storage at the end of the drought of record. Region B also uses some surface water supplies from Lake Greenbelt located in Region A. The reliable supplies for Greenbelt were determined by the Region A RWPG and use a one-year safe yield. Table A-1 and Table A-2 present the yields for major reservoirs in Region B. Existing water supplies provided by run-of-river water rights were determined using TCEQ WAM Run 3 for the Red, Trinity, and Brazos River Basins. Supplies are assumed to be constant for all planning decades.

Table A-1: Firm Yield of Reservoirs in Region B
-Values are in ac-ft/yr-

	Basin	2030	2040	2050	2060	2070	2080
WATER SUPPLY SYSTEMS							
Lake Kemp/ Diversion System	Red	46,500	43,480	40,460	37,440	34,420	31,400
Little Wichita System							
Kickapoo	Red	11,800	11,480	11,160	10,840	10,520	10,200
Arrowhead	Red	21,500	21,300	21,100	20,900	20,700	20,500
TOTAL	*Red*	*33,300*	*32,780*	*32,260*	*31,740*	*31,220*	*30,700*
Subtotal		**79,800**	**76,260**	**72,720**	**69,180**	**65,640**	**62,100**
RESERVOIRS IN REGION B							
Lake Amon Carter	Trinity	1,400	1,340	1,280	1,220	1,160	1,100
Lake Electra	Red	310	310	310	310	310	310
North Fork Buffalo Creek Reservoir	Red	840	840	840	840	840	840
Santa Rosa Lake	Red	2,200	2,200	2,200	2,200	2,200	2,200
Lake Cooper/Olney	Red	247	228	209	191	172	153
Lake Nocona*	Red	1,260	1,260	1,260	1,260	1,260	1,260
Subtotal		**6,257**	**6,178**	**6,099**	**6,021**	**5,942**	**5,863**
RESERVOIRS OUTSIDE REGION B							
Greenbelt Reservoir	Red	4,000	4,062	3,700	2,812	2,812	2,900
TOTAL		**90,057**	**86,500**	**82,519**	**78,013**	**74,394**	**70,863**

*Yield for Lake Nocona limited by permit amount.

Table A-2: Reliable Supply for Reservoirs in Region B for Planning Purposes
-Values are in ac-ft/yr-

	Basin	2030	2040	2050	2060	2070	2080
WATER SUPPLY SYSTEMS							
Lake Kemp/ Diversion System*	Red	32,900	30,480	28,060	25,640	23,220	20,800
Little Wichita System							
Kickapoo*	Red	5,400	5,060	4,720	4,380	4,040	3,700
Arrowhead*	Red	10,900	10,220	9,540	8,860	8,180	7,500
TOTAL	*Red*	*16,300*	*15,280*	*14,260*	*13,240*	*12,220*	*11,200*
Subtotal		**49,200**	**45,760**	**42,320**	**38,880**	**35,440**	**32,000**
RESERVOIRS IN REGION B							
Lake Amon Carter	Trinity	1,080	1,018	956	894	832	770
Lake Electra	Red	230	230	230	230	230	230
North Fork Buffalo Creek Reservoir	Red	790	790	790	790	790	790
Santa Rosa Lake	Red	920	920	920	920	920	920
Lake Cooper/Olney	Red	145	133	121	109	97	85
Lake Nocona**	Red	1,260	1,260	1,260	1,260	1,260	1,260
Subtotal		**4,425**	**4,351**	**4,277**	**4,203**	**4,129**	**4,055**
RESERVOIRS OUTSIDE REGION B							
Greenbelt Reservoir	Red	3,140	2,947	2,754	2,561	2,368	2,175
TOTAL		**56,765**	**53,081**	**49,397**	**45,675**	**41,952**	**38,230**

*Lake Kemp/Diversion, Lake Kickapoo and Lake Arrowhead safe yield is 20% safe yield
**Yield for Lake Nocona limited by permit amount.

A-2 Versions and Dates of Hydrologic Models

The following information is required for the hydrologic models used to determine Source Water Availability. More discussion on Source Water Availability is included in Section A-1. The required details for each hydrologic model used are included in Table A-3 and the respective input and output files are provided electronically with this report. Modifications to the surface water availability analysis are described in the RWPG's letters of request for hydrologic variances. TWDB's response letter approving the requested modifications is also included. The analyses of surface water availability were carried out by Freese and Nichols, Inc.

Table A-3: Hydrologic Models Used in Determining Surface Water Availability

WAM Version	Date Used	Run Used	Model Inputs Files Used	Model Outputs Files Used	Comments
Brazos WAM	May 2023	Region B Modified WAM Run 3 (October 2021)	Brazos_IrrigationBC.dat Brazos_IrrigationKC.dat	Brazos_IrrigationBC.OUT Brazos_IrrigationKC.OUT	Used to determine run-of-river supplies
Trinity WAM	May 2023	Region B Modified WAM Run 3 (October 2014)	Trin_IrrigationMC.dat	Trin_IrrigationMC.OUT	Used to determine run-of-river supplies
	November 2023	Region B Modified WAM Run 3 (October 2014)	trin3_AmonCarter_2030FY.dat trin3_AmonCarter_2030SY.dat trin3_AmonCarter_2080FY.dat trin3_AmonCarter_2080SY.dat	trin3_AmonCarter_2030FY.OUT trin3_AmonCarter_2030SY.OUT trin3_AmonCarter_2080FY.OUT trin3_AmonCarter_2080SY.OUT	Used for firm and safe yields for Amon Carter
Red WAM	April 2023	Region B Modified WAM Run 3 (October 2021)	red3_IrrigationAC.dat red3_MuniAC.dat red3_IrrigationBC.dat red3_IndusCC.dat red3_IrrigationCC.dat red3_MinCC.dat red3_MunGreaterCC.dat red3_MuniCC.dat red3_IrrigationCoC.dat red3_IrrigationHC.dat red3_OtherKC.dat red3_IrrigationMC.dat red3_MuniMC.dat	red3_IrrigationAC.OUT red3_MuniAC.OUT red3_IrrigationBC.OUT red3_IndusCC.OUT red3_IrrigationCC.OUT red3_MinCC.OUT red3_MunGreaterCC.OUT red3_MuniCC.OUT red3_IrrigationCoC.OUT red3_IrrigationHC.OUT red3_OtherKC.OUT red3_IrrigationMC.OUT red3_MuniMC.OUT	Used to determine run-of-river supplies
Red WAM	August 2023	Region B Modified WAM Run 3 (October 2021)	red3_IrrigationWC.dat red3_MuniWC.dat red3_OtherWC.dat red3_IrrigationWLC.dat red3_MinWLC.dat red3_MuniWLC.dat	red3_IrrigationWC.OUT red3_MuniWC.OUT red3_OtherWC.OUT red3_IrrigationWLC.OUT red3_MinWLC.OUT red3_MuniWLC.OUT	Used to determine run-of-river supplies

WAM Version	Date Used	Run Used	Model Inputs Files Used	Model Outputs Files Used	Comments
Red WAM	November 2023	Region B Modified WAM Run 3 (October 2021)	red3_Arrowhead_Kickapoo_2030FY.dat red3_Arrowhead_Kickapoo_2030SY.dat red3_Arrowhead_Kickapoo_2080FY.dat red3_Arrowhead_Kickapoo_2080SY.dat red3_Olney_Cooper_2030FY.dat red3_Olney_Cooper_2030SY.dat red3_Olney_Cooper_2080FY.dat red3_Olney_Cooper_2080SY.dat	red3_Arrowhead_Kickapoo_2030FY.OUT red3_Arrowhead_Kickapoo_2030SY.OUT red3_Arrowhead_Kickapoo_2080FY.OUT red3_Arrowhead_Kickapoo_2080SY.OUT red3_Olney_Cooper_2030FY.OUT red3_Olney_Cooper_2030SY.OUT red3_Olney_Cooper_2080FY.OUT red3_Olney_Cooper_2080SY.OUT	Used for firm and safe yields for Arrowhead, Kickapoo, Olney and Cooper
	December 2023	Region B Modified WAM Run 3 (October 2021)	red3_Kemp_Diversion_2030FY.dat red3_Kemp_Diversion_2030SY.dat red3_Kemp_Diversion_2080FY.dat red3_Kemp_Diversion_2080SY.dat red3_Nocona_2030FY.dat red3_Nocona_2030SY.dat red3_Nocona_2080FY.dat red3_Nocona_2080SY.dat	red3_Kemp_Diversion_2030FY.OUT red3_Kemp_Diversion_2030SY.OUT red3_Kemp_Diversion_2080FY.OUT red3_Kemp_Diversion_2080SY.OUT red3_Nocona_2030FY.OUT red3_Nocona_2030SY.OUT red3_Nocona_2080FY.OUT red3_Nocona_2080SY.OUT	Used for Kemp, Diversion and Nocona firm and safe yields
	December 2023	TCEQ WAM Run 3 (October 2021)	Electra_FY.dat Electra_SY.dat NFBC_FY.dat NFBC_SY.dat SantaRosa_FY.dat SantaRosa_SY.dat	Electra_FY.OUT Electra_SY.OUT NFBC_FY.OUT NFBC_SY.OUT SantaRosa_FY.OUT SantaRosa_SY.OUT	Used for safe and firm yields for Electra, NF Buffalo Creek, and Santa Rosa lakes
Red WAM	October 2024	TCEQ WAM Run 3 (October 2021)	red3_Ring_2030FY.dat red3_Ring_2030_SY.dat red3_Ring_2080FY.dat red3_Ring_2080SY.dat	red3_ring_2030fy.OUT red3_Ring_2030_SY.OUT red3_Ring_2080FY.OUT red3_Ring_2080SY.OUT	Used for safe and firm yields of Lake Ringgold

A-3 Reservoir Sedimentation and Area-Capacity Calculation Methodology

For all major reservoirs in the Region B, which includes seven reservoirs in the Red Rivers basin and one (Amon Carter) in the Trinity Basin, anticipated sedimentation rates and revised area-capacity rating curves were developed to estimate reservoir storage in future decades (2030 – 2080). Anticipated sedimentation rates, expressed in acre-feet per square mile per year, were estimated for each major reservoir based on actual sediment surveys (part of a volumetric survey), published sedimentation rates, or comparing changes in conservation pool capacity between two or more reservoir surveys. The reservoirs were sliced into incremental storage volumes based on elevation, then a uniform reduction was applied to the horizontal surface area of each slice. New storage volumes were then calculated for each increment and added together to calculate the total storage at each elevation. Two standard methods were used to calculate revised incremental storage volumes. The simplest assumes that each incremental volume can be represented as a trapezoid (trapezoidal method), while the other assumes that each incremental volume is a cross-section of a cone (conical method). The method with the best fit to the original rating curve data was used. The data utilized for calculating anticipated sedimentation rates and revised area-capacity rating curves are shown in Table A-4

Table A-4: Sedimentation Rates and Projected Storage Capacity of Major Reservoirs in Region B

Reservoir	Most Recent Survey		2026 Sedimentation Rate (ac ft/yr/ mi^2)	Source of Sedimentation Rate	Sediment Contributing Drainage Area (mi^2)	Projected 2030 Capacity (ac ft)	Projected 2080 Capacity (ac ft)
	Year	Conservation Pool Capacity (ac ft)					
Arrowhead	2013	230,359	1.29	TWDB Volumetric Survey-Derived Sedimentation Rate (2013)[1]	557	218,102	182,053
Kickapoo	2013	86,345	1.07	TWDB Volumetric Survey-Derived Sedimentation Rate (2013)[2]	275	81,364	66,715
Kemp	2006	245,434	0.90	Calculated based on multiple historical volumetric surveys	2,060	200,942	108,254
Diversion	2013	35,234	0.69	TWDB Volumetric Survey-Derived Sedimentation Rate (2013)[3]	78	34,414	31,736
Nocona	2001	21,749	1.12	TWDB Volumetric Survey-Derived Sedimentation Rate (2001)[4]	94	18,696	13,431
Olney	2014	1,189	1.68	TWDB Volumetric Survey-Derived Sedimentation Rate (2014)[5]	7.1	994	386
Cooper	2014	3,357	1.56	TWDB Volumetric Survey-Derived Sedimentation Rate (2014)[5]	12.2	3,052	2,100
Amon Carter	N/A	N/A	0.65	TBWE Bulletin 5912[6]	100	25,670	22,426

A-4 Reservoir Water Rights

Water rights for reservoirs located in Region B are summarized on Table A-5. Comparisons of rights to firm yields indicate that water rights for several of the reservoirs in Region B exceed firm yield. The current firm yield of Lake Kemp is about 30 percent of the total permitted diversion. The firm yields for Lakes Amon Carter and Wichita System are about half of the permitted diversions.

Table A-5: Summary of Reservoir Water Rights

Reservoir	Water Right No.	Priority Date	Holder	Water Right Amount (acre feet/year)					
				Mun	Ind	Irr	Mining	Rec	Total
Kemp/ Diversion	5123	10/2/20	Wichita Co WID#2 Wichita Falls	25,150	40,000	120,000[1]	2,000	5,850	193,000[1]
Santa Rosa	5124	6/30/26	W.T. Waggoner Estate			3,075			3,075
Electra	5128 5128	3/29/49 2/25/74	City of Electra Emergency supply	600 800					600 800
Kickapoo	5144	6/21/44	Wichita Falls	40,000					40,000
Arrowhead[3]	5150	6/20/62	Wichita Falls	45,000					45,000
Olney/ Cooper	5146	3/26/53	City of Olney	1,260		35			1,295
N.F. Buffalo Creek	5131	9/19/62	City of Iowa Park	840					840
Iowa Park/ Lake Gordon	5132 5133	8/3/49 11/22/38	City of Iowa Park	500 300					800
Nocona	4879	10/9/58	City of Nocona	1,080		100		80	1,260
Amon Carter	3320	7/12/54	City of Bowie	3,500	1,300		200		5,000

Mun – Municipal Use Ind – Industrial Use Irr – Irrigation Use Rec – Recreational Use

1. Water right 5123 includes the ability to divert 16,660 acre-feet per year of the permitted 120,000 acre-feet per year directly from the river for irrigation. This portion of the right was evaluated as a run-of-the-river right and is also shown in Table A-13.
2. Yield reported is the firm yield as determined for this plan.
3. Wichita Falls is authorized to use the bed and banks of Arrowhead to convey 22,302 acre-feet per year of existing and future surface water-based return flows. The yield from this supply is identified as an indirect reuse project and is not included in the yield calculation in this table.

Source: Texas Commission on Environmental Quality, Water Rights Database, 2024.

A-5 Run-of-the-River Supplies

Portions of three river basins are located in Region B. The Red River and its tributaries represent the largest river system, flowing across the central and northern areas of the region. The Brazos River flows through the southern portion of King and Baylor Counties, and the upper tributaries of the Trinity River lie in southwest Montague County.

The Red River forms the northern boundary of Region B and flows eastward along the Texas – Oklahoma border. Major tributaries within the region include the Pease River, Wichita River and Little Wichita River. High concentrations of total dissolved solids, sulfate and chloride are concerns for the upper reaches of these streams during low flow conditions. Naturally occurring salt springs, seeps and gypsum outcrops are found in the area westward of Wichita County to the High Plains Caprock Escarpment in the Panhandle Region Planning Area. As a result water from these rivers in Cottle, Foard, King, Hardeman and parts of Baylor and Wilbarger Counties is generally not used or is restricted to irrigation use only. The quality of the water gradually improves downstream toward the eastern portion of the region.

Table A-6 includes a list of the run-of-river water rights within Region B. The total available supplies from the run-of-the-river diversions are shown by use type, county and basin in Table A-7. These supplies were determined using the TCEQ Water Availability Models (WAM) Run 3 and were aggregated by county and use type. Generally, the available supply represents the minimum annual diversion over the historical record in the respective model unless noted. This is considered a reasonable approach to reliable supplies for these water rights given the monthly time-step of the WAM and the uncertainty of the diversions. Some of these rights include storage and may also be supplemented with other sources of water, such as groundwater. There is no direct connection between the aggregated water demand by county and an individual water right. Therefore, evaluating water reliability as if such direct relationship existed is not practical.

Table A-6: Summary of Run of the River Water Rights

Water Right	County	Permitted Amount (acre feet/year)	Use Type	Owner
Red River				
5143	Clay	200	Irrigation	Joe J. Parker
Little Wichita River				
4268	Clay	3,600	Irrigation	A.L. Rhodes
5147	Archer	30	Irrigation	Joy Graham
5152	Clay	1,560	Municipal	City of Henrietta
5153	Clay	50	Irrigation	Clay County Country Club Inc.
5154	Clay	15	Irrigation	Johnnie H. Shaw
Wichita River				
4433	Wichita	300	Irrigation	Alvin & Nana Robertson
5123	Wichita	16,660	Irrigation	WCWID #2
5135	Clay	357	Irrigation	Eagle Farms, Inc.
5136	Clay	200	Irrigation	Joe L. Hale Estate
5138	Clay	55	Irrigation	M.E. McBride
5139	Clay	30	Irrigation	Bob Brown
5140	Clay	270	Industrial	Red River Feed Yard, Inc.
5530	Wichita	32	Irrigation	Joe L. Burton
Beaver Creek				
5125	Wilbarger	675	Irrigation	W.T. Waggoner Estate
5126	Wilbarger	60	Municipal	W.T. Waggoner Estate
5127	Wilbarger	85	Municipal, Mining	W.T. Waggoner Estate
5129	Wichita	404	Irrigation	Harry L. Mitchell
5393	Wichita	450	Irrigation	James Brockriede
5128[1]	Wilbarger	800	Municipal	City of Electra
Groesbeck Creek				
5225	Hardeman	96	Irrigation	Hunter Brothers
5226	Hardeman	60	Irrigation	FW Howard Jr.
5227	Hardeman	100	Irrigation	FW Howard Jr. & Wife
5228	Hardeman	63	Irrigation	BJ Howard & Wife
5231	Hardeman	41	Irrigation	Garland Welborn
Antelope Creek				
5130	Wichita	40	Irrigation	Hulen J. Cook Jr. Et Al
Big Mineral Creek				
5113	Wilbarger	150	Irrigation	James David Belew & Wife
Sherwood				
5238	Wilbarger	160	Irrigation	Joyce Virginia Chapman
Devils Creek				
5112	Hardeman	45	Irrigation	Texas Parks & Wildlife Dept.
Armand Bayou				
5230	Hardeman	16	Irrigation	AEP Texas North Company
Belknap				
4874	Clay	30	Irrigation	Herschel H. Studdard
4875	Montague	133	Irrigation	Clarice Benton Whiteside
Frog Creek				
5142	Clay	200	Irrigation	Joe J. Parker
Long Creek				
5109	Clay	200	Irrigation	A D Hanna
Mesquite Creek				
5146	Archer	35	Irrigation	City of Olney
Deep Draw				
5605	Montague	100	Irrigation	Jerry D. Nunneley
Pease Creek				
5111	Cottle	23	Irrigation	John E. Isbell Jr. & Wife

Table A-7: Run of the River WAM Availability by County and Use Type

LOCAL RUN OF THE RIVER SUPPLIES									
	Use	County	Basin	2030	2040	2050	2060	2070	2080
Run-of-the-River[1]	Irrigation	Baylor	Brazos	13	13	13	13	13	13
Run-of-the-River	Irrigation	Clay	Red	1,241	1,241	1,241	1,241	1,241	1,241
Run-of-the-River	Irrigation	Cottle	Red	8	8	8	8	8	8
Run-of-the-River	Irrigation	Hardeman	Red	141	141	141	141	141	141
Run-of-the-River	Irrigation	Montague	Red	6	6	6	6	6	6
Run-of-the-River	Irrigation	Wichita	Red	878	878	878	878	878	878
Run-of-the-River	Irrigation	Wilbarger	Red	15	15	15	15	15	15
Run-of-the-River - Archer City Lake	Municipal	Archer	Red	137	137	137	137	137	137
Run-of-the-River - Petrolia	Municipal	Clay	Red	12	12	12	12	12	12
*Run-of-the-River – Henrietta	Municipal	Clay	Red	1,559	1,559	1,559	1,559	1,559	1,559
Run-of-the-River - Iowa Park/Gordon	Municipal	Wichita	Red	545	545	545	545	545	545
Run-of-the-River	Municipal	Wilbarger	Red	81	81	81	81	81	81
Run-of-the-River	Industrial	Clay	Red	91	91	91	91	91	91
Run-of-the-River	Mining	Clay	Red	1	1	1	1	1	1
Run-of-the-River	Mining	Wilbarger	Red	11	11	11	11	11	11
Subtotal				**4,738**	**4,738**	**4,738**	**4,738**	**4,738**	**4,738**

* Henrietta has an agreement in place with Wichita Falls to make releases from Lake Arrowhead for their run-of-river diversion. For Henrietta in this table supplies were determined based on the TCEQ WAM Run 3 minimum monthly diversions.

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. <u>Please complete a separate checklist for each river basin in which variances are being requested.</u>

Water Planning Region: B

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Brazos River WAM limited to the portions of those basins within Region B.

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   To best represent how local supplies are managed the following modifications will be needed to a better basis for planning.
   - One-Year Safe Yield

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   Yes

   A similar request was submitted as part of the 2021 Plan.

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Choose an item.

   Since the Brazos River WAM has been extended by TCEQ there is no need to request extended models. It is likely that this model captures the new drought of record from 2011-2014.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   Yes

   Existing and Strategy Supply

   One-year safe yield is defined as the maximum annual diversion that can be taken from a reservoir during a repeat of drought-of-record conditions with a minimum reserve supply equal to that annual maximum diversion.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

   No

   Choose an item.

   Click or tap here to enter text.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

   No

   Choose an item.

   Click or tap here to enter text.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

   Yes

   Existing and Strategy Supply

   - Updating sedimentation for reservoirs based on TWDB volumetric surveys for 2030 and 2080 conditions.

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

   No

   Choose an item.

   Click or tap here to enter text.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    No

    Click or tap here to enter text.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    Click or tap here to enter text.

[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. Please complete a separate checklist for each river basin in which variances are being requested.

Water Planning Region: B

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Red River WAM limited to the portions of those basins within Region B.

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   To best represent how local supplies are managed the following modifications will be needed to a better basis for planning.

   - 20 percent reserve (20% of conservation storage remaining in the reservoir at all times)

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   Yes

   A similar request was submitted as part of the 2021 Plan, however, in this request, all reservoirs in the Red River Basin will include the 20 percent reserve safe yield. The 2021 Plan

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

request only included the 20% reserve for the City of Wichita Falls Supplies (Kickapoo, Arrowhead and the Kemp-Diversion reservoir system).

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Choose an item.

   Since the Red River WAM has been extended by TCEQ there is no need to request extended models. It is likely that this model captures the new drought of record from 2011-2014.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   Yes

   Existing and Strategy Supply

   To maintain reservoir supply operations during a repeat of drought-of-record conditions, a minimum reserve supply equal to 20 percent of the conservation storage will be maintained in each Region B supply reservoir in the Red River Basin.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

   No

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

   No

   Choose an item.

   Click or tap here to enter text.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

   Yes

   Existing and Strategy Supply

   - Modeling Kemp and Diversion reservoirs as a system rather than as individual reservoirs
   - Updating sedimentation for reservoirs based on TWDB volumetric surveys for 2030 and 2080 conditions.

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

   No

   Choose an item.

   Click or tap here to enter text.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    No

    Click or tap here to enter text.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    Click or tap here to enter text.

[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. Please complete a separate checklist for each river basin in which variances are being requested.

Water Planning Region: B

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Trinity River WAM limited to the portions of those basins within Region B.

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   To best represent how local supplies are managed the following modifications will be needed to a better basis for planning.
   - One-Year Safe Yield

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   Yes

   A similar request was submitted as part of the 2021 Plan.

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Choose an item.

   The Trinity WAM has not been extended, but it is unclear if a new drought of record has occurred in this portion of the basin.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   Yes

   Existing and Strategy Supply

   One-year safe yield is defined as the maximum annual diversion that can be taken from a reservoir during a repeat of drought-of-record conditions with a minimum reserve supply equal to that annual maximum diversion.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

   No

   Choose an item.

   Click or tap here to enter text.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

   No

   Choose an item.

   Click or tap here to enter text.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

   Yes

   Existing and Strategy Supply

   - Updating sedimentation for reservoirs based on TWDB volumetric surveys for 2030 and 2080 conditions.

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

   No

   Choose an item.

   Click or tap here to enter text.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    No

    Click or tap here to enter text.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    Click or tap here to enter text.

[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

November 27, 2023

Jeff Walker
Texas Water Development Board
1700 North Congress
Austin, Texas 78711-3231

Re: Amended Hydrologic Variance Requests for Water Availability Determination in Region B

Dear Mr. Walker,

Region B submitted a hydrologic variance request to the TWDB on October 26, 2023. This request was for surface water modeling for the three river basins in Region B (Brazos, Red and Trinity). While evaluating the water availability in the Red River Basin, we identified several other changes to the Red River WAM. These changes are consistent with how the basin is operated and better reflect water availability in Region B. This amended request was approved by the Region B Water Planning Group during a meeting on November 15, 2023.

Attached is an amended Surface Water Hydrologic Checklist for the Red River Basin and supplemental information that details the reasons for the request.

Please contact me at 817-735-7446 or Jon Albright of Freese and Nichols at 817-735-7267 if you have any questions regarding our request.

Sincerely,

Simone Kiel

Simone Kiel
Region B Lead Consultant, Freese and Nichols

Supplemental Information for Hydrologic Variance Request for Region B
Red River Basin
November 27, 2023

Subordination of Water Rights in Lake Texoma

The Red River WAM used for previous regional water planning was originally developed in 2001 and included hydrology through 1998. This WAM has unique considerations since it must respect Texas water rights authorizations and the Red River Compact. The Red River Compact addresses the split of water between Texas and adjoining states. In the vicinity of Region B, the water in the Red River and downstream in Lake Texoma is shared by Texas and Oklahoma equally (50-50). All water originating in Texas and upstream of the Red River is owned solely by Texas.

In 2021, TCEQ updated the Red River WAM. These updates included extended hydrology through 2018 and other corrections identified during the update. One of these corrections was the inflows to Lake Texoma. The original Red River WAM Run 3 had double counted the inflows from Oklahoma directly into Lake Texoma. This was corrected for the 2021 Red River WAM. However, neither WAM (2001 or 2021) included inflows to the Red River from tributaries in Oklahoma upstream of Texoma in Run 3. As a result, the inflows to Texoma in the 2021 WAM were reduced from the 2001 WAM. However, the actual inflows to Texoma would be greater if the tributary flows from Oklahoma were considered. This inconsistency in how Oklahoma flows are treated results in unnecessary calls for passing upstream Texas inflows to meet senior water rights, which affect the water availability in Region B.

Review of the WAM identified two water rights affecting the supply for Lake Arrowhead. These rights include CA4901, a 1952 water right for the City of Denison and an equivalent water right for Oklahoma at the same priority date. The Oklahoma water right does not represent a real authorization by the state of Oklahoma – it is an assumption that was made in the WAM to mirror Texas authorizations with equivalent authorizations for Oklahoma. The Oklahoma water right should not impact water availability for Texas water rights. The Denison water right diverts water from Lake Texoma to Lake Randell for municipal and industrial use. Lake Texoma has plenty of storage to accommodate this water right and Denison would likely never call for upstream flows. We are unaware of any priority call being made by Denison to meet its needs.

This change in the functionality of the Red River WAM as it pertains to upstream water rights is the result of three things:

1. Correction of the error in Oklahoma inflows to Lake Texoma in the 2021 WAM update
2. Omission of inflows from Oklahoma upstream of Lake Texoma, which results in an underestimation of flows available at Lake Texoma
3. WAM modeling of USACE storage contracts and diversions of individual water right holders in Lake Texoma rather than evaluating the lake as a whole.

To reflect the reliable supply in Region B, we are requesting the inclusion of subordination of senior downstream water rights in Lake Texoma to current and future water supply reservoirs in the Little Wichita River Basin. This request includes the existing Lake Arrowhead and the future Lake Ringgold. Lake Kickapoo is senior to the 1952 water rights in Lake Texoma. Under current supply analyses this request does not change the water availability for the City of Denison. It is still able to fully divert its water right.

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. Please complete a separate checklist for each river basin in which variances are being requested.

Water Planning Region: B

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Red River WAM, as applicable to Region B

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   To best represent how local supplies are managed the following modifications will be needed to a better basis for planning.

   - Subordinate senior water rights in Lake Texoma to Lake Arrowhead and Lake Ringgold (see attached)
   - Include 20 percent reserve for all reservoirs for reliable supply (20% of conservation storage remaining in the reservoir at all times). Firm yield also will be determined in accordance with the TWDB rules.

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

No

The Red River WAM was updated in 2021. Changes made in this update resulted in significant increases in pass throughs to downstream water right holders in Lake Texoma, which are not consistent with current operations. (see attached)

The use of the 20 percent reserve for reliable supply was requested for the 2021 Region B plan for the reservoirs used by the City of Wichita Falls, but not for other reservoirs. This request of a 20 percent reserve safe yield is expanded to include all reservoirs in the Red River Basin.

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Choose an item.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   Yes

   Existing and Strategy Supply

   To maintain reservoir supply operations during a repeat of drought-of-record conditions, a minimum reserve supply equal to 20 percent of the conservation storage will be maintained in each Region B supply reservoir in the Red River Basin.

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

   Yes

   We are requesting the use of a safe yield that maintains a minimum 20 percent reserve capacity as noted above.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

No

Choose an item.
Click or tap here to enter text.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

   Yes

   Existing and Strategy Supply

   - Subordinate senior water right from Lake Texoma to water rights in the Little Wichita River basin. This includes the existing Lake Arrowhead and future Lake Ringgold.
   - Modeling Kemp and Diversion reservoirs as a system rather than as individual reservoirs
   - Updating sedimentation for reservoirs based on TWDB volumetric surveys for 2030 and 2080 conditions.

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

   No

   Choose an item.
   Click or tap here to enter text.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    No

    Click or tap here to enter text.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    Click or tap here to enter text.

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[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

Texas Water Development Board

P.O. Box 13231, 1700 N. Congress Ave.
Austin, TX 78711-3231, www.twdb.texas.gov
Phone (512) 463-7847, Fax (512) 475-2053

January 4, 2024

Mr. Randy Whiteman
Chair
Region B Regional Water Planning Group
c/o Red River Authority
P.O. Box 240
Wichita Falls, Texas 76307

Dear Chairman Whiteman:

I have reviewed your request dated October 26, 2023, and amended request dated November 27, 2023, for approval of alternative water supply assumptions to be used in determining existing and future surface water availability. This letter confirms that the TWDB approves the following assumptions that require a variance:

1. Use of a one-year safe yield for existing and strategy supply from surface water reservoirs within portions of the Trinity and Brazos River Basins within Region B.

2. Modify the TCEQ Red River WAM to include subordination of senior water rights in Lake Texoma to current and future water supply reservoirs (i.e., Lake Arrowhead and Lake Ringgold) in the Little Wichita River Basin.

3. Use of a safe yield that maintains a minimum reserve supply equal to 20 percent of the conservation storage, for existing and strategy supply, in each Region B water supply reservoir within the Red River Basin.

4. Model Kemp and Diversion reservoirs as a system rather than as individual reservoirs in the TCEQ Red River WAM for existing and strategy supply.

Although the TWDB approves the use of a one-year and 20 percent reserve safe yield for developing estimates of current and future water supplies, firm yield for each reservoir must still be reported to TWDB in the online planning database and plan documents.

While the use of these modified conditions may be reasonable for planning purposes, WAM RUN3 would be utilized by the TCEQ for analyzing permit applications. It is acceptable to use the modified conditions for WMS supply evaluations only if the yield produced is more conservative (less) for surface water appropriations than WAM RUN3.

While the TWDB authorizes these modification to evaluate existing and future water supplies for development of the 2026 Region B RWP, it is the responsibility of the RWPG to ensure that the resulting estimates of water availability are reasonable for drought planning purposes and will reflect conditions expected in the event of actual drought conditions; and in all other regards will be evaluated in accordance with the most recent version of regional water planning contract Exhibit C, *General Guidelines for Development of the 2026 Regional Water Plans.*

Please do not hesitate to contact Kevin Smith of our Regional Water Planning staff at 512-475-1561 or kevin.smith@twdb.texas.gov if you have any questions.

Sincerely,

Matt Nelson
Deputy Executive Administrator

c: Fabian Heaney, Red River Authority
Jeremy Rice, P.E., Freese & Nichols, Inc.
Kevin Smith, Water Supply Planning
Sarah Lee, Water Supply Planning
Nelun Fernando, Ph.D., Surface Water

Surface Water Hydrologic Variance Request Checklist

Texas Water Development Board (TWDB) rules[1] require that regional water planning groups (RWPG) use most current Water Availability Models (WAM) from the Texas Commission on Environmental Quality (TCEQ) and assume full utilization of existing water rights and no return flows for surface water supply analysis. Additionally, evaluation of existing stored surface water available during Drought of Record conditions must be based on Firm Yield using anticipated sedimentation rates. However, the TWDB rules also allow, and **we encourage**, RWPGs to use more representative, water availability modeling assumptions; better site-specific information; or justified operational procedures other than Firm Yield with written approval (via a Hydrologic Variance) from the Executive Administrator in order to better represent and therefore prepare for expected drought conditions.

RWPGs must use this checklist, which is intended to save time and reduce effort, to request a Hydrologic Variance for estimating the availability of surface water sources. For Questions 4 – 10, please indicate whether the requested variance is for determining Existing Supply, Strategy Supply, or both. <u>Please complete a separate checklist for each river basin in which variances are being requested.</u>

Water Planning Region: B

1. Which major river basin does the request apply to? Please specify if the request only applies part of the basin or only to certain reservoirs.

   Red River WAM, as applicable to Region B

2. Please give a brief, bulleted, description of the requested hydrologic variances including how the alternative availability assumptions vary from rule requirements, how the modifications will affect the associated annual availability volume(s) in the regional water plan, and why the variance is necessary or provides a better basis for planning. You must provide more-detailed descriptions in the subsequent checklist questions. Attach any available documentation supporting the request.

   To best represent how local supplies are managed the following modifications will be needed to a better basis for planning.

   - Subordinate senior water rights in Lake Texoma to Lake Arrowhead and Lake Ringgold (see attached)
   - Include 20 percent reserve for reliable supply (20% of conservation storage remaining in the reservoir at all times) for the following reservoirs:
     - Arrowhead
     - Kickapoo
     - Kemp/Diversion system
   - Include a one-year safe yield for reservoirs where a 20% reserve supply at all times is not attainable:

[1] 31 Texas Administrative Code (TAC) §§ 357.10(14) and 357.32(c)

  - Santa Rosa
  - Electra
  - North Fork Buffalo Creek
  - Olney/Cooper System

3. Was this request submitted in a previous planning cycle? If yes, please indicate which cycle and note how it is different, if at all, from the previous request?

   No

   The Red River WAM was updated in 2021. Changes made in this update resulted in significant increases in pass throughs to downstream water right holders in Lake Texoma, which are not consistent with current operations. (see attached)

4. Are you requesting to extend the period of record beyond the current applicable WAM hydrologic period? If yes, please describe the proposed methodology. Indicate whether you believe there is a new drought of record in the basin.

   No

   Choose an item.

5. Are you requesting to use a reservoir safe yield? If yes, please describe in detail how the safe yield would be calculated and defined, which reservoir(s) it would apply to, and why the modification is needed or preferrable for drought planning purposes.

   Yes

   Existing and Strategy Supply

   To maintain reservoir supply operations during a repeat of drought-of-record conditions, a minimum reserve supply equal to 20 percent of the conservation storage will be maintained in each of the following Region B supply reservoirs in the Red River Basin:
   - Arrowhead
   - Kickapoo
   - Kemp/Diversion system

   A one-year safe yield reserve supply will be maintained in the following Region B supply reservoirs in the Red River Basin:

   - Santa Rosa
   - Electra
   - North Fork Buffalo Creek
   - Olney/Cooper System

6. Are you requesting to use a reservoir yield other than firm yield or safe yield? If yes, please describe, in a bulleted list, each modification requested including how the alternative yield was

calculated, which reservoir(s) it applies to, and why the modification is needed or preferrable for drought planning purposes. Examples of alternative reservoir yield analyses may include using an alternative reservoir level, conditional reliability, or other special reservoir operations.

Yes

We are requesting the use of a safe yield that maintains a minimum 20 percent reserve capacity as noted above.

7. Are you requesting to use a different model (such as a RiverWare or Excel-based models) than RUN 3 of the applicable TCEQ WAM? If yes, please describe the model being considered including how it incorporates water rights and prior appropriation and how it is more conservative than RUN 3 of the applicable TCEQ WAM.

No

Choose an item.
Click or tap here to enter text.

8. Are you requesting to use a modified TCEQ WAM? If yes, please describe in a bulleted list all modifications in detail including all specific changes to the WAM and whether the modified WAM is more conservative than the TCEQ WAM RUN 3. Examples of WAM modifications may include adding subordination agreements, contracts, updated water rights, modified spring flows, updated lake evaporation, updated sedimentation[2], system or reservoir operations, or special operational procedures into the WAM.

Yes

Existing and Strategy Supply

- Subordinate senior water right from Lake Texoma to water rights in the Little Wichita River basin. This includes the existing Lake Arrowhead and future Lake Ringgold.
- Modeling Kemp and Diversion reservoirs as a system rather than as individual reservoirs
- Updating sedimentation for reservoirs based on TWDB volumetric surveys for 2030 and 2080 conditions.

9. Are you requesting to include return flows in the modeling? If yes, are you doing so to model an indirect reuse water management strategy (WMS)? Please provide complete details regarding the proposed methodology for determining reuse WMS availability.

No

[2] Updating anticipated sedimentation rates does not require a hydrologic variance under 31 TAC § 357.10(14). The Technical Memorandum will require providing details regarding the sedimentation methodology utilized. Please consider providing that information with this request.

Choose an item.
Click or tap here to enter text.

10. Are any of the requested Hydrologic Variances also planned to be used by another region for the same basin? If yes, please indicate the other Region. Please indicate if unknown.

    No

    Click or tap here to enter text.

11. Please describe any other variance requests not captured on this checklist or add any other information regarding the variance requests on this checklist.

    Click or tap here to enter text.

APPENDIX B
WUG SUMMARY TABLES
MULTIPLE COUNTY

Water User Group:	**Baylor County SUD - Archer, Baylor and Young Counties**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population - Archer	180	175	170	165	160	155
Population - Baylor	1,019	1,029	1,076	1,099	1,121	1,145
Population - Young	239	242	245	252	259	266
Population - Total (number of persons)	**1,438**	**1,446**	**1,491**	**1,516**	**1,540**	**1,566**
Water Demand - Archer (ac-ft/yr)	45	43	42	41	39	38
Water Demand - Baylor (ac-ft/yr)	252	254	265	271	276	282
Water Demand - Young (ac-ft/yr)	59	60	60	62	64	66
Water Demand (G) - Young (ac-ft/yr)	25	25	25	25	25	25
Water Demand (G) - Throckmorton (ac-ft/yr)	2	1	1	1	1	1
Water Demand - Total (ac-ft/yr)	**383**	**382**	**393**	**400**	**405**	**412**
Current Supply - Seymour Aquifer Baylor County	377	377	389	398	404	412
Current Supply - Milllers Creek Lake - Sales from North Central Texas MWA	6	5	4	2	1	0
Total Current Supply	**383**	**382**	**393**	**400**	**405**	**412**
Supply - Archer County	45	43	42	41	39	38
Supply - Baylor County	252	254	265	271	276	282
Supply - Young County	59	60	60	62	64	66
Supply - Region G	27	26	26	26	26	26
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	**Wichita Valley WSC - Archer and Wichita Counties**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population - Archer	1,650	1,636	1,622	1,622	1,594	1,594
Population - Wichita	3,330	3,340	3,350	3,360	3,370	3,380
Population - Total (number of persons)	**4,980**	**4,976**	**4,972**	**4,982**	**4,964**	**4,974**
Water Demand - Archer (ac-ft/yr)	216	212	211	211	207	207
Water Demand - Wichita (ac-ft/yr)	435	434	435	436	438	439
Water Demand - Total (ac-ft/yr)	**650**	**646**	**646**	**647**	**645**	**646**
Current Supply - treated and raw - Wichita Falls (ac-ft/yr)	1,038	987	933	886	839	792
Current Supply - sales from Iowa Park (Wichita System) (ac-ft/yr)	619	589	556	528	500	473
Current Supply - sales from Archer City (Wichita System) (ac-ft/yr)	37	35	33	31	30	28
Total Current Supply	**1,694**	**1,611**	**1,522**	**1,445**	**1,369**	**1,293**
Supply - Archer County	586	554	518	491	460	434
Supply - Wichita County	1,108	1,057	1,004	954	909	859
Supply - Demand (ac-ft/yr)	1,044	965	876	798	724	647

Water User Group:	**Dean Dale SUD - Clay and Wichita Counties**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population - Clay	1,743	1,800	1,861	1,930	1,996	2,060
Population - Wichita	838	838	854	896	941	988
Water User Group:	**2,581**	**2,638**	**2,715**	**2,826**	**2,937**	**3,048**
Demand - Clay	145	148	153	159	164	170
Demand - Wichita	70	69	70	74	77	81
Water Demand (ac-ft/yr)	**214**	**217**	**223**	**233**	**242**	**251**
Current Supply - Contracts w/ Wichita Falls (ac-ft/yr)	848	805	761	722	686	646
Current Supply - Seymour Aquifer (ac-ft/yr)	0	0	0	0	0	0
Total Current Supply	**848**	**805**	**761**	**722**	**686**	**646**
Current Supply - Clay County	572	549	521	493	466	436
Current Supply - Wichita County	276	256	240	229	220	210
Supply - Demand (ac-ft/yr)	634	588	538	489	444	395

Water User Group:	**Windthorst WSC - Archer and Clay Counties**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population - Archer	686	680	675	664	653	642
Population - Clay	325	320	310	305	300	300
Population - Total (number of persons)	**1,011**	**1,000**	**985**	**969**	**953**	**942**
Demand - Archer	232	229	228	224	220	217
Demand - Clay	110	108	105	103	101	101
Water Demand (ac-ft/yr)	**342**	**337**	**332**	**327**	**322**	**318**
Current Supply - Contracts w/ Wichita Falls (ac-ft/yr)	770	733	692	657	622	588
Total Current Supply	**770**	**733**	**692**	**657**	**622**	**588**
Current Supply - Archer County	522	498	474	450	426	401
Current Supply - Clay County	248	235	218	207	196	187
Supply - Demand (ac-ft/yr)	428	396	360	330	300	270

Water User Group:	**Harrold WSC - Wichita and Wilbarger Counties**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population - Wichita	66	66	66	66	66	66
Population - Wilbarger	123	121	119	115	111	107
Population - Total (number of persons)	**189**	**187**	**185**	**181**	**177**	**173**
Demand - Wichita	21	21	21	21	21	21
Demand - Wilbarger	39	39	38	37	35	34
Water Demand (ac-ft/yr)	**60**	**60**	**59**	**58**	**56**	**55**
Current Supply - Electra	**50**	**47**	**44**	**41**	**38**	**34**
Current Supply - Wichita County	17	17	16	15	14	13
Current Supply - Wilbarger County	33	30	28	26	24	21
Supply - Demand (ac-ft/yr)	-10	-13	-15	-17	-18	-21

Water User Group:	**Holliday - Wichita and Archer Counties**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population - Wichita	33	33	32	32	31	31
Population - Archer	1,595	1,593	1,589	1,561	1,535	1,508
Population - Total (number of persons)	**1,628**	**1,625**	**1,621**	**1,593**	**1,566**	**1,539**
Demand - Wichita	5	5	5	5	5	5
Demand - Archer	255	254	253	249	245	240
Water Demand (ac-ft/yr)	**261**	**259**	**258**	**254**	**250**	**245**
Current Supply - Wichita Falls	**226**	**214**	**202**	**193**	**182**	**173**
Current Supply - Wichita County	5	4	4	4	4	3
Current Supply - Archer County	221	210	198	189	178	170
Supply - Demand (ac-ft/yr)	-35	-45	-56	-61	-68	-72

APPENDIX B
WUG SUMMARY TABLES
ARCHER COUNTY

Water User Group:	**Archer City - Archer**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population	1,683	1,668	1,654	1,625	1,597	1,570
Water Demand (ac-ft/yr)	286	283	280	275	271	266
Current Supply - contract w/ Wichita Falls (ac-ft/yr)	399	380	359	341	322	305
Supply - Demand (ac-ft/yr)	113	97	79	66	51	39

Water User Group:	**Archer County MUD 1 - Archer**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population	1,179	1,170	1,160	1,150	1,140	1,130
Water Demand (ac-ft/yr)	243	240	238	236	234	232
Current Supply - contract w/ Wichita Falls (ac-ft/yr)	474	451	426	404	383	362
Supply - Demand (ac-ft/yr)	231	211	188	168	149	130

Water User Group:	**Baylor County SUD - Archer**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population	180	175	170	165	160	155
Water Demand (ac-ft/yr)	45	43	42	41	39	38
Current Supply - Seymour Aquifer Baylor County	45	43	42	41	39	38
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	County-Other - Archer					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	262	260	257	252	247	243
Water Demand (ac-ft/yr)	51	50	50	49	48	47
Current supply - Lake Megargel	0	0	0	0	0	0
Current Supply - Seymour Aquifer Baylor County from Baylor SUD	15	15	15	15	15	15
Current Supply - Cross Timbers Aquifer	36	35	35	34	33	32
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Holliday - Archer					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	1,595	1,593	1,589	1,561	1,535	1,508
Water Demand (ac-ft/yr)	255	254	253	249	245	240
Current Supply - Wichita Falls (ac-ft/yr)	221	210	198	189	178	170
Supply - Demand (ac-ft/yr)	-34	-44	-55	-60	-67	-70

Water User Group:	Lakeside City - Archer					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	1,179	1,170	1,160	1,150	1,140	1,130
Water Demand (ac-ft/yr)	162	160	159	156	153	151
Current Supply - Wichita Falls (ac-ft/yr)	169	160	152	143	137	129
Supply - Demand (ac-ft/yr)	7	0	-7	-13	-16	-22

Water User Group:	City of Scotland					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	375	370	365	360	355	350
Water Demand (ac-ft/yr)	150	148	146	144	142	140
Current Supply- Wichita Falls System (ac-ft/yr)	189	179	170	161	153	144
Supply - Demand (ac-ft/yr)	39	31	24	17	11	4

Water User Group:	Wichita Valley WSC - Archer					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	1,650	1,636	1,622	1,622	1,594	1,594
Water Demand (ac-ft/yr)	216	212	211	211	207	207
Current Supply- Wichita Falls System (Sales from Wichita Falls, Iowa Park, and Archer City) (ac-ft/yr)	586	554	518	491	460	434
Supply - Demand (ac-ft/yr)	370	342	307	280	253	227

Water User Group:	Windthorst WSC - Archer					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	1,019	1,029	1,076	1,099	1,121	1,145
Water Demand (ac-ft/yr)	232	229	228	224	220	217
Current Supply - raw water - Wichita Falls (ac-ft/yr)	522	498	474	450	426	401
Supply - Demand (ac-ft/yr)	290	269	246	226	206	184

Water User Group:	Livestock - Archer					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	1,686	1,686	1,686	1,686	1,686	1,686
Current Supply stock ponds (ac-ft/yr)	1,349	1,349	1,349	1,349	1,349	1,349
Current Supply - Cross Timbers Aquifer	0	0	17	45	72	100
Current Supply Lake Kemp/Diversion (Dundee Fish Hatchery)	375	347	320	292	265	237
Supply - Demand (ac-ft/yr)	38	10	0	0	0	0

Water User Group:	Manufacturing - Archer					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	1	1	1	1	1	1
Current Supply - Cross Timbers Aquifer (ac-ft/yr)	1	1	1	1	1	1
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Mining - Archer					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	1	1	1	1	1	1
Current Supply - Cross Timbers Aquifer (ac-ft/yr)	1	1	1	1	1	1
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	**Baylor County SUD - Baylor**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	1,019	1,029	1,076	1,099	1,121	1,145
Water Demand (ac-ft/yr)	252	254	265	271	276	282
Current Supply - Milllers Creek Lake - Sales from North Central Texas MWA (ac-ft/yr)	6	5	4	2	1	0
Current Supply - Seymour Aquifer Baylor County (ac-ft/yr)	246	249	261	269	275	282
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	**County-Other - Baylor**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	13	13	12	11	11	11
Water Demand (ac-ft/yr)	2	2	1	1	1	1
Current Supply - Seymour Aquifer (ac-ft/yr)	2	2	1	1	1	1
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Irrigation - Baylor					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	5,070	5,070	5,070	5,070	5,070	5,070
Current Supply - Brazos Run-of-river	13	13	13	13	13	13
Current Supply - Seymour Aquifer (ac-ft/yr)	5,058	5,058	5,058	5,058	5,058	4,750
Supply - Demand (ac-ft/yr)	0	0	0	0	0	-308

Water User Group:	Livestock - Baylor					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	963	963	963	963	963	963
Current Supply Stock ponds (ac-ft/yr)	770	770	770	770	770	770
Current Supply - Seymour Aquifer	163	163	163	163	163	163
Current Supply - Cross Timbers Aquifer	30	30	30	30	30	30
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Mining - Baylor					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	10	10	10	10	10	10
Current Supply - Cross Timbers Aquifer (ac-ft/yr)	10	10	10	10	10	10
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:

Water User Group:	Seymour - Baylor					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	2,502	2,450	2,403	2,303	2,203	2,203
Water Demand (ac-ft/yr)	506	494	484	464	444	444
Current Supply - Seymour Aquifer (ac-ft/yr)	443	431	421	401	381	381
Current Supply - Direct Reuse Golf Course Irrigation (ac-ft/yr)	63	63	63	63	63	63
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

APPENDIX B
WUG SUMMARY TABLES
CLAY COUNTY

Water User Group:	**County-Other - Clay**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	3,307	3,257	3,204	3,104	3,008	2,914
Water Demand (ac-ft/yr)	452	443	436	422	409	396
Current Supply - Seymour Aquifer (ac-ft/yr)	170	170	170	170	170	170
Current Supply - Cross TimbersAquifer (ac-ft/yr)	330	330	330	330	330	330
Supply - Demand (ac-ft/yr)	48	57	64	78	91	104

Water User Group:	**Dean Dale SUD - Clay**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	1,743	1,800	1,861	1,930	1,996	2,060
Water Demand (ac-ft/yr)	145	148	153	159	164	170
Current Supply - Contracts w/ Wichita Falls (ac-ft/yr)	572	549	521	493	466	436
Current Supply - Seymour Aquifer (ac-ft/yr)	0	0	0	0	0	0
Supply - Demand (ac-ft/yr)	427	401	368	334	302	266

Water User Group:	Henrietta - Clay					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	3,317	3,332	3,350	3,350	3,350	3,350
Water Demand (ac-ft/yr)	744	745	749	749	749	749
Current Supply - Run-of-river (ac-ft/yr)	1,130	1,130	1,130	1,130	1,130	1,130
Supply - Demand (ac-ft/yr)	386	385	381	381	381	381

Water User Group:	Irrigation - Clay					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	1,358	1,358	1,358	1,358	1,358	1,358
Current Supply - Lake Kemp (ac-ft/yr)	80	74	68	62	57	51
Current supply - Run-of-river	1,241	1,241	1,241	1,241	1,241	1,241
Current Supply - Seymour Aquifer (ac-ft/yr)	587	587	587	587	587	587
Current Supply - Cross Timbers Aquifer (ac-ft/yr)	600	600	600	600	600	600
Supply - Demand (ac-ft/yr)	**1,150**	**1,144**	**1,138**	**1,132**	**1,127**	**1,121**

Water User Group:	**Livestock - Clay**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	1,443	1,443	1,443	1,443	1,443	1,443
Current Supply Stock Ponds (ac-ft/yr)	1,227	1,227	1,227	1,227	1,227	1,227
Current Supply Cross Timbers Aquifer (ac-ft/yr)	190	190	190	190	190	190
Water User Group:	30	30	30	30	30	30
Supply - Demand (ac-ft/yr)	4	4	4	4	4	4

Water User Group:	**Mining - Clay**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	4	4	4	4	4	4
Current Supply Red Run-of-River	1	1	1	1	1	1
Current Supply Cross Timbers Aquifer	3	3	3	3	3	3
Current Supply - Seymour Aquifer (ac-ft/yr)	0	0	0	0	0	0
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Red River Authority - Clay					
	2030	2040	2050	2060	2070	2080
Population (number of persons)	1,770	1,765	1,760	1,755	1,750	1,745
Water Demand (ac-ft/yr)	491	488	486	485	484	482
Current Supply - Lake Arrowhead	383	363	344	326	309	293
Supply - Demand (ac-ft/yr)	-108	-125	-142	-159	-175	-189
Demand MG	159.85	158.94	158.49	158.04	157.59	157.14

Water User Group:	Windthorst WSC - Clay					
	2030	2040	2050	2060	2070	2080
Population (number of persons)	325	320	310	305	300	300
Water Demand (ac-ft/yr)	110	108	105	103	101	101
Current Supply - Sales Wichita Falls (ac-ft/yr)	248	235	218	207	196	187
Supply - Demand (ac-ft/yr)	138	127	113	104	95	86

Water User Group:	County-Other - Cottle					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	215	210	205	200	195	190
Water Demand (ac-ft/yr)	33	32	31	30	30	29
Current Supply Other Aquifer (ac-ft/yr)	33	32	31	30	30	29
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Irrigation - Cottle					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	4,319	4,319	4,319	4,319	4,319	4,319
Current Supply Blaine Aquifer (ac-ft/yr)	2,711	2,711	2,711	2,711	2,711	2,711
Current Supply Other Aquifer (ac-ft/yr)	1,600	1,600	1,600	1,600	1,600	1,600
Current Supply Run of River (ac-ft/yr)	8	8	8	8	8	8
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Livestock - Cottle					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	376	376	376	376	376	376
Current Supply Blaine Aquifer (ac-ft/yr)	225	225	225	225	225	225
Current Supply Other Aquifer (ac-ft/yr)	55	55	55	55	55	55
Current Supply Stock Ponds (ac-ft/yr)	113	113	113	113	113	113
Supply - Demand (ac-ft/yr)	17	17	17	17	17	17

Water User Group:	Mining - Cottle					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	6	6	6	6	6	6
Current Supply Blaine Aquifer (ac-ft/yr)	6	6	6	6	6	6
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Paducah - Cottle					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population	1,090	1,065	1,030	1,004	981	981
Water Demand (ac-ft/yr)	298	254	253	249	245	240
Current Supply - Blaine Aquifer (ac-ft/yr)	298	254	253	249	245	240
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Red River Authority - Cottle					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	103	104	105	107	110	110
Water Demand (ac-ft/yr)	29	29	29	30	30	30
Current Supply - Other Aquifer	29	29	29	30	30	30
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	County-Other - Foard					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	84	83	82	80	78	76
Water Demand (ac-ft/yr)	17	17	17	17	16	16
Current Supply Seymour Aquifer (Pod 4) (ac-ft/yr)	17	17	17	17	16	16
Current Supply (Greenbelt MIWA) Greenbelt Reservoir - From Crowell (ac-ft/yr)	23	23	23	23	23	23
Supply - Demand (ac-ft/yr)	23	23	23	23	23	23

Water User Group:	Crowell - Foard					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	771	764	756	741	726	711
Water Demand (ac-ft/yr)	120	119	117	115	113	110
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	80	78	77	75	74	74
Current Supply (Greenbelt MIWA) Ogallala Aquifer Donley County (ac-ft/yr)	41	41	41	40	39	37
Supply - Demand (ac-ft/yr)	1	0	1	0	0	1

Water User Group:	**Irrigation - Foard**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	2,489	2,489	2,489	2,489	2,489	2,489
Current Supply Seymour Aquifer (ac-ft/yr)	3,000	3,000	3,000	3,000	2,761	3,000
Current Supply Blaine Aquifer (ac-ft/yr)	200	200	200	200	200	200
Current Supply Other Aquifer (ac-ft/yr)	100	100	100	100	100	100
Supply - Demand (ac-ft/yr)	811	811	811	811	572	811

Water User Group:	**Livestock - Foard**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	379	379	379	379	379	379
Current Supply Other Aquifer (ac-ft/yr)	8	8	8	8	8	8
Current Supply Blaine Aquifer (ac-ft/yr)	30	30	30	30	30	30
Current Supply Stock Ponds (ac-ft/yr)	341	341	341	341	341	341
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	**Red River Authority - Foard**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	262	264	267	272	277	282
Water Demand (ac-ft/yr)	73	73	74	75	77	78
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	48	48	48	49	52	52
Current Supply (Greenbelt MIWA) Ogallala Aquifer Donley County (ac-ft/yr)	25	25	26	26	26	26
Supply - Demand (ac-ft/yr)	0	0	0	0	1	0

Water User Group:	Chillicothe - Hardeman					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	508	505	500	493	486	479
Water Demand (ac-ft/yr)	72	71	71	70	69	68
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	19	19	18	18	18	18
Current Supply (Greenbelt MIWA) Ogallala Donley County (ac-ft/yr)	10	10	10	10	9	9
Current Supply Seymour Aquifer (ac-ft/yr)	43	43	42	42	41	41
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	County-Other - Hardeman					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	273	271	269	269	257	244
Water Demand (ac-ft/yr)	49	48	48	48	46	43
Current Supply Seymour Aquifer (ac-ft/yr)	36	36	36	36	36	36
Current Supply Blaine Aquifer (ac-ft/yr)	14	14	14	14	14	14
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	1	1	1	1	1	1
Current Supply (Greenbelt MIWA) Ogallala Donley County (ac-ft/yr)	1	1	1	1	1	1
Supply - Demand (ac-ft/yr)	3	4	4	4	6	9

Water User Group:	Irrigation - Hardeman					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	18,290	18,290	18,290	18,290	18,290	18,290
Current Supply Blaine Aquifer (ac-ft/yr)	6,444	6,444	6,444	6,444	6,444	6,444
Current Supply Run-of-river	141	141	141	141	141	141
Current Supply Seymour Aquifer (ac-ft/yr)	11,846	11,846	11,846	11,846	11,846	11,846
Supply - Demand (ac-ft/yr)	141	141	141	141	141	141

Water User Group:	**Livestock - Hardeman**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	387	387	387	387	387	387
Current Supply Seymour Aquifer (ac-ft/yr)	40	40	40	40	40	40
Current Supply Blaine Aquifer (ac-ft/yr)	120	120	120	120	120	120
Current Supply Other Aquifer (ac-ft/yr)	50	50	50	50	50	50
Current Supply Stock Ponds (ac-ft/yr)	232	232	232	232	232	232
Supply - Demand (ac-ft/yr)	55	55	55	55	55	55

Water User Group:	**Manufacturing - Hardeman**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	225	233	242	251	260	270
Current Supply Blaine Aquifer	175	183	192	201	210	220
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	33	33	33	33	33	33
Water User Group:	17	17	17	17	17	17
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Mining - Hardeman					
	2030	2040	2050	2060	2070	2080
Water Demand (ac-ft/yr)	5	5	5	5	5	5
Current Supply Blaine Aquifer (ac-ft/yr)	5	5	5	5	5	5
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Quanah - Hardeman					
	2030	2040	2050	2060	2070	2080
Population (number of persons)	2,135	2,121	2,106	2,078	2,050	2,022
Water Demand (ac-ft/yr)	347	343	340	336	331	327
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	230	225	222	220	218	218
Current Supply (Greenbelt MIWA) Ogallala Donley County (ac-ft/yr)	117	119	118	116	114	109
Supply - Demand (ac-ft/yr)	0	1	0	0	1	0

Water User Group:	Red River Authority - Hardeman					
	2030	2040	2050	2060	2070	2080
Population (number of persons)	704	700	694	684	674	664
Water Demand (ac-ft/yr)	195	193	192	189	186	184
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	129	126	125	124	122	123
Current Supply (Greenbelt MIWA) Ogallala Donley County (ac-ft/yr)	66	67	67	65	64	61
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	**County-Other - King**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	49	49	50	52	52	52
Water Demand (ac-ft/yr)	15	15	15	15	15	15
Current Supply Blaine Aquifer (ac-ft/yr)	15	15	15	15	15	15
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	**Irrigation - King**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	245	245	245	245	245	245
Current Supply Other Aquifer (ac-ft/yr)	245	245	245	245	245	245
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Livestock - King					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	446	446	446	446	446	446
Current Supply Other Aquifer (ac-ft/yr)	278	278	278	278	278	278
Current Supply Blaine Aquifer (ac-ft/yr)	34	34	34	34	34	34
Current Supply Stock Ponds (ac-ft/yr)	134	134	134	134	134	134
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Mining - King					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	4	4	4	4	4	4
Current Supply - Other Aquifer (ac-ft/yr)	4	4	4	4	4	4
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Red River Authority - King					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	221	223	226	231	236	240
Water Demand (ac-ft/yr)	61	62	62	64	65	66
Current Supply - Other Aquifer (Dickens County)	61	62	62	64	65	66
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

APPENDIX B
WUG SUMMARY TABLES
MONTAGUE COUNTY

Water User Group:	**Bowie - Montague**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	6,735	7,220	7,705	8,190	8,675	9,160
Water Demand (ac-ft/yr)	1,286	1,373	1,465	1,558	1,650	1,742
Current Supply Amon Carter (ac-ft/yr)	923	837	751	664	577	491
Supply - Demand (ac-ft/yr)	-363	-536	-714	-894	-1,073	-1,251

Water User Group:	**County-Other - Montague**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	11,678	13,528	15,378	17,228	19,078	20,928
Water Demand (ac-ft/yr)	1,568	1,806	2,053	2,300	2,547	2,793
Current Supply Amon Carter (ac-ft/yr)	157	181	205	230	255	279
Current Supply Trinity Aquifer (ac-ft/yr)	200	200	200	200	200	200
Current Supply Lake Nocona (ac-ft/yr)	0	0	0	0	0	0
Current Supply Cross Timbers Aquifer (ac-ft/yr)	700	700	700	700	700	700
Supply - Demand (ac-ft/yr)	-511	-725	-948	-1,170	-1,392	-1,614

Water User Group:	Irrigation - Montague					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	425	425	425	425	425	425
Current Supply Trinity Aquifer (ac-ft/yr)	140	140	140	140	140	140
Current Supply Cross Timbers Aquifer (ac-ft/yr)	300	300	300	300	300	300
Current Supply Lk Nocona (ac-ft/yr)	19	19	19	19	19	19
Current Supply Red Run-of-River Wtr Rt 5605 (ac-ft/yr)	6	6	6	6	6	6
Current Supply Direct Reuse from Nocona for Golf Course (ac-ft/yr)	31	31	31	31	31	31
Supply - Demand (ac-ft/yr)	71	71	71	71	71	71

Water User Group:	Livestock - Montague					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	1,474	1,474	1,474	1,474	1,474	1,474
Current Supply Trinity Aquifer (ac-ft/yr)	15	15	15	15	15	15
Current Supply Cross Timbers Aquifer (ac-ft/yr)	60	60	60	60	60	60
Current Supply Stock ponds (ac-ft/yr)	1,400	1,400	1,400	1,400	1,400	1,400
Supply - Demand (ac-ft/yr)	1	1	1	1	1	1

Water User Group:	Mining - Montague					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	34	34	34	34	34	34
Current Supply Cross Timbers Aquifer (ac-ft/yr)	31	31	31	31	31	31
Current Supply Trinity Aquifer (ac-ft/yr)	0	0	0	0	0	0
Current Supply Run-of-River (ac-ft/yr)	0	0	0	0	0	0
Current Supply - Direct Reuse (Sales from Bowie) (ac-ft/yr)	3	3	3	3	3	3
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Nocona - Montague					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	4,126	4,662	5,198	5,734	6,270	6,806
Water Demand (ac-ft/yr)	1,091	1,230	1,371	1,512	1,654	1,795
Current Supply Lake Nocona (ac-ft/yr)	1,080	1,080	1,080	1,080	1,080	1,080
Current Supply - Trinity Aquifer (ac-ft/yr)	92	92	92	92	92	92
Supply - Demand (ac-ft/yr)	81	-58	-199	-340	-482	-623

Water User Group:	Nocona Hills WSC - Montague					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	912	1,037	1,162	1,287	1,412	1,537
Water Demand (ac-ft/yr)	201	228	255	283	310	338
Current Supply - Trinity Aquifer (ac-ft/yr)	201	228	255	283	310	338
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Red River Authority - Montague					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	160	163	166	175	180	180
Water Demand (ac-ft/yr)	44	45	46	48	50	50
Current Supply - Trinity Aquifer	44	45	46	48	50	50
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Saint Jo - Montague					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	1,630	1,965	2,300	2,635	2,970	3,305
Water Demand (ac-ft/yr)	269	323	378	433	488	544
Current Supply Trinity Aquifer (ac-ft/yr)	269	308	308	308	308	308
Supply - Demand (ac-ft/yr)	0	-15	-70	-125	-180	-235

APPENDIX B
WUG SUMMARY TABLES
WICHITA COUNTY

Water User Group:	**Burkburnett - Wichita**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	11,270	11,285	11,303	11,336	11,370	11,403
Water Demand (ac-ft/yr)	1,673	1,667	1,670	1,675	1,680	1,685
Current Supply Seymour Aquifer (ac-ft/yr)	1,000	1,000	1,000	1,000	1,000	1,000
Current Supply Wichita System (ac-ft/yr)	1,434	1,585	1,499	1,421	1,345	1,270
Current Supply Direct Reuse for ISD, Golf Course, Parks (ac-ft/yr)	167	167	167	167	167	167
Supply - Demand (ac-ft/yr)	927	1,085	996	913	832	752

Water User Group:	**County-Other - Wichita**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	1,226	1,226	1,230	1,234	1,238	1,242
Water Demand (ac-ft/yr)	169	168	168	169	169	170
Current Supply Wichita System (ac-ft/yr)	263	249	237	224	213	202
Sales from Iowa Park to Horseshoe Bend Estates	69	65	62	59	55	52
Current Supply Seymour Aquifer (ac-ft/yr)	90	90	90	90	90	90
Current Supply Cross Timbers Aquifer (ac-ft/yr)	70	70	70	70	70	70
Supply - Demand (ac-ft/yr)	323	306	291	274	259	244

Water User Group:	Dean Dale WSC - Wichita					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	838	838	854	896	941	988
Water Demand (ac-ft/yr)	70	69	70	74	77	81
Current Supply - Wichita Falls (ac-ft/yr)	276	256	240	229	220	210
Supply - Demand (ac-ft/yr)	206	187	170	155	143	129

Water User Group:	Electra - Wichita					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	2,348	2,350	2,355	2,362	2,369	2,376
Water Demand (ac-ft/yr)	874	873	874	877	880	882
Current Supply Lk Electra (ac-ft/yr)	0	0	0	0	0	0
Current Supply Sales from Iowa Park (Wichita System) (ac-ft/yr)	722	686	650	617	586	555
Current Supply Seymour Aquifer (ac-ft/yr)	0	0	0	0	0	0
Supply - Demand (ac-ft/yr)	-152	-187	-224	-260	-294	-327

Water User Group:	Harrold WSC - Wichita					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	66	66	66	66	66	66
Water Demand (ac-ft/yr)	21	21	21	21	21	21
Water User Group:	17	17	16	15	14	13
Supply - Demand (ac-ft/yr)	-4	-4	-5	-6	-7	-8

Water User Group:	Holliday - Wichita					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	33	33	32	32	31	31
Water Demand (ac-ft/yr)	5	5	5	5	5	5
Current Supply - Wichita Falls (ac-ft/yr)	5	4	4	4	4	3
Supply - Demand (ac-ft/yr)	0	-1	-1	-1	-1	-2

Water User Group:	Iowa Park - Wichita					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	6,759	6,769	6,779	6,799	6,819	6,839
Water Demand (ac-ft/yr)	1,020	1,017	1,018	1,021	1,024	1,027
Current Supply Lk Iowa Park/Lake Gordon (ac-ft/yr)	0	0	0	0	0	0
Current Supply NF Buffalo Crk (ac-ft/yr)	0	0	0	0	0	0
Current Supply Wichita Falls (ac-ft/yr)	1,095	1,038	976	922	870	818
Supply - Demand (ac-ft/yr)	75	21	-42	-99	-154	-209

Water User Group:	**Irrigation - Wichita**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	26,657	26,657	26,657	26,657	26,657	26,657
Current Supply Lk Kemp (ac-ft/yr)	20,172	18,688	17,205	15,721	14,237	12,753
Current Supply Run-of-river (ac-ft/yr)	878	878	878	878	878	878
Current Supply Seymour Aquifer (ac-ft/yr)	0	0	0	0	0	0
Current Supply Cross Timbers Aquifer (ac-ft/yr)	600	600	600	600	600	600
Supply - Demand (ac-ft/yr)	-5,007	-6,491	-7,974	-9,458	-10,942	-12,426

Water User Group:	**Livestock - Wichita**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	718	718	718	718	718	718
Current Supply Cross Timbers Aquifer (ac-ft/yr)	36	36	36	36	36	36
Current Supply Stock Ponds (ac-ft/yr)	682	682	682	682	682	682
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Manufacturing - Wichita					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	880	913	947	982	1,018	1,056
Current Supply Wichita System (sales from Wichita Falls) (ac-ft/yr)	484	478	468	461	453	443
Current Supply Wichita System (sales from Burkburnett) (ac-ft/yr)	40	40	39	38	38	37
Current Supply Wichita System (sales from Iowa Park) (ac-ft/yr)	121	119	117	115	113	111
Current Supply Seymour Aquifer (ac-ft/yr)	129	129	129	129	129	129
Current Supply Direct Reuse from Wichita Falls and Iowa Park	190	190	190	190	190	190
Supply - Demand (ac-ft/yr)	84	43	-4	-49	-95	-146

Water User Group:	Mining - Wichita					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	45	45	45	45	45	45
Current Supply Seymour Aquifer (ac-ft/yr)	45	45	45	45	45	45
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

APPENDIX B
WUG SUMMARY TABLES
WICHITA COUNTY

Water User Group:	**Sheppard Air Force Base - Wichita**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	5,905	5,905	5,905	5,905	5,905	5,905
Water Demand (ac-ft/yr)	1,075	1,069	1,069	1,069	1,069	1,069
Current Supply Wichita Falls (ac-ft/yr)	986	932	881	837	792	748
Supply - Demand (ac-ft/yr)	-89	-137	-188	-232	-277	-321

Water User Group:	**Steam Electric Power - Wichita**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	20	20	20	20	20	20
Current Supply Wichita Falls (ac-ft/yr)	20	17	16	15	15	14
Supply - Demand (ac-ft/yr)	0	-3	-4	-5	-5	-6

Water User Group:	**Wichita Falls - Wichita**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	102,308	104,299	106,290	107,285	108,280	109,275
Water Demand (ac-ft/yr)	18,455	18,726	19,084	19,262	19,441	19,620
Current Supply Little Wichita System (ac-ft/yr)	8,401	7,919	7,446	6,926	6,393	5,862
Current Supply Indirect Reuse	5,181	5,214	5,254	5,276	5,295	5,316
Current Supply Lk Kemp (ac-ft/yr)	3,344	3,098	2,852	2,606	2,360	2,114
Supply - Demand (ac-ft/yr)	-1,529	-2,495	-3,532	-4,454	-5,393	-6,328

Water User Group:	**Wichita Valley WSC - Wichita**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	3,330	3,340	3,350	3,360	3,370	3,380
Water Demand (ac-ft/yr)	435	434	435	436	438	439
Current Supply - Wichita System (Sales from Wichita Falls, Iowa Park and Archer City) (ac-ft/yr)	1,108	1,057	1,004	954	909	859
Supply - Demand (ac-ft/yr)	673	623	569	518	471	420

APPENDIX B
WUG SUMMARY TABLES
WILBARGER COUNTY

Water User Group:	**County-Other - Wilbarger**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	1,139	1,124	1,106	1,074	1,042	1,010
Water Demand (ac-ft/yr)	203	199	196	190	184	179
Current Supply Seymour Aquifer Sales from Vernon	61	61	61	61	61	61
Current Supply Seymour Aquifer	61	57	54	48	42	37
Current Supply Red Run-of-River (ac-ft/yr)	81	81	81	81	81	81
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	**Harrold WSC - Wilbarger**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	123	121	119	115	111	107
Water Demand (ac-ft/yr)	39	39	38	37	35	34
Current Supply - City of Electra (ac-ft/yr)	33	30	28	26	24	21
Supply - Demand (ac-ft/yr)	-6	-9	-10	-11	-11	-13

Water User Group:	Irrigation - Wilbarger					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	26,736	26,736	26,736	26,736	26,736	26,736
Current Supply Seymour Aq (ac-ft/yr)	23,692	23,692	23,692	23,692	23,692	23,692
Current Supply Other Aq (ac-ft/yr)	3,029	3,029	3,029	3,029	3,029	3,029
Current Supply Run-of-river (ac-ft/yr)	15	15	15	15	15	15
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Livestock - Wilbarger					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	780	780	780	780	780	780
Current Supply Seymour Aquifer (ac-ft/yr)	195	195	195	195	195	195
Current Supply Santa Rosa Lake (ac-ft/yr)	920	920	920	920	920	920
Current Supply Stock Ponds (ac-ft/yr)	585	585	585	585	585	585
Supply - Demand (ac-ft/yr)	920	920	920	920	920	920

Water User Group:	**Manufacturing - Wilbarger**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	1,110	1,151	1,194	1,238	1,284	1,332
Current Supply Seymour Aquifer Sales from Vernon	746	773	802	832	863	895
Current Supply Seymour Aquifer	364	378	392	406	421	437
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:

Water User Group:	**Mining - Wilbarger**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	32	32	32	32	32	32
Current Supply Other Aquifer (ac-ft/yr)	21	21	21	21	21	21
Current Supply Beaver Creek (ac-ft/yr)	11	11	11	11	11	11
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Steam Electric Power - Wilbarger					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	5,878	5,878	5,878	5,878	5,878	5,878
Current Supply Lk Kemp from Wichita Falls/WCWID #2 (ac-ft/yr)	6,819	6,317	5,816	5,314	4,812	4,311
Supply - Demand (ac-ft/yr)	941	439	-62	-564	-1,066	-1,567

Water User Group:	Red River Authority - Wilbarger					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	1,140	1,145	1,150	1,150	1,150	1,150
Water Demand (ac-ft/yr)	316	316	318	318	318	318
Curren Supplies - Sales from Greenbelt MIWA	7	8	8	8	7	7
Current Supply - Sales from Vernon Seymour Aquifer	263	263	264	264	264	264
Current Supply -Seymour Aquifer (Hardeman County)	46	46	47	47	47	47
Supply - Demand (ac-ft/yr)	0	1	1	1	0	0

Water User Group:	Vernon - Wilbarger					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	10,746	10,775	10,804	10,833	10,848	10,863
Water Demand (ac-ft/yr)	1,926	1,922	1,927	1,932	1,935	1,938
Current Supply Seymour Aquifer (ac-ft/yr)	2,130	2,103	2,073	2,043	2,012	1,980
Supply - Demand (ac-ft/yr)	204	181	146	110	77	42

APPENDIX B
WUG SUMMARY TABLES
YOUNG COUNTY

Water User Group:	**Baylor County SUD - Young**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	239	242	245	252	259	266
Water Demand (ac-ft/yr)	59	60	60	62	64	66
Current Supply - Seymour Aquifer Baylor County (ac-ft/yr)	59	60	60	62	64	66
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	**County-Other - Young (Region B portion)**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	626	626	626	624	621	618
Water Demand (ac-ft/yr)	85	84	84	84	83	83
Purchase from Graham	32	31	24	33	20	20
Current Supply - Cross Timbers Aquifer (ac-ft/yr)	53	53	60	51	63	63
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	**Irrigation - Young**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	6	6	6	6	6	6
Current Supply Cross Timbers Aquifer (ac-ft/yr)	6	6	6	6	6	6
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	Livestock - Young					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	56	56	56	56	56	56
Current Supply Stock Ponds (ac-ft/yr)	45	45	45	45	45	45
Current Supply Cross Timbers Aquifer (ac-ft/yr)	15	15	15	15	15	15
Local Surface Water Supply (Region G)	15	15	15	15	15	15
Supply - Demand (ac-ft/yr)	19	19	19	19	19	19

Water User Group:	Olney - Young					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	2,714	2,694	2,674	2,646	2,646	2,646
Water Demand (ac-ft/yr)	499	493	490	485	485	485
Current Supply Wichita System (ac-ft/yr)	1,014	895	843	796	751	705
Current Supply Lk Olney/Cooper (ac-ft/yr)	77	65	53	41	29	17
Current Supply Direct Reuse to Golf Course (ac-ft/yr)	5	5	5	5	5	5
Supply - Demand (ac-ft/yr)	597	472	412	358	301	243

APPENDIX C

COST ESTIMATES

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

DRAFT

APPENDIX C COST ESTIMATES

Region B Regional Water Planning Area Cost Estimates

As part of the 2026 Region B Regional Water Plan (RWP), cost estimates were developed for each of the recommended water management strategies in Region B. As appropriate, these cost estimates have been updated from the 2021 RWP. In accordance with the Texas Water Development Board guidance the costs for water management strategies are to be updated from September 2018 dollars to September 2023 dollars. The methodology used to develop the costs for the 2026 RWP is described in the following sections. Where updated unit costs were not available, the Engineering News Record (ENR) Index for construction was used to increase the costs from September 2018 to September 2023 costs. An increase of about 21% from September 2018 to September 2023 was determined using the ENR Index method.

Introduction

1. The evaluation of water management strategies requires developing cost estimates. Guidance for cost estimates may be found in the TWDB's "Exhibit C - Second Amended General Guidelines for Development of the 2026 Regional Water Plans" (Exhibit C) Section 2.5.2.12. Costs are to be reported in September 2023 dollars.

2. Standard unit costs for installed pipe, pump stations, standard treatment facilities, and well fields were developed and/or updated using the costing tool provided by the TWDB. The unit costs do not include engineering, contingency, financial and legal services, costs for land and rights-of-way, permits, environmental and archeological studies, or mitigation. The costs for these items are determined separately in the cost tables.

3. The information presented in this section is intended to be 'rule-of-thumb' guidance. Specific situations may call for alteration of the procedures and costs. Note that the costs in this memorandum provide a planning level estimate for comparison purposes.

4. It is important that when comparing alternatives that the cost estimates be similar and include similar items. If an existing reliable cost estimate is available for a project it should be used where appropriate. All cost estimates must meet the requirements set forth in the TWDB's Exhibit C.

5. The cost estimates have two components:

    - Initial Capital Costs: Including total construction cost of facilities, engineering and legal contingencies, environmental and archaeology studies and mitigation, land acquisition and surveying, and interest incurred during construction (3.5 percent annual interest rate less a 0.5 percent rate of return on investment of unspent funds).

    - Average Annual Costs: Including annual operation and maintenance costs, pumping energy costs, purchase of water and debt service.

TWDB does not require the consultant to determine life cycle or present value analysis. For most situations annual costs are sufficient for comparison purposes and a life-cycle analysis is not required.

Assumptions for Capital Costs:

Conveyance Systems

The unit costs and factors shown in Tables C-1 through C-7 were developed directly from the TWDB Uniform Costing Model (UCM). These costs are the basis of the capital costs developed for this plan. Standard pipeline costs used for these cost estimates are shown in Table C-1. Pump station costs are based on required Horsepower capacity and are listed in Table C-2. The power capacity is to be determined from the hydraulic analyses included in the UCM (or detailed analysis if available). Pipelines and pump stations are to be sized for peak pumping capacity.

- Pump efficiency is assumed to be 70 percent.
- Peaking factor of 2 times the average demand is to be used for strategies when the water is pumped directly to a water treatment plant. (or historical peaking factor, if available).
- The target flow velocity in pipes is 5 fps and the Hazen-Williams Factor is assumed to be 120.
- Peaking factor of 1.2 to 1.5 is to be used if there are additional water sources and/or the water is transported to a terminal storage facility.
- Ground storage is to be provided at each booster pump station along the transmission line unless there is a more detailed design.
- Ground storage tanks should provide sufficient storage for 2.5 to 4 hours of pumping at peak capacity. Costs for ground storage are shown in Table C-3. Covered storage tanks are used for all strategies transporting treated water.

Water Treatment Plants

Water treatment plants are to be sized for peak day capacity (assume peaking factor of 2 if no specific data is available). Costs estimated include six different treatment levels of varying degree. These levels are groundwater chlorine disinfection, iron and manganese removal, simple filtration, construction of a new conventional treatment plant, expansion of a conventional treatment plant, brackish desalination, and seawater desalination. Costs are also based upon a TDS factor that will increase or decrease the cost of treatment accordingly. These costs are summarized in Table C-4. **All treatment plants are to be sized for finished water capacity**.

Direct Reuse

Direct reuse refers to the introduction of reclaimed water directly from a water reclamation plant to a distribution system. The following assumptions were made for direct potable and non-potable reuse strategies.

Direct Non-Potable Reuse

Non-potable reuse is the use of reclaimed water that is used directly for non-potable beneficial uses such as landscape irrigation. The UCM currently does not have a direct non-potable reuse treatment plant improvements option, therefore the following assumptions were made.

- It was assumed that the cost of an iron and manganese removal plant would be an appropriate approximation of the improvements that would be needed at the Wastewater Treatment Plant. This cost was further refined by assuming that only upgrades to an existing facility would be required, and not construction of an entirely new plant.
- Approximately two miles of 6-inch pipeline was also included in the cost estimates for transport of the treated water to the destination. Since reuse is still relatively new, there is a lack of piping infrastructure for reuse water. It was also assumed that the pump station was included in the WWTP improvements.

Direct Potable Reuse

Direct potable reuse is the use of reclaimed water that is transported directly from a wastewater treatment plant to a drinking water system. The UCM currently does not have a direct potable reuse treatment plant improvements option, therefore the following assumptions were made.

- Due to the high level of treatment that is required for direct potable reuse, the wastewater treatment plant improvements cost was assumed to be equivalent to 75 percent of a conventional treatment plant expansion plus brackish desalination treatment improvements. The 25 percent discount was given to Level 3 Treatment in order to alleviate any redundancy being assumed by the costing tool.

New Groundwater Wells

Cost estimates required for water management strategies that include additional wells or well fields were determined through the UCM (unless a more detailed design was available). The associated costs are shown in Table C-5. The costing tool differentiated the wells based upon purpose. The categories were Public Supply, Irrigation, and ASR. These cost relationships are “rule-of-thumb” in nature and are only appropriate in the broad context of the cost evaluations for the RWP process.

The cost relationships assume construction methods required for public water supply wells, including carbon steel surface casing and pipe-based, stainless steel, and wire-wrap screen. The cost estimates assume that wells would be gravel-packed in the screen sections and the surface casing cemented to their total depth. Estimates include the cost of drilling, completion, well development, well testing, pump, motor, motor controls, column pipe, installation and mobilization. The cost relationships do not include engineering, contingency, financial and legal services, land costs, or permits. A more detailed cost analysis should be completed prior to developing a project.

The costs associated with conveyance systems for multi-well systems can vary widely based on the distance between wells, terrain characteristics, well production, and distance to the treatment facility. These costs should be estimated using standard engineering approaches and site-specific information. For planning purposes, these costs were estimated using the UCM’s assumptions for conveyance. It is important to note that conveyance costs were not included for point of use water user groups such as mining.

Other Costs

- Engineering, contingency, construction management, financial and legal costs are to be estimated at 30 percent of construction cost for pipelines and 35 percent of construction costs for pump stations, treatment facilities and reservoir projects. (This is in accordance with TWDB guidance.)
- Permitting and mitigation for transmission and treatment projects are to be estimated at $25,000 per mile. For reservoirs, mitigation and permitting costs are assumed equal to twice the land purchase cost, unless site specific data is available.
- Right-of-way (ROW) costs for transmission lines are estimated through costs provided by the Texas A&M University Real Estate Center (https://www.recenter.tamu.edu/data/rural-land/) which gives current land costs based on county. The ROW width is assumed to be 50 ft. If a small pipeline follows existing right-of-ways (such as highways), no additional right-of-way cost may be assumed. Large pipelines will require ROW costs regardless of routing.

Interest during construction is the total of interest accrued at the end of the construction period using a 3.5 percent annual interest rate on total borrowed funds, less a 0.5 percent rate of return on investment of unspent funds. This is calculated assuming that the total estimated project cost (excluding interest during construction) would be drawn down at a constant rate per month during the construction period. Factors were determined for different lengths of time for project construction. These factors were used in cost estimating and are presented in Table C-6.

Assumptions for Annual Costs:

Annual costs are to be estimated using the following assumptions:

- Debt service for all transmission and treatment facilities is to be annualized over 20 years, but not longer than the life of the project. [Note: uniform amortization periods should be used when evaluating similar projects for an entity.]
- Annual interest rate for debt service is 3.5 percent.
- Water purchase costs are to be based on wholesale rates reported by the selling entity when possible. In lieu of known rates, a typical regional cost for treated water and raw water will be developed.
- Operation and Maintenance costs are to be calculated based on the construction cost of the capital improvement. Engineering, permitting, etc. should not be included as a basis for this calculation. However, a 20% allowance for construction contingencies should be included for all O&M calculations. Per Exhibit C, O&M should be calculated at:
    - 1 percent of the construction costs for pipelines
    - 1.5 percent for dams
    - 2.5 percent of the construction costs for pump stations

- O&M Costs for the varying levels of water treatment plant improvements were developed by the TWDB and are shown in Table C-7.

- Pumping costs are to be estimated using an electricity rate of $0.08 per Kilowatt Hour. If local data is available, this can be used.

Table C-1: Pipeline Costs (September 2023)

Diameter	Soil		Rock	
	Rural	Urban	Rural	Urban
(Inches)	($/Foot)	($/Foot)	($/Foot)	(Feet)
6	$141	$212	$153	$236
8	$165	$248	$198	$287
10	$189	$284	$244	$337
12	$214	$321	$289	$388
14	$238	$356	$335	$436
16	$262	$393	$381	$484
18	$286	$430	$427	$532
20	$310	$465	$470	$582
24	$358	$538	$562	$678
30	$432	$646	$698	$823
36	$590	$1,014	$846	$1,204
42	$750	$1,380	$993	$1,586
48	$909	$1,748	$1,141	$1,967
54	$1,020	$1,961	$1,289	$2,348
60	$1,130	$2,173	$1,436	$2,729
66	$1,242	$2,389	$1,584	$3,110
72	$1,353	$2,602	$1,731	$3,491
78	$1,464	$2,815	$1,879	$3,872
84	$1,820	$3,501	$2,303	$4,694
90	$2,122	$4,082	$2,654	$5,365
96	$2,426	$4,665	$3,007	$6,040
102	$2,728	$5,246	$3,358	$6,711
108	$3,030	$5,828	$3,709	$7,382
114	$3,333	$6,409	$4,060	$8,048
120	$3,636	$6,992	$4,413	$8,719
132	$4,049	$7,787	$4,884	$9,601
144	$4,655	$8,952	$5,588	$10,942

Table C-2: Pump Station Costs (September 2023)

Horsepower	Intake PS Cost ($ million)	Booster PS cost ($ millions)
5	$3.51	$0.58
10	$3.63	$0.62
20	$3.89	$0.71
25	$4.02	$0.75
50	$4.66	$0.95
100	$5.94	$1.37
200	$8.50	$2.21
300	$11.05	$3.05
400	$13.61	$3.88
500	$16.17	$4.72
600	$18.74	$5.56
700	$21.30	$6.40
800	$23.86	$7.23
900	$26.42	$8.07
1,000	$28.98	$8.91
2,000	$54.58	$17.27
3,000	$56.59	$25.63
4,000	$58.62	$33.99
5,000	$60.64	$42.36
6,000	$62.65	$44.01
7,000	$64.68	$45.66
8,000	$66.70	$47.31
9,000	$68.71	$48.96
10,000	$70.73	$50.61
20,000	$89.86	$67.09
30,000	$108.98	$83.58
40,000	$128.10	$100.05
50,000	$147.22	$116.53
60,000	$166.34	$133.02
70,000	$185.46	$149.50

Note:
1. Intake PS costs include intake and pump station.
2. Adjust pump station costs upward if the pump station is designed to move large quantities of water at a low head (i.e. low horsepower).
3. Assumed multiple pump setup for all pump stations.

Table C-3: Ground Storage Tanks (September 2023)

Tank Volume (MG)	With Roof ($)	Without Roof ($)
0.05	$1,061,624	$604,482
0.1	$1,099,666	$632,123
0.5	$1,404,011	$852,945
1	$1,784,442	$1,128,898
1.5	$2,164,873	$1,404,851
2	$2,545,304	$1,680,954
2.5	$2,925,735	$1,956,907
3	$3,306,166	$2,233,010
3.5	$3,686,597	$2,508,963
4	$4,067,028	$2,784,915
5	$4,827,890	$3,336,971
6	$5,588,752	$3,889,027
7	$6,349,614	$4,441,083
8	$7,110,476	$4,993,139
10	$8,632,200	$6,498,937
12	$10,153,924	$8,004,735
14	$11,675,648	$9,510,684

Note: Costs assume steel tanks smaller than 1 MG, concrete tanks 1 MG and larger.

Table C-4: Conventional Water Treatment Plant Costs (September 2023)

	Level 0	Level 1	Level 2	Level 3 (new)	Level 3 (exp)	Level 4	Level 5
	Chlorine Disinfection (GW)	Iron & Manganese Removal	Simple Filtration	Conventional Treatment	Conventional Treatment	Brackish Desalination	Seawater Desalination
Capacity (MGD)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)	Capital Cost ($)
0.1	$30,707	$348,017	$1,596,785	$2,129,047	$2,129,047	$2,316,216	$3,418,758
1	$102,358	$1,402,305	$5,598,984	$21,331,413	$7,523,315	$23,133,206	$22,887,255
10	$685,799	$5,824,172	$45,815,453	$71,845,099	$28,813,784	$77,902,062	$153,148,079
50	$3,418,758	$16,899,310	$128,244,371	$231,226,782	$104,036,698	$250,711,071	$578,251,199
75	$5,128,137	$24,381,682	$179,996,590	$330,186,522	$165,400,335	$358,019,424	$808,126,856
100	$6,847,752	$29,878,308	$231,748,808	$427,477,826	$200,488,667	$463,503,757	$1,024,747,147
150	$10,266,510	$45,713,095	$335,253,244	$618,651,913	$300,727,882	$670,795,431	$1,432,121,857
200	$13,685,268	$52,642,733	$438,757,681	$806,601,721	$370,894,309	$874,593,479	$1,816,005,400
0.1	$30,707	$348,017	$1,596,785	$2,129,047	$2,129,047	$2,316,216	$3,418,758

Note: Plant is sized for finished peak day capacity.

Table C-5: Cost Elements for Water Wells (September 2023)

Public Supply Well Costs						
	Well Capacity (MGD)					
Well Depth (ft)	100	175	350	700	1000	1800
150	$203,302	$308,626	$453,985	$667,043	$806,153	$1,010,256
300	$271,968	$388,528	$540,560	$760,986	$909,620	$1,126,561
500	$352,104	$485,660	$641,915	$909,028	$1,082,999	$1,311,028
700	$424,953	$573,078	$754,694	$1,044,083	$1,238,791	$1,487,701
1000	$558,509	$733,346	$937,703	$1,290,820	$1,527,758	$1,793,668
1500	$781,912	$1,002,888	$1,239,383	$1,703,778	$2,005,182	$2,299,176
2000	$1,005,314	$1,270,000	$1,532,046	$2,116,736	$2,485,121	$2,806,901
3000	$1,437,600	$1,816,101	$2,190,825	$3,026,934	$3,553,723	$4,013,868
Irrigation Well Costs						
150	$97,133	$149,922	$255,499	$293,508	$371,635	$536,338
300	$128,805	$192,153	$312,511	$369,524	$468,768	$654,585
500	$160,480	$240,718	$373,747	$451,874	$574,345	$791,837
700	$185,817	$276,615	$426,535	$521,557	$667,255	$910,084
1000	$242,830	$356,855	$536,338	$665,143	$850,960	$1,142,355
1500	$339,963	$494,107	$717,932	$903,749	$1,155,025	$1,526,661
2000	$434,983	$627,134	$899,526	$1,140,245	$1,461,202	$1,913,077
ASR Well Costs						
150	$264,293	$401,214	$590,181	$867,156	$1,047,999	$1,313,333
300	$353,559	$505,086	$702,728	$989,282	$1,182,506	$1,464,529
500	$457,736	$631,358	$834,489	$1,181,737	$1,407,899	$1,704,337
700	$552,438	$745,001	$981,102	$1,357,307	$1,610,428	$1,934,012
1000	$726,062	$953,350	$1,219,014	$1,678,066	$1,986,085	$2,331,768
1500	$1,016,486	$1,303,754	$1,611,198	$2,214,911	$2,606,737	$2,988,929
2000	$1,306,909	$1,651,000	$1,991,660	$2,751,757	$3,230,657	$3,648,971
3000	$1,868,880	$2,360,931	$2,848,073	$3,935,014	$4,619,840	$5,218,028

Table C-6: Factors for Interest During Construction (September 2023)

Construction Period	Factor
6 months	0.015
12 months	0.03
18 months	0.045
24 months	0.06
36 months	0.09
48 month	0.12
60 months	0.15
72 months	0.18
84 months	0.21

Table C-7: Annual Water Treatment Plant O&M Costs (September 2023)

	Level 0	Level 1	Level 2	Level 3 (New)	Level (Exp)	Level 4	Level 5
Capacity (MGD)	Chlorine Disinfection (GW)	Iron & Manganese Removal	Simple Filtration	Conventional Treatment	Conventional Treatment	Brackish Desalination	Seawater Desalination
0.1	$18,424	$114,846	$159,679	$212,905	$212,905	$421,130	$512,814
1	$61,415	$462,761	$559,898	$2,133,141	$752,331	$4,206,038	$3,433,088
10	$411,479	$1,921,977	$3,207,082	$5,029,157	$2,016,965	$14,164,011	$22,972,212
50	$2,051,255	$5,576,772	$8,977,106	$16,185,875	$7,282,569	$45,583,831	$86,737,680
75	$3,076,882	$8,045,955	$12,599,761	$23,113,057	$11,578,023	$65,094,441	$121,219,028
100	$4,108,651	$9,859,842	$16,222,417	$29,923,448	$14,034,207	$84,273,410	$153,712,072
150	$6,159,906	$15,085,321	$23,467,727	$43,305,634	$21,050,952	$121,962,806	$214,818,279
200	$8,211,161	$17,372,102	$30,713,038	$56,462,120	$25,962,602	$159,016,996	$272,400,810

Cost Estimate Summary						
Water Supply Project Option						
September 2023 Prices						
Alternative Cooling Technology - SEP Wilbarger County						
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Supply (Ac-Ft)			3,000	3,000	3,000	3,000
Supply (MGD)			2.7	2.7	2.7	2.7
Steam-Electric Needs (acft)			62	564	1,066	1,567
Capacity Installed (MW)			400	400	400	400
Total Capital Cost (million $)			$61.31	$0.00	$0.00	$0.00
Debt Service (million $)			$4.31	$4.31	$0.00	$0.00
Operation & Maintenance (million $)			$1.53	$1.53	$1.53	$1.53
Total Annual Cost (million $)			$5.84	$5.84	$1.53	$1.53
Amount of Water Saved (acft/yr)			3,000	3,000	3,000	3,000
Annual Cost of Water ($ per acft)			$1,947	$1,947	$510	$510
Annual Cost of Water ($ per 1,000 gallons)			$5.97	$5.97	$1.57	$1.57

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
City of Bowie Wastewater Indirect Reuse

Item	***Estimated Costs for Facilities***
CAPITAL COST	
Pump Station (0.9 MGD)	$1,060,000
Transmission Pipeline (8 in. dia., 4.6 miles)	$3,680,000
Water Treatment Plant (0.5 MGD)	$4,526,000
TOTAL COST OF FACILITIES	**$9,272,000**
- Planning (3%)	$278,000
- Design (7%)	$649,000
- Construction Engineering (1%)	$93,000
Legal Assistance (2%)	$185,000
Fiscal Services (2%)	$185,000
All Other Facilities Contingency (20%)	$1,119,000
Environmental & Archaeology Studies and Mitigation	$204,000
Land Acquisition and Surveying (33 acres)	$456,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$423,000
TOTAL COST OF PROJECT	**$13,416,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$944,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$37,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$27,000
Water Treatment Plant	$453,000
Pumping Energy Costs (94501 kW-hr @ 0.09 $/kW-hr)	$9,000
TOTAL ANNUAL COST	**$1,470,000**
Available Project Yield (acft/yr)	700
Annual Cost of Water ($ per acft), based on PF=1.5	$2,100
Annual Cost of Water After Debt Service ($ per acft), based on PF=1.5	$751
Annual Cost of Water ($ per 1,000 gallons), based on PF=1.5	$6.44
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1.5	$2.31

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Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Red River Chloride Control Project

Item	*Estimated Costs for Facilities*
Chloride Control Infrastructure Cost	$83,821,000
TOTAL COST OF FACILITIES	**$83,821,000**
TOTAL COST OF PROJECT	**$83,821,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$5,898,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$838,000
TOTAL ANNUAL COST	**$6,736,000**
Available Project Yield (acft/yr)	6,580
Annual Cost of Water ($ per acft), based on PF=1	$1,024
Annual Cost of Water After Debt Service ($ per acft), based on PF=1	$127
Annual Cost of Water ($ per 1,000 gallons), based on PF=1	$3.14
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=1	$0.39
Note: One or more cost element has been calculated externally	
	7/18/2024

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
City of Nocona - New Groundwater Wells

Item	*Estimated Costs for Facilities*
Well Fields (Wells, Pumps, and Piping)	$2,960,000
TOTAL COST OF FACILITIES	**$2,960,000**
- Planning (3%)	$89,000
- Design (7%)	$207,000
- Construction Engineering (1%)	$30,000
Legal Assistance (2%)	$59,000
Fiscal Services (2%)	$59,000
All Other Facilities Contingency (20%)	$592,000
Environmental & Archaeology Studies and Mitigation	$19,000
Land Acquisition and Surveying (2 acres)	$21,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$132,000
TOTAL COST OF PROJECT	**$4,168,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$293,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$30,000
Pumping Energy Costs (352746 kW-hr @ 0.09 $/kW-hr)	$32,000
TOTAL ANNUAL COST	**$355,000**
Available Project Yield (acft/yr)	726
Annual Cost of Water ($ per acft), based on PF=0	$489
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$85
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$1.50
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.26

Note: One or more cost element has been calculated externally

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Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
City of Saint Jo - New Groundwater Wells

Item	***Estimated Costs for Facilities***
Transmission Pipeline (8 in. dia., 0.2 miles)	$100,000
Transmission Pump Station(s) & Storage Tank(s)	$1,000,000
Well Fields (Wells, Pumps, and Piping)	$2,015,000
Disinfection Facilities	$75,000
TOTAL COST OF FACILITIES	**$3,190,000**
- Planning (3%)	$96,000
- Design (7%)	$223,000
- Construction Engineering (1%)	$32,000
Legal Assistance (2%)	$64,000
Fiscal Services (2%)	$64,000
Pipeline Contingency (15%)	$15,000
All Other Facilities Contingency (20%)	$618,000
Environmental & Archaeology Studies and Mitigation	$18,000
Land Acquisition and Surveying (1 acres)	$14,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$141,000
TOTAL COST OF PROJECT	**$4,475,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$315,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$21,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$25,000
Pumping Energy Costs (352746 kW-hr @ 0.09 $/kW-hr)	$32,000
TOTAL ANNUAL COST	**$393,000**
Available Project Yield (acft/yr)	290
Annual Cost of Water ($ per acft), based on PF=0	$1,355
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$269
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$4.16
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.83

Note: One or more cost element has been calculated externally

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Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
City of Vernon - New Wells

Item	*Estimated Costs for Facilities*
CAPITAL COST	
Well Fields (Wells, Pumps, and Piping)	$374,000
TOTAL COST OF FACILITIES	**$374,000**
Engineering:	
- Planning (3%)	$11,000
- Design (7%)	$26,000
- Construction Engineering (1%)	$4,000
Legal Assistance (2%)	$7,000
Fiscal Services (2%)	$7,000
All Other Facilities Contingency (20%)	$75,000
Environmental & Archaeology Studies and Mitigation	$3,000
Land Acquisition and Surveying (1 acres)	$3,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$17,000
TOTAL COST OF PROJECT	**$527,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$37,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$4,000
Pumping Energy Costs (94066 kW-hr @ 0.09 $/kW-hr)	$8,000
TOTAL ANNUAL COST	**$49,000**
Available Project Yield (acft/yr)	730
Annual Cost of Water ($ per acft), based on PF=0	$67
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$16
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.21
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.05

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Cost Estimate Summary *Water Supply Project Option* *September 2023 Prices* *Wichita Falls - Lake Ringgold*	
Item	***Estimated Costs for Facilities***
Dam and Reservoir (Conservation Pool acft, 15500 acres)	$87,807,000
Intake Pump Stations (39.8 MGD)	$59,582,000
Transmission Pipeline (48 in. dia., 28.9 miles)	$149,896,016
Integration, Relocations, Backup Generator & Other	$10,613,000
TOTAL COST OF FACILITIES	**$307,898,016**
- Planning (3%)	$9,237,000
- Design (7%)	$21,553,000
- Construction Engineering (1%)	$3,079,000
Legal Assistance (2%)	$6,158,000
Fiscal Services (2%)	$6,158,000
Pipeline Contingency (15%)	$22,484,000
All Other Facilities Contingency (20%)	$31,600,000
Environmental & Archaeology Studies and Mitigation	$104,640,000
Land Acquisition and Surveying (9029 acres)	$29,552,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$17,594,000
TOTAL COST OF PROJECT	**$559,953,016**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$21,073,000
Reservoir Debt Service (3.5 percent, 40 years)	$12,147,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$1,605,000
Intakes and Pump Stations (2.5% of Cost of Facilities)	$1,490,000
Dam and Reservoir (1.5% of Cost of Facilities)	$1,317,000
Pumping Energy Costs (7561013 kW-hr @ 0.09 $/kW-hr)	$680,000
TOTAL ANNUAL COST	**$38,312,000**
Available Project Yield (acft/yr)	22,300
Annual Cost of Water ($ per acft), based on PF=2	$1,718
Annual Cost of Water After Debt Service ($ per acft), based on PF=2	$228
Annual Cost of Water ($ per 1,000 gallons), based on PF=2	$5.27
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=2	$0.70
Note: One or more cost element has been calculated externally	
	7/18/2024

Cost Estimate Summary Water Supply Project Option September 2023 Prices Rolling Plains GCD - Managed Aquifer Recharge (Baylor County)	
Item	*Estimated Costs for Facilities*
CAPITAL COST	
Managed Aquifer Recharge Site Construction Costs	$1,896,000
TOTAL COST OF FACILITIES	**$1,896,000**
- Planning (3%)	$57,000
- Design (7%)	$133,000
- Construction Engineering (1%)	$19,000
Legal Assistance (2%)	$38,000
Fiscal Services (2%)	$38,000
All Other Facilities Contingency (20%)	$379,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$84,000
TOTAL COST OF PROJECT	**$2,644,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$186,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$19,000
TOTAL ANNUAL COST	**$205,000**
Available Project Yield (acft/yr)	4,500
Annual Cost of Water ($ per acft), based on PF=0	$46
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$4
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$0.14
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.01
Note: One or more cost element has been calculated externally	
	11/8/2024

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Montague County-Other New Groundwater

Public Water Supply Wells				
Item	***#***	***Unit***	***Unit Cost***	***Estimated Costs for Facilities***
CAPITAL COST				
Drill and complete 500' Well	10	each	$250,000	$2,500,000
10 HP pump, motor, and column pipe	10	each	$62,500	$625,000
Electrical equipment and controls	10	each	$50,000	$500,000
4" well conveyance piping	17,500	LF	$40	$700,000
Well metering building	5	each	$175,000	$875,000
Pump Station and GST	5	each	$750,000	$3,750,000
8" distribution line (conn to dist system)	5,000	LF	$40	$200,000
Disinfection Facilities	5	each	$75,000	$375,000
Site work and fencing	10	each	$100,000	$1,000,000
TOTAL COST OF FACILITIES				**$10,525,000**
Engineering:				
- Planning (3%)				$316,000
- Design (7%)				$737,000
- Construction Engineering (1%)				$105,000
Legal Assistance (2%)				$211,000
Fiscal Services (2%)				$211,000
Pipeline Contingency (15%)				$30,000
All Other Facilities Contingency (20%)				$2,065,000
Environmental & Archaeology Studies and Mitigation				$91,000
Land Acquisition and Surveying (5 acres)				$69,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)				$467,000
TOTAL COST OF PWS WELLS				**$14,827,000**
ANNUAL COST				
Debt Service (3.5 percent, 20 years)			per well	$104,300
Operation and Maintenance				
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)				$64,000
Intakes and Pump Stations (2.5% of Cost of Facilities)				$94,000
Pumping Energy Costs (1241143 kW-hr @ 0.09 $/kW-hr)				$112,000
TOTAL ANNUAL COST OF PWS WELLS (AFTER DEBT SERVICE)[1]				**$270,000**
Individual Residential Wells				
Item	***#***	***Unit***	***Unit Cost***	***Estimated Costs for Facilities***
Drill and complete 500' Well	1,100	each	$50,000	$55,000,000
Pressure Maintenance Facilities	1,100	each	$5,000	$5,500,000
Electrical equipment and controls	1,100	each	$5,000	$5,500,000
Well metering building	1,100	each	$3,500	$3,850,000
1" distribution line (conn to house)	1,100	each	$750	$825,000
Disinfection Facilities	1,100	each	$1,500	$1,650,000
TOTAL COST OF FACILITIES				**$72,325,000**
Residential Well Contingencies (10%)				$7,232,500
TOTAL COST OF RESIDENTIAL WELLS				**$79,557,500**
TOTAL ANNUAL COST OF RESIDENTIAL WELLS				**N/A[2]**
TOTAL PROJECT CAPITAL COST				**$94,384,500**
TOTAL PROJECT ANNUAL COST (AFTER DEBT SERVICE)				**$270,000**
Available Project Yield (acft/yr) - PWS Wells				645
Available Project Yield (acft/yr) - Residential Wells				660
Total Available Project Yield (acft/yr)				1,305
Annual Cost of Water After Debt Service ($ per acft)[3]				$419
Annual Cost of Water After Debt Service ($ per 1,000 gallons)				$1.28

Note: One or more cost element has been calculated externally

[1] Annual cost for PWS wells are provided without debt service. Wells will be devolped in phases instead of all 10 wells at once. Calculating annual cost with debt service for all 10 wells is not appropriate.

[2] Annual cost for residential wells are not provided. UCM is not appropriate for estimating annual cost for well projects at residential scale. It is assumed the individual property owners will pay the capital cost of individual wells, not the project sponsor.

[3] Annual cost calcualted using only PWS well supply. Residential well annaul costs are not provided in this table.

Cost Estimate Summary
Water Supply Project Option
September 2023 Prices
Red River Authority - Pipeline Replacement Projects

Item	***Estimated Costs for Facilities***
Distribution Pipeline Replacement (Multiple Systems)	$3,751,000
TOTAL COST OF FACILITIES	**$3,751,000**
- Planning (3%)	$113,000
- Design (7%)	$263,000
- Construction Engineering (1%)	$38,000
Legal Assistance (2%)	$75,000
Fiscal Services (2%)	$75,000
All Other Facilities Contingency (20%)	$750,000
Interest During Construction (3.5% for 1 years with a 0.5% ROI)	$165,000
TOTAL COST OF PROJECT	**$5,230,000**
ANNUAL COST	
Debt Service (3.5 percent, 20 years)	$368,000
Operation and Maintenance	
Pipeline, Wells, and Storage Tanks (1% of Cost of Facilities)	$38,000
TOTAL ANNUAL COST	**$406,000**
Available Project Yield (acft/yr)	169
Annual Cost of Water ($ per acft), based on PF=0	$2,409
Annual Cost of Water After Debt Service ($ per acft), based on PF=0	$225
Annual Cost of Water ($ per 1,000 gallons), based on PF=0	$7.39
Annual Cost of Water After Debt Service ($ per 1,000 gallons), based on PF=0	$0.69

Note: One or more cost element has been calculated externally

11/21/2024

Cost Estimate Summary ***Water Supply Project Option*** ***September 2023 Prices*** ***WCWID#2 – Canal Conversion to Pipelines***					
Lateral	**Ranking**	**Water Saved**	**Capital Cost**	**Annual Cost**	**Unit Cost**
		(ac-ft/yr)	**($)**	**($)**	**($/ac-ft)**
Priority Group A					
PB	1	0 (completed)	$0	$0	$0.00
SJ	2	1,462	$674,000	$50,122	$34.28
RR	3	1,364	$735,000	$54,619	$40.04
NF	4	3,362	$2,325,000	$172,765	$51.39
Subtotal		***6,188***	***$3,734,000***	***$277,506***	***$44.85***
Priority Group B					
WJ	5	691	$847,000	$62,977	$91.14
PO	6	953	$1,175,000	$87,328	$91.63
Subtotal		***1,644***	***$2,022,000***	***$150,305***	***$91.43***
Priority Group C					
RRG	7	1,672	$1,525,000	$113,358	$67.80
SK	8	446	$228,000	$16,956	$38.02
NB	9	866	$466,000	$34,602	$39.96
Subtotal		***2,984***	***2,219,000***	***164,916***	***$55.27***
Total		**10,816**	**7,975,000**	**592,727**	**$54.80**

APPENDIX D

STRATEGY EVALUATION AND ENVIRONMENTAL IMPACT MATRIX

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

DRAFT

APPENDIX D STRATEGY EVALUATION AND QUANTIFIED ENVIRONMENTAL IMPACT MATRIX

In accordance with TWDB rules and guidelines, the Region B Water Planning Group has adopted a standard procedure for ranking potential water management strategies. This procedure classifies the strategies using the TWDB's standard categories developed for regional water planning.

The strategies are ranked based upon the following categories:

- Quantity
- Reliability
- Cost
- Environmental Factors
- Agricultural Resources/Rural Areas
- Other Natural Resources
- Key Water Quality Parameters
- Third Party Social & Economic Factors

Each category is quantitatively assessed and assigned a ranking from 1 to 5. With the exception of the Environmental Factors category, Table D-1 shows the correlation between the category and the ranking. The Environmental Factors score is taken directly from the Environmental Matrix where the potential environmental considerations are evaluated in more detail.

Table D-1: Evaluation Matrix Category Ranking Correlation

Rank	Quantity	Cost per Ac Ft	Reliability	Remaining Strategy Impacts
1	Meets 0-25% Shortage	>$5,000	Low	High
2	Meets 25-50% Shortage	$1,000-$5,000	Low to Medium	Medium
3	Meets 50-75% of Shortage	$500-$1,000	Medium	Low
4	Meets 75-100% of Shortage	$0-$500	Medium to High	None
5	Exceeds Shortage	No Cost	High	Positive Impact

Environmental Matrix

The Environmental Matrix is used to determine the score of the 'Environmental Factors' category on the Evaluation Matrix.

The Environmental Matrix takes into consideration the following categories;

- Total Acres Impacted
- Total Wetland Acres Impacted
- Environmental Water Needs
- Habitat
- Threatened and Endangered Species
- Cultural Resources
- Bays & Estuaries
- Environmental Water Quality

Each category is quantitatively assessed and assigned a ranking from 1 to 5. The Overall Environmental Impacts column averages all the rankings assigned to the strategy. This value is also illustrated in the Evaluation Matrix as the Environmental Factors rank. Table D-2 shows the correlation between the rank assigned within each category.

Table D-2: Environmental Matrix Category Ranking Correlation

Rank	Acres Impacted	Threatened and Endangered Species	Agricultural Impacts	All Remaining Categories
1	Greater than 500 Acres and/or Wetlands	Greater than 20	Greater than 2,000 acres	High Impact
2	100-500 Acres	Between 15-20	Between 50 and 2,000 acres	Medium Impact
3	50-100 Acres	Between 10-15 or 'varies'	Between 6 and 50 acres	Low Impact
4	0-50 Acres	Between 5-10	Between 0 and 5 acres	No Impact or n/a
5	None	Between 0-5 (or n/a)	Provides water to agriculture or rural	Positive

Acres Impacted

Acres Impacted refers to the total amount of area that will be impacted due to the implementation of a strategy. The following conservative assumptions were made (unless more detailed information was available):

- Each well will impact approximately 1 acre of land including the right-of-way needed to connect to the water system.

- The acres impacted for pipelines is equivalent to the right of way easements required.
- Reservoirs will impact an area equal to their surface area.
- A conventional water treatment plant will impact 5 acres
- Conservation and Precipitation Enhancement strategies will have no impact on land area (acres).

Wetland Acres

Wetland Acres refers to how many acres that are classified as wetlands are impacted by implementation of the strategy. The only strategy that had a quantified impact on surrounding wetlands was the Lake Ringgold strategy. The total acreage was determined using the National Wetlands Inventory located at http://www.fws.gov/wetlands/Data/Mapper.html, as prepared for the Report Supporting an Application for Texas Water Right for Lake Ringgold, May 2017.

Environmental Water Needs

Environmental Water Needs refers to how the strategy will impact the area's overall environmental water needs. Water is vital to the environmental health of a region, and so it is important to consider how strategies will impact the amount of water that will be available to the environment.

The following conservative assumptions were made (unless more detailed information was available):

- The majority of the strategies will have a low impact on environmental water needs
- Reuse will also have a medium impact if the effluent was previously used for irrigation or discharged back into the water system. This will decrease the overall amount of water that is available to the environment by diverting the effluent and using it for another purpose
- Precipitation Enhancement will have a positive impact because both of these strategies increase the amount of water available to the environment.

Habitat

Habitat refers to how the strategy will impact the habitat of the local area. The more area that is impacted due to the implementation of the strategy, the more the area's habitat will be disrupted.

The following conservative assumptions were made (unless more detailed information was available):

- Strategies with less than 100 acres impacted will have a low impact
- Strategies above 100 acres impacted will have a medium impact

Threatened and Endangered Species

Threatened and endangered species refers to how the strategy will impact those species in the area once implemented.

The following conservative assumptions were made (unless more detailed information was available):

- Only applicable to strategies implementing infrastructure
- Rankings were based on the amount of threatened and endangered species located within the county. This amount was found using the Texas Parks and Wildlife Database located at http://tpwd.texas.gov/gis/rtest/ and the U.S. Fish and Wildlife Service Database located at http://www.fws.gov/endangered/.

- This ranking only includes threatened and endangered species as defined in the TWDB guidelines and does not include species without official protection such as those proposed for listing or species that are considered rare or otherwise of special concern.

Agricultural Resources

Impacts to Agricultural Resources is quantified based on the permanent impacts to water supplies to irrigation users or direct impacts to irrigated acreage. Projects with only temporary impacts, such as pipeline projects, would be classified as low impacts. Specific assumptions include:

- If the location of the strategy is known and data is available, actual impacts to agricultural lands will be used. An example of this was Lake Ringgold.
- If a strategy is located in a rural area of a county with significant irrigation use (>10,000 irrigated acres), it is assumed that the strategy could potentially impact agricultural lands. Since most projects will avoid direct impacts to agricultural lands, the quantity of impacts is estimated to be no more than 10% of the total area for the strategy.
- If a strategy impacts more than 2,000 acres of agricultural land, the impacts are classified as “high”. If a strategy impacts between 5 and 50 acres of agricultural lands, the impacts are classified as “low”. If the strategy impacts less than 5 acres, it was assumed to negligible.
- If a strategy will reduce the available water to an irrigation user (by county) by the greater of 10% current irrigation use or 5,000 ac-ft/yr, the strategy is determined to have “high” impacts. If a strategy will reduce the available water to an irrigation user (by county) by 1% of current irrigation use or 500 ac-ft/yr, the strategy is determined to have “low” impacts.
- If the entity already holds water rights for the strategy, the impacts would be “none”.
- If the strategy does not impact any agricultural or rural user, “none” is selected.
- For strategies that provide water to agricultural and rural users, the strategy is rated as “positive impacts.”

Cultural Resources

Cultural Resources refers to how the strategy will impact cultural resources located within the area. Cultural resources are defined as the collective evidence of the past activities and accomplishments of people. Locations, buildings and features with scientific, cultural or historic value are considered to be cultural resources.

The following conservative assumptions were made (unless more detailed information was available):

- Only applicable to strategies implementing infrastructure
- All applicable strategies will have a low impact on cultural resources

Bays and Estuaries

Region B is located too far away from bays or estuaries to have a quantifiable impact. Therefore this category was assumed to be non-applicable for every strategy.

Environmental Water Quality

Environmental Water Quality refers to the impact that the implementation of the strategy will have on the area's water quality. Generally, most strategies will have a neutral to low impact on water quality and are ranked as "3" as documented in Table D-2. Similarly, strategies with no impacts are assigned a "4" and those with a positive impact are assigned a "5".

Region B
Appendix D
Strategy Evaluation Matrix

Entity	County Used	Strategy	Maximum Quantity (Ac-Ft/Yr)	Maximum Need	Percentage of Max Need Met	Quantity Score	Reliability	Maximum Cost ($/Ac-Ft)	Cost Score	Impacts of Strategy on:					Overall Score (5-45)	Implementation Issues	Comments
										Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters	Third Party Social & Economic Factors			
Lakeside City	Archer	Conservation	18	22	82%	4	3	$400	4	4	5	5	3	5	33		
Holliday	Archer, Wichita	Conservation	29	72	40%	3	3	$400	4	4	5	5	3	5	32		
Holliday	Archer, Wichita	Voluntary Transfer	23	72	32%	3	5	$1,377	2	4	3	4	3	4	28		
Irrigation	Baylor	Conservation	254	308	82%	4	3	$11	4	4	5	5	3	5	33		
Irrigation	Baylor	Managed Aquifer Recharge	4,500	308	100%	4	3	$46	4	4	5	3	3	3	29		
Mining	Baylor	Conservation	3	0	100%	4	3	$3,200	2	4	5	5	3	5	31		
Irrigation	Clay	Conservation	68	0	100%	4	3	$11	4	4	5	5	3	5	33		
Mining	Clay	Conservation	1	0	100%	4	3	$3,200	2	4	5	5	3	5	31		
Red River Authority	Clay	Conservation	194	189	103%	5	3	$343	4	4	5	5	3	5	34		
Irrigation	Cottle	Conservation	216	0	100%	4	3	$11	4	4	5	5	3	5	33		
Mining	Cottle	Conservation	2	0	100%	4	3	$3,200	2	4	5	5	3	5	31		
Irrigation	Foard	Conservation	124	0	100%	4	3	$11	4	4	5	5	3	5	33		
Irrigation	Hardeman	Conservation	915	0	100%	4	3	$11	4	4	5	5	3	5	33		
Mining	Hardeman	Conservation	1	0	100%	4	3	$3,200	2	4	5	5	3	5	31		
Irrigation	King	Conservation	12	0	100%	4	3	$11	4	4	5	5	3	5	33		
Mining	King	Conservation	1	0	100%	4	3	$3,200	2	4	5	5	3	5	31		
Bowie	Montague	Conservation	263	1,251	21%	1	3	$400	4	4	5	5	3	5	30		
Bowie	Montague	Reuse	700	1,251	56%	3	5	$2,882	2	4	3	4	3	4	28		
County Other	Montague	Conservation	319	1,614	20%	1	3	$400	4	4	5	5	3	5	30		
County Other	Montague	New Groundwater	1,305	1,614	81%	4	5	$831	3	3	3	4	3	4	29		
Irrigation	Montague	Conservation	21	0	100%	4	3	$11	4	4	5	5	3	5	33		
Mining	Montague	Conservation	9	805	1%	1	3	$3,200	2	4	5	5	3	5	28		
Nocona	Montague	Conservation	257	623	41%	3	3	$400	4	4	5	5	3	5	32		
Nocona	Montague	New Groundwater	436	623	70%	3	5	$813	3	3	3	4	3	4	28		
Saint Jo	Montague	Conservation	80	235	34%	3	3	$400	4	4	5	5	3	5	32		
Saint Jo	Montague	New Groundwater	290	235	123%	5	5	$1,352	2	3	3	4	3	4	29		
Electra	Wichita	Conservation	86	327	26%	3	3	$400	4	4	5	5	3	5	32		
Electra	Wichita	Voluntary Transfer	136	327	42%	3	5	$1,377	2	4	3	4	3	4	28		
Iowa Park	Wichita	Conservation	135	209	65%	3	3	$400	4	4	5	5	3	5	32		
Irrigation	Wichita	Conservation	1,958	12,426	16%	1	3	$10	4	4	5	5	3	5	30		
Irrigation	Wichita	Red River Chloride Control	6,580	12,426	53%	3	4	$1,024	2	4	5	5	5	5	33		
Manufacturing	Wichita	Voluntary Transfer	146	146	100%	4	5	$1,377	2	4	3	4	3	4	29		
Mining	Wichita	Conservation	11	0	100%	4	3	$3,200	2	4	5	5	3	5	31		
Sheppard AFB	Wichita	Conservation	110	321	34%	3	3	$400	4	4	5	5	3	5	32		
Wichita County WID2	Wichita	Irrigation Conservation	10,816	13,767	79%	4	4	$274	4	4	5	5	3	5	34		
Wichita Falls	Wichita	Conservation	1,883	19,745	10%	1	3	$400	4	4	5	5	3	5	30		
Wichita Falls	Wichita	Reservoir	22,300	19,745	113%	5	4	$1,718	2	3	1	3	3	3	24		
Harrold WSC	Wichita/Wilbarger	Conservation	5	21	24%	1	3	$400	4	4	5	5	3	5	30		
Harrold WSC	Wichita/Wilbarger	Voluntary Transfer	16	21	76%	4	5	$1,377	2	4	3	4	3	4	29		
Irrigation	Wilbarger	Conservation	1,337	29,476	5%	1	3	$10	4	4	5	5	3	5	30		
Mining	Wilbarger	Conservation	8	0	100%	4	3	$3,200	2	4	5	5	3	5	31		
Steam Electric Power	Wilbarger	Alternative Cooling	3,000	1,567	191%	5	3	$1,947	2	4	5	5	3	5	32		
Vernon	Wilbarger	New Groundwater	730	754	97%	4	5	$67	4	4	3	3	3	5	31		

Region B
Appendix D
Environmental Impact Matrix

Entity	County	Strategy	Environmental Factors															Agricultural Resource Impacts		
			Acres Impacted	Wetland Acres	Acres Impacted Score	Envir Water Needs	Envir Water Needs Score	Habitat	Habitat Score	Threatened and Endangered Species	Threat and Endanger Species Score	Cultural Resources	Cultural Resources Score	Bays & Estuaries	Bays & Estuaries Score	Envir Water Quality	Overall Environmental Impacts	Temp Ag Acres Impacted	Permanent Ag Acres Impacted	Agricultural Resources Score
Lakeside City	Archer	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Holliday	Archer/Wichita	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Holliday	Archer/Wichita	Voluntary Transfer	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Irrigation	Baylor	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	5	4	0	0	5
Irrigation	Baylor	Managed Aquifer Recharge	32	14	4	Low	3	Low	3	10	4	n/a	4	None	5	3	4	32	24	5
Mining	Baylor	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Irrigation	Clay	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	5	4	0	0	5
Mining	Clay	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Red River Authority	Clay	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Irrigation	Cottle	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	5	4	0	0	5
Mining	Cottle	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Irrigation	Foard	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	5	4	0	0	5
Irrigation	Hardeman	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	5	4	0	0	5
Mining	Hardeman	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Irrigation	King	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	5	4	0	0	5
Mining	King	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Bowie	Montague	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Bowie	Montague	Reuse	15	n/a	4	Medium	2	Low	3	n/a	5	Low	3	None	5	3	4	2	2	4
County Other	Montague	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
County Other	Montague	New Groundwater	10	n/a	4	Low	3	Low	3	11	3	Low	3	None	5	3	3	10	1	4
Irrigation	Montague	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	5	4	0	0	5
Mining	Montague	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Nocona	Montague	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Nocona	Montague	New Groundwater	3	n/a	4	Low	3	Low	3	11	3	Low	3	None	5	3	3	3	0	4
Saint Jo	Montague	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Saint Jo	Montague	New Groundwater	2	n/a	4	Low	3	Low	3	11	3	Low	3	None	5	3	3	2	0	4
Electra	Wichita	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Electra	Wichita	Voluntary Transfer	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Iowa Park	Wichita	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Irrigation	Wichita	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	5
Irrigation	Wichita	Red River Chloride Control	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	5	4	0	0	5
Manufacturing	Wichita	Voluntary Transfer	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Mining	Wichita	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Sheppard AFB	Wichita	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Wichita County WID2	Wichita	Irrigation Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Wichita Falls	Wichita	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Wichita Falls	Wichita	Reservoir	15,500	418	1	Medium	2	High	1	10	4	Mid-High	2	None	5	3	3	0	667	2
Harrold WSC	Wichita/Wilbarger	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Harrold WSC	Wichita/Wilbarger	Voluntary Transfer	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Irrigation	Wilbarger	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	5
Mining	Wilbarger	Conservation	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Steam Electric Power	Wilbarger	Alternative Cooling	0	n/a	5	Low	3	Low	3	n/a	5	n/a	4	None	5	3	4	0	0	4
Vernon	Wilbarger	New Groundwater	34	n/a	4	Low	3	Low	3	9	4	Low	3	None	5	3	4	3	3	4

APPENDIX E

SOCIOECONOMIC IMPACTS OF PROJECTED WATER SHORTAGES

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

Will include the TWDB Socioeconomic Impact Analysis for Region B in the Final Plan

APPENDIX F

REGIONAL WATER PLAN REQUIREMENTS AND TAC CHAPTER 357 AND 358 REGULATIONS PERTAINING TO THE 2026 PLAN

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

2026 Initially Prepared Plan Checklist

2026 IPP Review Item Number	Key Requirement Citation: TWC, 31 TAC Rule, or Contract Exhibit	Corresponding Contract Guidance and SOW Task *(if applicable)*	Requirement (see published rule and other contract documents for full context)	Location(s) in Regional Plan and/or Commentary
Header	§ 357.22		General Considerations for Development of Regional Water Plans	
1	§ 357.22(a)		RWPGs shall consider existing local, regional, and state water planning efforts, including water plans, information and relevant local, regional , state and federal programs and goals when developing the RWP. **The RWPGs shall also consider:**	Chapters 1 - 10 consider existing local, regional, and state water planning efforts, including water plans, information and relevant local, regional, state, and federal program goals
2	§ 357.22(a)(1)		**[The RWPGs shall also consider:]** water conservation plans;	Chapter 5
3	§ 357.22(a)(2)		**[The RWPGs shall also consider:]** drought management and drought contingency plans;	Chapter 7
4	§ 357.22(a)(3)	Exhibit C, Section 2.1	**[The RWPGs shall also consider:]** information compiled by the Board from water loss audits performed by retail public utilities pursuant to § 358.6 (relating to Water Loss Audits)	Chapter 1
5	§ 357.22(a)(4)		**[The RWPGs shall also consider:]** publicly available plans for major agricultural, municipal, manufacturing and commercial water users;	Chapter 5
6	§ 357.22(a)(5)		**[The RWPGs shall also consider:]** local and regional water management plans;	Chapter 5
7	§ 357.22(a)(6)		**[The RWPGs shall also consider:]** water availability requirements promulgated by a county commissioners court in accordance with TWC § 35.019 (relating to Priority Groundwater Management Areas)	Chapter 3 and 5
8	§ 357.22(a)(7)		**[The RWPGs shall also consider:]** the Texas Clean Rivers Program;	Chapter 5
9	§ 357.22(a)(8)		**[The RWPGs shall also consider:]** the U.S. Clean Water Act;	Chapter 5
10	§ 357.22(a)(9)		**[The RWPGs shall also consider:]** water management plans;	Chapter 5
11	§ 357.22(a)(10)		**[The RWPGs shall also consider:]** other planning goals including, but not limited to, regionalization of water and wastewater services where appropriate	Chapter 5
12	§ 357.22(a)(11)		**[The RWPGs shall also consider:]** approved groundwater conservation district management plans and other plans submitted under Texas Water Code § 16.054 (relating to Local Water Planning);	Chapter 3
13	§ 357.22(a)(12)		**[The RWPGs shall also consider:]** approved groundwater regulatory plans;	Chapter 3
14	§ 357.22(a)(13)		**[The RWPGs shall also consider:]** potential impacts on public health, safety, or welfare;	Chapter 6
15	§ 357.22(a)(14)		**[The RWPGs shall also consider:]** water conservation best management practices available on the TWDB website; and	Chapter 5
16	§ 357.22(a)(15)		**[The RWPGs shall also consider:]** any other information available from existing local or regional water planning studies.	Chapter 5
17	§ 357.22(b)	Exhibit C, Section 1.6	The RWP shall contain a separate chapter for the contents of §§357.30, 357.31, 357.32, 357.33, 357.42, 357.43, 357.45, and 357.50 of this title and shall also contain a separate chapter for the contents of §357.34 and §§357.35, 357.40 and 357.41 of this title for a total of ten separate chapters	Chapters 1-10
Header	§ 357.30	SOW Task 1	Description of the Regional Water Planning Area	
18	§ 357.30(1)	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their RWPA including the following:]** social and economic aspects of a region such as information on current population, economic activity and economic sectors heavily dependent on water resources;	Chapter 1
19	§ 357.30(2)	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their RWPA including the following:]** current water use and major water demand centers;	Chapter 1
20	§ 357.30(3)	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their RWPA including the following:]** current groundwater, surface water, and reuse supplies including major springs that are important for water supply or protection of natural resources;	Chapter 1
21	§ 357.30(4)	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their RWPA including the following:]** major water providers;	Chapter 1
22	§ 357.30(5)	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their RWPA including the following:]** agricultural and natural resources;	Chapter 1
23	§ 357.30(6)	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their RWPA including the following:]** identified water quality problems;	Chapter 4
24	§ 357.30(7)	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their RWPA including the following:]** identified threats to agricultural and natural resources due to water quantity problems or water quality problems related to water supply;	Chapter 1

2026 IPP Review Item Number	Key Requirement Citation: TWC, 31 TAC Rule, or Contract Exhibit	Corresponding Contract Guidance and SOW Task *(if applicable)*	Requirement (see published rule and other contract documents for full context)	Location(s) in Regional Plan and/or Commentary
25	**§ 357.30(8)**	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their regional water planning area including the following:]** summary of existing local and regional water plans;	Chapter 1
26	**§ 357.30(9)**	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their RWPA including the following:]** the identified historic drought(s) of record within the planning area;	Chapter 7
27	**§ 357.30(10)**	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their RWPA including the following:]** current preparations for drought within the RWPA;	Chapter 7
28	**§ 357.30(11)**	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their RWPA including the following:]** information compiled by the Board from water loss audits performed by retail public utilities pursuant to § 358.6 of this title (relating to Water Loss Audits); and	Chapter 1
29	**§ 357.30(12)**	Exhibit C, Section 2.1; SOW Task 1	**[RWPGs shall describe their RWPA including the following:]** an identification of each threat to agricultural and natural resources and a discussion of how that threat will be addressed or affected by the water management strategies evaluated in the plan.	Chapter 1 and Chapter 6
Header	**§ 357.31**	**SOW Task 2A and 2B**	**Projected Population and Water Demands**	
30	**§ 357.31(a)**	Exhibit C, Section 2.2; SOW Task 2A and B	RWPs shall present projected population and Water Demands by WUG as defined in § 357.10 of this title (relating to Definitions and Acronyms). If a WUG lies in one or more counties or RWPA or river basins, data shall be reported for each river basin, RWPA, and county split.	Appendix B
31	**§ 357.31(b)**	Exhibit C, Section 2.2.3; SOW Task 2A and B	RWPs shall present projected Water Demands associated with MWPs by category of water use, including municipal, manufacturing, irrigation, steam electric power generation, mining, and livestock for the RWPA.	Chapter 2
32	**§ 357.31(c)**	SOW Task 2A and B	RWPs shall evaluate the current contractual obligations of WUGs and WWPs to supply water in addition to any demands projected for the WUG or WWP. Information regarding obligations to supply water to other users must also be incorporated into the water supply analysis in § 357.32 of this title (relating to Water Supply Analysis) in order to determine net existing water supplies available for each WUG's own use. The evaluation of contractual obligations under this subsection is limited to determining the amount of water secured by the contract and the duration of the contract.	Chapter 2
33	**§ 357.31(d)**	Exhibit C, Section 2.2 and 2.5.5; SOW Task 2B	Municipal demands shall be adjusted to reflect water savings due to plumbing fixture requirements identified in the Texas Health and Safety Code, Chapter 372. RWPGs shall report how changes in plumbing fixtures would affect projected municipal Water Demands using projections with plumbing code savings provided by the Board or by methods approved by the EA.	Chapter 2, 5, and 6
34	**§ 357.31(e)(1)**	Exhibit C, Section 2.2; SOW Task 2A and B	**[Source of population and water demands. In developing RWPs, RWPGs shall use:]** Population and water demand projections developed by the EA that shall be contained in the next state water plan and adopted by the Board after consultation with the RWPGs, Commission, Texas Department of Agriculture, and the Texas Parks and Wildlife Department.	Chapter 2
35	**§ 357.31(f)**	Exhibit C, Section 2.2; SOW Task 2A and B	Population and Water Demand projections shall be presented for each Planning Decade for WUGs and MWPs.	Chapter 2, Appendix B
Header	**§ 357.32**	**SOW Task 3**	**Water Supply Analysis**	
36	**§ 357.32(a)(1)**	Exhibit C, Section 2.3; SOW Task 3	**[RWPGs shall evaluate:]** source water Availability during Drought of Record conditions; and	Chapter 3, Appendix A
37	**§ 357.32(a)(2)**	Exhibit C, Section 2.3; SOW Task 3	**[RWPGs shall evaluate:]** Existing Water Supplies that are legally and physically available to each WUG and WWP within the RWPA for use during the Drought of Record.	Chapter 3
38	**§ 357.32(b)**	Exhibit C, Section 2.3.6; SOW Task 3	Evaluations shall consider surface water and groundwater data from the state water plan, existing water rights, contracts and option agreements relating to water rights, other planning and water supply studies, and analysis of water supplies existing in and available to the RWPA during Drought of Record conditions.	Chapter 3

2026 IPP Review Item Number	Key Requirement Citation: TWC, 31 TAC Rule, or Contract Exhibit	Corresponding Contract Guidance and SOW Task *(if applicable)*	Requirement (see published rule and other contract documents for full context)	Location(s) in Regional Plan and/or Commentary
39	**§ 357.32(c)**	Exhibit C, Section 2.3.1; SOW Task 3	For surface water supply analyses, RWPGs shall use most current Water Availability Models from the Commission to evaluate the adequacy of surface water supplies. As the default approach for evaluating existing supplies, RWPGs shall assume full utilization of existing water rights and no return flows when using Water Availability Models. RWPGs may use better, more representative, water availability modeling assumptions or better site-specific information with written approval from the EA. Information available from the Commission shall be incorporated by RWPGs unless better site-specific information is available and approved in writing by the EA.	Chapter 3, Appendix A
40	**§ 357.32(c)(1)**	Exhibit C, Section 2.3.1; SOW Task 3	Evaluation of existing stored surface water available during Drought of Record conditions shall be based on Firm Yield as defined in §357.10 of this title (relating to Definitions and Acronyms). The analysis may be based on justified operational procedures other than Firm Yield. The EA shall consider a written request from an RWPG to use procedures other than Firm Yield.	Chapter 3, Appendix A
41	**§ 357.32(c)(2)**	Exhibit C, Section 2.3.1	Evaluation of existing run of river surface water available for municipal WUGs during Drought of Record conditions shall be based on the minimum monthly diversion amounts that are available 100 percent of the time, if those run of river supplies are the only supply for the municipal WUG.	Chapter 3, Appendix A
42	**Contract Scope of Work Task 3**	Exhibit C, Section 2.3.1	Inclusion of sedimentation into the WAM RUN3 models (or other models) for major reservoirs is a necessary modification.	Appendix A
43	**Contract Exhibit C, Section 2.3.1**		The methodology used for calculating anticipated sedimentation rate and revising the area-capacity rating curve must be described in the IPP and final adopted RWP.	Appendix A
44	**Contract Exhibit C, Section 2.3.1**		For surface water withdrawals that do not require permits, such as for domestic and livestock uses, RWPGs will estimate these local annual water availability volumes under drought of record conditions based on the most current accessible information. RWPGs shall document the methodologies utilized for these availabilities in the Technical Memorandum, IPP, and final adopted RWP.	Chapter 3
45	**Contract Exhibit C, Section 2.3.2**	SOW Task 3	For planning purposes, availability for reservoirs operated as a system may be reported as a system in lieu of reporting individual reservoir availability. Such a relationship could include reservoirs owned and operated by the same entity, so long as the operations comply with the existing permit conditions. **The firm yield of the system should be the firm yield during drought of record conditions for the system as a whole.**	Chapter 3, Appendix A
46	**Contract Exhibit C, Section 2.3.2**	SOW Task 3	System gain is the amount of permitted water a system creates that would otherwise be unavailable if the reservoirs were operated independently; and **for existing systems, this volume shall be reported separately in the RWPs in addition to the reservoir system firm yield**. For multi-reservoir systems, the minimum system gain during drought conditions may be considered additional water available, if it has already been permitted. Total existing water from a system shall not exceed the sum of the system gain plus the firm yields of individual reservoirs in that system. **To report system gain, system operations must produce a measurable system yield greater than the sum of the individual reservoir yields.** System gain for system operations that mask individual reservoir yields or that group reservoirs together without a permitted relationship shall not be allowed in the RWPs.	Chapter 3, Chapter 5, Appendix A
47	**§ 357.32(d)**	Exhibit C, Section 2.3.4.1; SOW Task 3	RWPGs shall use modeled available groundwater volumes for groundwater Availability, as issued by the EA, and incorporate such information in its RWP unless no modeled available groundwater volumes are provided. Groundwater Availability used in the RWP must be consistent with the desired future conditions as of the most recent deadline for the Board to adopt the State Water Plan or, at the discretion of the RWPG, established subsequent to the adoption of the most recent State Water Plan.	Chapter 3
48	**§ 357.32(d)(1)**	Exhibit C, Section 2.3.4.1; SOW Task 3	An RWP is consistent with a desired future condition if the groundwater Availability amount in the RWP and on which an Existing Water Supply or recommended WMS relies does not exceed the modeled available groundwater amount associated with the desired future condition for the relevant aquifers, in accordance with paragraph (2) of this subsection or as modified by paragraph (3) of this subsection, if applicable. The desired future condition must be either the desired future condition adopted as of the most recent deadline for the Board to adopt the State Water Plan or, at the option of the RWPG, a desired future condition adopted on a subsequent date.	Chapter 3

2026 IPP Review Item Number	Key Requirement Citation: TWC, 31 TAC Rule, or Contract Exhibit	Corresponding Contract Guidance and SOW Task *(if applicable)*	Requirement (see published rule and other contract documents for full context)	Location(s) in Regional Plan and/or Commentary
49	**§ 357.32(d)(2)**	Exhibit C, Section 2.3.4.3; SOW Task 3	If no groundwater conservation district exists within the RWPA, then the RWPG shall determine the Availability of groundwater for regional planning purposes. The Board shall review and consider approving the RWPG-Estimated Groundwater Availability, prior to inclusion in the IPP, including determining if the estimate is physically compatible with the desired future conditions for relevant aquifers in groundwater conservation districts in the co-located groundwater management area or areas. The EA shall use the Board's groundwater availability models as appropriate to conduct the compatibility review.	Chapter 3
50	**Contract Exhibit C, Section 2.3.4.3**	SOW Task 3	***[In relation to TWDB Board approved RWPG-estimated groundwater availability]*** , a copy of the TWDB Board approval memorandum as well as documentation of the request process should be included in the IPP and final adopted RWP. The TWDB Board approved RWPG-estimated groundwater availabilities will be used as the planning condition in the RWP and basis of analysis in DB27. The unmodified annual MAG volume(s) must also be reported in the IPP, and final adopted RWP	Chapter 3
51	**§ 357.32(d)(3)**	Exhibit C, Section 2.3.5.2; SOW Task 3	In RWPAs that have at least one groundwater conservation district, the EA shall consider a written request from an RWPG to apply a MAG Peak Factor in the form of a percentage (e.g., greater than 100 percent) applied to the modeled available groundwater value of any particular aquifer-region-county-basin split within the jurisdiction of a groundwater conservation district, or groundwater management area if no groundwater conservation district exists, to allow temporary increases in annual availability for planning purposes.	N/A, no MAG peaking factors
52	**Contract Exhibit C, Section 2.3.5.2**	SOW Task 3	***[In relation to approved MAG Peak Factor requests],*** a copy of the MAG peak factor approval letter as well as documentation of variance request process should be included in the IPP, and final adopted RWP. The unmodified annual MAG volume(s)must also be reported in the Technical Memorandum, IPP, and final adopted RWP.	N/A, no MAG peaking factors
53	**Contract Exhibit C, Section 2.3.4.2**	SOW Task 3	For groundwater sources where no DFC exists, RWPGs may determine the groundwater availability for planning purposes. These RWPG-estimated groundwater availabilities may be determined by using availability values presented in the local GCD management plan, TWDB GAMs, if available, or other means. RWPGs must include a table documenting the method(s) used for estimating RWPG-estimated groundwater availability in the Technical Memorandum, IPP, and final adopted RWP. **This table should include the aquifer, county, and methodology description(s).**	Chapter 3
54	**Contract Exhibit C, Section 2.3.5.2**		***[In relation to approved MAG Reallocation requests]*** , a copy of the MAG reallocation approval letter as well as documentation of variance request process should be included in the Technical Memorandum, IPP, and final adopted RWP. The unmodified annual MAG volume(s)must also be reported in the Technical Memorandum, IPP, and final adopted RWP.	N/A
55	**§ 357.32(e)**	SOW Task 3, Contract Exhibit C, Section 2.3.6	Water supplies based on contracted agreements shall be based on the terms of the contract, which may be assumed to renew upon contract termination if the contract contemplates renewal or extensions.	Chapter 2, 3, and 5
56	**§ 357.32(f)**	SOW Task 3	Evaluation results shall be reported by WUG in accordance with § 357.31(a) of this title (relating to Projected Population and Water Demands) and MWP in accordance with § 357.31(b) of this title.	Chapter 2, Chapter 3, Appendix B
57	**Contract Scope of Work, Task 3**	Contract Exhibit C, Section 2.12.2	In addition to submitting all electronic model input/output files used in determining water availability (in sufficient detail for another party to replicate the resulting availability estimates that are incorporated into the plan), the Technical Memorandum, IPP, and final RWP must include a table summarizing the details of any hydrologic models used, including the model name, version date, model input/output files used, date model run, and any relevant comments	Appendix A
58	**Contract Exhibit C, 2.3.5.1**		If the use of a hydrologic variance for an alternative surface water availability evaluation is approved by the Executive Administrator, a copy of the approved alternative hydrologic assumptions and methodologies as well as documentation of variance request process must be included in the IPP and final adopted RWP.	Appendix A
59	**Contract Exhibit C, Section 2.3.5.1. Table 2**		If the use of a hydrologic variance for an alternative surface water availability evaluation is approved by the Executive Administrator, the plan must include the additional yield information specified in Exhibit C, Section 2.3.5.1; Table 2, as a value reported in IPP and final RWP.	Chapter 3 and Appendix A
60	**Contract Exhibit C, Section 2.3.3**		Reuse is considered a stand-alone water source type and RWPGs will evaluate reuse availability and supplies separately from conservation, which is classified as a demand reduction associated with a WUG.	Chapter 3

2026 IPP Review Item Number	Key Requirement Citation: TWC, 31 TAC Rule, or Contract Exhibit	Corresponding Contract Guidance and SOW Task *(if applicable)*	Requirement (see published rule and other contract documents for full context)	Location(s) in Regional Plan and/or Commentary
61	**Contract Exhibit C, Section 2.3.3**		Reuse availability should be presented as a separate subsection within Chapter 3 of the IPP and final RWP. The subsection must describe the data sources and methodology used to calculate reuse availability.	Chapter 3
62	**Contract Exhibit C, Section 2.3.3**		RWPGs must classify reuse availability as either direct or indirect.	Chapter 3 and DB27
63	**Contract Exhibit C, Section 2.3.6**		For direct reuse [existing supplies], RWPGs shall base their drought of record existing direct reuse analyses on: currently installed wastewater reclamation infrastructure; and the amount of wastewater anticipated to be treated at the WWTP, based on associated decade populations/demands. These amounts shall not exceed the amounts of water available to utilities generating the wastewater.	Chapter 3
64	**Contract Exhibit C, Section 2.3.6**		For indirect reuse [existing supplies], RWPGs must base their drought of record existing indirect reuse analyses on currently installed wastewater treatment infrastructure; currently permitted wastewater discharge amounts; and the amount of wastewater anticipated to be treated at the WWTP, based on associated decade populations/demands. These amounts may not exceed the amounts of water available to utilities generating the wastewater.	Chapter 3
65	**Contract Exhibit C, Section 2.3.6**		**[The following items must also be presented in the IPP and final adopted RWP:]** Water rights which are the basis for surface water existing supply volumes. RWPGs must also submit water rights data to the TWDB electronically using a TWDB provided spreadsheet.	Appendix A and electronic submittal
66	**Contract Exhibit C, Section 2.3.6**		**[The following items must also be presented in the IPP and final adopted RWP:]** For local surface water supply, plans must include a single table that lists each local surface water supply with a) an explanation for the basis of the supply itself, and b) the basis for the volume of supply. For unpermitted supplies, list the source as the sum of unpermitted surface water by county-basin split. Any unpermitted local surface water supplies must be listed individually as well with explanation and may be aggregated at the county-basin level when appropriate.	Chapter 3
67	**Contract Exhibit C, Section 2.3.6**		**[The following items must also be presented in the IPP and final adopted RWP:]** For local supplies, the plan must acknowledge whether the RWPG can confirm if the local supplies are firm. For any local supplies that cannot be confirmed as 'firm' under DOR, the RWP must include a summary of the number of WUGs for which this is true and the total associated volume of water associated with this uncertainty.	Chapter 3 and Appendix A
68	**Contract Exhibit C, Section 2.3.6**		An RWPG may not set existing groundwater supplies equal to demands just for convenience. If a RWPG determines groundwater supply volumes are appropriate to equal demand values, then they must provide justification within the RWP.	Groundwater supplies were not set equal to demands for convenience.
Header	**§ 357.33**	**SOW Task 4A**	**Needs Analysis: Comparison of Water Supplies and Demands**	
69	**§ 357.33(a)**	Exhibit C, Section 2.4; SOW Task 4A	RWPs shall include comparisons of existing water supplies and projected Water Demands to identify Water Needs.	Chapter 4
70	**§ 357.33(b)+§ 357.33(c)**	Exhibit C, Section 2.4; SOW Task 4A	RWPGs shall compare projected Water Demands, developed in accordance with § 357.31 of this title (relating to Projected Population and Water Demands), with existing water supplies available to WUGs and WWPs in a planning area, as developed in accordance with § 357.32 of this title (relating to Water Supply Analysis), to determine whether WUGs will experience water surpluses or needs for additional supplies.	Chapter 4, Appendix B
71	**§ 357.33(c)**	Exhibit C, Section 2.4; SOW Task 4A	Results of evaluations shall be reported by WUG in accordance with §357.31(a) of this title and by MWP in accordance with §357.31(b) of this title.	Chapter 4, Appendix B
72	**§ 357.33(d)**	Exhibit C, Section 2.4; SOW Task 4A	RWPGs shall perform a secondary water needs analysis for all WUGs and WWPs for which conservation WMSs or direct Reuse WMSs are recommended. This secondary water needs analysis shall calculate the Water Needs that would remain after assuming all recommended conservation and direct Reuse WMSs are fully implemented. The resulting secondary water needs volumes shall be presented in the RWP by WUG and MWP and decade.	Chapter 4, DB27
Header	**§ 357.34**	**SOW Task 5A-C**	**Identification and Evaluation of Potentially Feasible Water Management Strategies and Projects**	
73	**§ 357.34(a)**	Exhibit C, Section 2.5; SOW Task 5A and 5B	RWPGs shall identify and evaluate potentially feasible WMSs and the WMSPs required to implement those strategies for all WUGs and WWPs with identified Water Needs.	Chapter 5

2026 IPP Review Item Number	Key Requirement Citation: TWC, 31 TAC Rule, or Contract Exhibit	Corresponding Contract Guidance and SOW Task *(if applicable)*	Requirement (see published rule and other contract documents for full context)	Location(s) in Regional Plan and/or Commentary
74	§ 357.34(b)	Exhibit C, Section 2.5.1; SOW Task 5A	RWPGs shall identify potentially feasible WMSs to meet water supply needs identified in §357.33 of this title (relating to Needs Analysis: Comparison of Water Supplies and Demands) in accordance with the process in §357.12(b) of this title (relating to General Regional Water Planning Group Responsibilities and Procedures). Strategies shall be developed for WUGs and WWPs. WMS and WMSPs shall be developed for WUGs and WWPs that would provide water to meet water supply needs during Drought of Record conditions.	Chapter 5
75	TWC § 16.053(e)(5)+ 31 TAC § 357.34(c)(1-6)	Exhibit C, Section 2.5.1	**Potentially feasible WMSs may include, but are not limited to:** conservation; drought management; reuse; management of existing supplies; conjunctive use; acquisition of available existing supplies; development of new water supplies; developing regional water supply facilities or providing regional management of water supply facilities; developing large-scale desalination facilities for seawater or brackish groundwater that serve local or regional brackish groundwater production zones identified and designated under TWC, 16.060(b)(5); voluntary transfer of water within the region using, but not limited to, contracts, water marketing, regional water banks, sales, leases, options, subordination agreements, and financing agreements; emergency transfers of water under TWC, 11.139; interbasin transfers of surface water; system optimization; reallocation of reservoir storage to new uses; enhancements of yields; improvements to water quality; new surface water supply; new groundwater supply, brush control; precipitation enhancement; aquifer storage and recovery; cancellation of water rights; and rainwater harvesting.	Chapter 5
76	Contract Scope of Work Task 5A	Exhibit C, Section 2.5.1	The IPP and final adopted RWP must include the documented process used by the RWPG to identify potentially feasible WMS.	Attachment 5-1
77	Contract Scope of Work Task 5A	Exhibit C, Section 2.5.1	The IPP and final adopted RWP must include a list or table of all identified WMSs that were considered potentially feasible, to date, for meeting a need in the region per 31 TAC § 357.12(b). RWPGs must consider the potentially feasible WMSs listed in Exhibit C, Section 2.5.1.	Attachment 5-2
78	Contract Scope of Work, Task 5A	Exhibit C, Section 2.5.1	Identify those potentially feasible WMSs, if any, that, in addition to providing water supply, could potentially provide non-trivial flood mitigation benefits or that might be the best potential candidates for exploring ways that they might be combined with flood mitigation features to leverage planning efforts to achieve potential cost savings or other combined water supply and flood mitigation benefits. The work required to identify these WMSs will be based entirely on a high-level, qualitative assessment and should not require modeling or other additional technical analyses.	Chapter 5
79	§ 357.34(d)	Exhibit C, Section 2.5.2; SOW Task 5B	All recommended WMSs and WMSPs that are entered into the State Water Planning Database shall be designed to reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or develop, deliver or treat additional water supply volumes to WUGs or WWPs in at least one planning decade such that additional water is available during Drought of Record conditions. Any other RWPG recommendations regarding permit modifications, operational changes, and/or other infrastructure that are not designed to reduce the consumption of water, reduce the loss or waste of water, improve the efficiency in the use of water, or develop, deliver or treat additional water supply volumes to WUGs or WWPs in at least one Planning Decade such that additional water is available during Drought of Record conditions shall be indicated as such and presented separately in the RWP and shall not be eligible for funding from the State Water Implementation Fund for Texas.	Chapter 5
80	§ 357.34(e)(1)	Exhibit C, Section 2.5.2; SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include the following analyses:]** For the purpose of evaluating potentially feasible WMSs, the Commission's most current Water Availability Model with assumptions of no return flows and full utilization of senior water rights, is to be used. Alternative assumptions may be used with written approval from the EA who shall consider a written request from a RWPG to use assumptions other than no return flows and full utilization of senior water rights.	Appendix A
81	Contract Exhibit C, Section 2.5.2.1		For surface water WMSs, the RWP must clearly indicate which, if any, WMSs are assumed to rely on or to mutually exclude another WMS(s) and explain how the interaction may impact both the estimated future water availability and the future water supply associated with each WMS.	N/A
82	Contract Exhibit C, Section 2.5.2.1		Potential future operation of multiple reservoirs as a new system, or changes to current operational procedures for existing reservoir systems, in order to provide additional yield may be evaluated as a potential WMS. Such a WMS analysis shall adequately describe methods used to calculate these future system gains (to be permitted) and shall include discussion regarding any associated permit changes that would be required.	No proposed new system operations

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83	**§ 357.34(e)(2)**	SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include the following analyses:]** An equitable comparison between and consistent evaluation and application of all WMSs the RWPGs determine to be potentially feasible for each water supply need.	Chapter 5 and Attachment 5-2
84	**§ 357.34(e)(3)(A)**	Exhibit C, Sections 2.5.2; 2.5.2.12; 2.5.2.14; SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include: a quantitative reporting of]** The net quantity, reliability, and cost of water delivered and treated for the end user's requirements during Drought of Record conditions, taking into account and reporting anticipated strategy water losses, incorporating factors used in calculating infrastructure debt payments and may include present costs and discounted present value costs. Costs do not include costs of infrastructure associated with distribution of water within a WUG after treatment, except for specific, limited allowances for direct reuse and conservation WMSs.	Chapter 5, Attachement 5-2 and 5-3 , Appendix C
85	**Contract Exhibit C, Section 2.5.2**		***[Related to § 357.34(e)(3)(A):]*** WMSs shown as providing a supply in a planning decade, must come online, with a reliable supply, in or prior to that initial decade year (31 TAC §357.10(21)).	All WMSs are shown coming online in or prior to the initial decade year of when the supply is needed
86	**Contract Exhibit C, Section 2.5.2**	SOW Task 5B	***[Related to § 357.34(e)(3)(A):]*** Water quantities produced by recommended WMSs and WMSPs must be based on water availability in accordance with Section 2.3 of Exhibit C, including firm yield under Drought of Record conditions.	Water quantities produced by recommended WMSs and WMSPs were based on water availability in accordance with Section 2.3 of Exhibit C
87	**Contract Exhibit C, Section 2.5.2.9**	SOW Task 5B	***[Related to § 357.34(e)(3)(A):]*** Estimated water losses associated with each WMS must be presented in the IPP and final adopted RWP. Water losses may be presented as a calculated percent water loss included in each strategy evaluation or a range of estimated losses by strategy type.	N/A, no WMS with advanced treatment that need to account for losses
88	**§ 357.34(e)(3)(B)**	Exhibit C, Section 2.5.2.10; SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include: a quantitative reporting of]** PART I: Environmental factors including effects on environmental water needs, wildlife habitat, cultural resources, and effect of upstream development on bays, estuaries, and arms of the Gulf of Mexico.	Appendix D
89	**§ 357.34(e)(3)(B)**	Exhibit C, Section 2.5.2.10; SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include: a quantitative reporting of]** PART II: Evaluations of effects on environmental flows shall include consideration of the Commission's adopted environmental flow standards under 30 Texas Administrative Code Chapter 298 (relating to Environmental Flow Standards for Surface Water). If environmental flow standards have not been established, then environmental information from existing site-specific studies, or in the absence of such information, state environmental planning criteria adopted by the Board for inclusion in the State Water Plan after coordinating with staff of the Commission and the Texas Parks and Wildlife Department to ensure that WMSs are adjusted to provide for environmental water needs including instream flows and bays and estuaries inflows.	Appendix D
90	**§ 357.34(e)(3)(C)**	Exhibit C, Section 2.5.2.10; SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include: a quantitative reporting of]** impacts to agricultural resources.	Appendix D
91	**§ 357.34(e)(4)**	Exhibit C, Section 2.5.2.10; SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include:]** Discussion of the plan's impact on other water resources of the state including other WMSs and groundwater and surface water interrelationships.	Chapter 6
92	**§ 357.34(e)(5)**	Exhibit C, Section 2.5.2.10; SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include:]** A discussion of each threat to agricultural or natural resources identified pursuant to § 357.30(7) of this title (relating to Description of the Regional Water Planning Area) including how that threat will be addressed or affected by the water management strategies evaluated.	Chapter 6
93	**§ 357.34(e)(6)**	Exhibit C, Section 2.5.2.11; SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include:]** If applicable, consideration and discussion of the provisions in Texas Water Code § 11.085(k)(1) for interbasin transfers of surface water. At minimum, this consideration shall include a summation of water needs in the basin of origin and in the receiving basin.	There are no new interbasin strategies for Region B
94	**§ 357.34(e)(7)**	Exhibit C, Section 2.5.2.10; SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include:]** Consideration of third-party social and economic impacts resulting from voluntary redistributions of water including analysis of third-party impacts of moving water from rural and agricultural areas.	Chapter 6

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95	**§ 357.34(e)(8)**	Exhibit C, Section 2.5.2.10; SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include:]** A description of the major impacts of recommended WMSs on key parameters of water quality identified by RWPGs as important to the use of a water resource and comparing conditions with the recommended WMSs to current conditions using best available data.	Chapter 6
96	**§ 357.34(e)(9)**	Exhibit C, Section 2.5.2.10; SOW Task 5B	**[Evaluations of potentially feasible WMSs and associated projects shall include:]** Other factors as deemed relevant by the RWPG including recreational impacts.	Chapter 6
97	**§ 357.34(f)**		RWPGs shall evaluate and present potentially feasible WMSs and WMSPs with sufficient specificity to allow state agencies to make financial or regulatory decisions to determine consistency of the proposed action before the state agency with an approved RWP.	Chapter 5, Attachment 5-3, Appendix C
98	**§ 357.34(g)(1)(A)**	Exhibit C, Section 2.5.2.7; SOW Task 5B	Implementation of large recommended WMSs and associated WMSPs. **[For large recommended WMSs and associated WMSPs, RWPGs must include the following information:]** expenditures of sponsor money;	Chapter 5, Appendix C
99	**§ 357.34(g)(1)(B)**	Exhibit C, Section 2.5.2.7; SOW Task 5B	**[For large recommended WMSs and associated WMSPs, RWPGs must include the following information:]** permit applications, including the status of a permit application; and	Chapter 5
100	**§ 357.34(g)(1)(C)**	Exhibit C, Section 2.5.2.7; SOW Task 5B	**[For large recommended WMSs and associated WMSPs, RWPGs must include the following information:]** status updates on the phase of construction of a project.	Chapter 5
101	**§ 357.34(g)(2)**	Exhibit C, Section 2.5.2.7; SOW Task 5B	The implementation status must be provided for the following types of recommended WMSs with any online decade: • All reservoir strategies (including major and minor reservoirs) • All seawater desalination strategies • Direct potable reuse strategies that provide greater than 5,000 acre-feet per year (AFY) of supply in any planning decade • Brackish groundwater strategies that provide greater than 10,000 AFY of supply in any planning decade • Aquifer storage and recovery strategies that provide greater than 10,000 AFY in any decade • All water transfers from out of state • Any other innovative technology projects the RWPG considers appropriate	Chapter 5 (applies only to Lake Ringgold)
102	**Contract Scope of Work, Task 5B**	Exhibit C, Section 2.5.2.7; SOW Task 5B	Documentation of the implementation status addressing rule 357.34(g), must be included in a separate Chapter 5 subsection. The subsection must include 1) the implementation status in table format, using the TWDB provided table template, and 2) a simple, graphic, showing the full planning horizon, and displaying separate timeline/schedules for each project in accordance with Exhibit C, Section 2.5.2.7. **Planning groups are required to use the TWDB table template in the 2026 RWP Exhibit C Tables Excel file for this subsection.**	Chapter 5
103	**§ 357.34(h)**	Exhibit C, Section 2.5.2.8; SOW Task 5B	If an RWPG does not recommend aquifer storage and recovery strategies, seawater desalination strategies, or brackish groundwater desalination strategies it must document the reason(s) in the RWP.	Chapter 5
104	**§ 357.34(i)**	Exhibit C, Section 2.5.2.4; SOW Task 5B	In instances where an RWPG has determined there are significant identified Water Needs in the RWPA, the RWP shall include an assessment of the potential for aquifer storage and recovery to meet those Water Needs. Each RWPG shall define the threshold to determine whether it has significant identified Water Needs. Each RWP shall include, at a minimum, a description of the methodology used to determine the threshold of significant needs. If a specific assessment is conducted, the assessment may be based on information from existing studies and shall include minimum parameters as defined in contract guidance.	Chapter 5
105	**Contract Exhibit C, Section 2.5.2.4**		Aquifer storage and recovery WMS evaluations must report the expected percent of recovery for the ASR projects and must present that expected, lesser volume as the net water supply yield for the project.	N/A
106	**§ 357.34(j)**	Exhibit C, Section 2.5.2.5-6; SOW Task 5B and 5C	Conservation, Drought Management Measures, and Drought Contingency Plans shall be considered by RWPGs when developing the regional plans, particularly during the process of identifying, evaluating, and recommending WMSs. RWPs shall incorporate water conservation planning and drought contingency planning in the RWPA.	Chapter 5, Chapter 7

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107	**§ 357.34(j)(1)**	Exhibit C, Section 2.5.2.6 and 2.5.2.8; SOW Task 5B	Drought Management Measures including water demand management. **RWPGs shall consider Drought Management Measures for each need identified in § 357.33 of this title and *shall include such measures* for each user group to which Texas Water Code § 11.1272 (relating to Drought Contingency Plans for Certain Applicants and Water Right Holders) applies**. Impacts of the Drought Management Measures on Water Needs must be consistent with guidance provided by the Commission in its administrative rules implementing Texas Water Code § 11.1272. **If an RWPG does not adopt a drought management strategy for a need it must document the reason in the RWP.** *Drought management measures are defined in 31 TAC §357.10(9) as demand management activities to be implemented during drought that may be evaluated and included as Water Management Strategies.*	Chapter 5, Chapter 7
108	**§ 357.34(j)(2)**	Exhibit C, Section 2.5.2.5; SOW Task 5B and 5C	Water conservation practices. RWPGs must consider water conservation practices, including potentially applicable best management practices, for each identified water need.	Chapter 5
109	**§ 357.34(j)(2)(A)**	Exhibit C, Section 2.5.2.5; SOW Task 5B and 5C	**RWPGs shall include water conservation practices for each user group to which Texas Water Code § 11.1271 and § 13.146 (relating to Water Conservation Plans) apply.** The impact of these water conservation practices on water needs must be consistent with requirements in appropriate Commission administrative rules related to Texas Water Code § 11.1271 and § 13.146. *Water conservation measures (practices) are defined in 31 TAC §357.10(36) as practices, techniques, programs, and technologies that will protect water resources, reduce the consumption of water, reduce the loss or waste of water, or improve the efficiency in the use of water that may be presented as Water Management Strategies, so that a water supply is made available for future or alternative uses.*	Chapter 5 and Chapter 6
110	**§ 357.34(j)(2)(B)**	Exhibit C, Section 2.5.2.5 and 2.5.2.8; SOW Task 5B and 5C	RWPGs shall consider water conservation practices for each WUG beyond the minimum requirements of subparagraph (A) of this paragraph, whether or not the WUG is subject to Texas Water Code § 11.1271 and § 13.146. **If RWPGs do not adopt a water conservation strategy to meet an identified need, they shall document the reason in the RWP.**	Chapter 5
111	**§ 357.34(j)(2)(C)**	Exhibit C, Section 2.5.2.5 and Section 2.5.2.11; SOW Task 5B and Task 5C	For each WUG or WWP that is to obtain water from a proposed interbasin transfer to which Texas Water Code § 11.085 (relating to Interbasin Transfers) applies, RWPGs shall include a Water Conservation Strategy, pursuant to Texas Water Code § 11.085(l), that will result in the highest practicable level of water conservation and efficiency achievable. For these strategies, RWPGs shall determine and report projected water use savings in gallons per capita per day based on its determination of the highest practicable level of water conservation and efficiency achievable. RWPGs shall develop conservation strategies based on this determination. In preparing this evaluation, RWPGs shall seek the input of WUGs and WWPs as to what is the highest practicable level of conservation and efficiency achievable, in their opinion, and take that input into consideration. RWPGs shall develop water conservation strategies consistent with guidance provided by the Commission in its administrative rules that implement Texas Water Code § 11.085. When developing water conservation strategies, the RWPGs must consider potentially applicable best management practices. Strategy evaluation in accordance with this section shall include a quantitative description of the quantity, cost, and reliability of the water estimated to be conserved under the highest practicable level of water conservation and efficiency achievable.	N/A, there are no IBTs in Region B
112	**§ 357.34(j)(2)(D)**	Exhibit C, Section 2.5.2.5; SOW Task 5A and 5C	RWPGs shall consider strategies to address any issues identified in the information compiled by the Board from the water loss audits performed by retail public utilities pursuant to § 358.6 of this title (relating to Water Loss Audits).	Chapter 5
113	**Contract Scope of Work, Task 5C**	Exhibit C, Section 2.5.2.5	RWPGs must develop water loss mitigation WMSs distinctly separate from water use reduction WMSs.	Chapter 5, Attachment 5-3 (RRA water loss mitigation is a separate WMS rom water conservation through demand reduction)
114	**Contract Exhibit C, Section 2.5.2.14**		***[Related to § 357.34(e)(3)(A):]*** Regional and state water plans may not include the cost of distribution of water within a WUG service area. The exception regarding the inclusion of costs associated with Conservation - water loss mitigation projects may only include the costs specifically listed in Contract Exhibit C, Section 2.5.2.14.	The cost of distribution of water within a WUG service area was not included in the Region B Water Plan.

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115	**Contract Exhibit C, Section 2.5.2.14**		If the distribution line replacement for the water conservation strategy is subject to adopted utility standard minimum size requirements that exceed two standard pipe diameters, the water management strategy evaluation must note the specific utility standard and include 1) a map of the proposed line replacement; and 2) detailed water loss calculations before and after the proposed line replacement.	N/A
116	**§ 357.34(j)(3)**	Exhibit C, Section 2.5.5; SOW Task 5C	RWPGs shall recommend Gallons Per Capita Per Day goal(s) for each municipal WUG or specified groupings of municipal WUGs. Goals must be recommended for each planning decade and may be a specific goal or a range of values. At a minimum, the RWPs shall include Gallons Per Capita Per Day goals based on drought conditions to align with guidance principles in §358.3 of this title (relating to Guidance Principles).	Chapter 5, Attachment 5-4
117	**§ 357.34(k)**	Exhibit C, Section 2.5.5; SOW Task 5C	RWPs shall include a subchapter consolidating the RWPG's recommendations regarding water conservation. RWPGs shall include in the RWPs model water conservation plans pursuant to Texas Water Code § 11.1271.	Chapter 5 and https://regionbwater.org/
118	**Contract Exhibit C, Section 2.5.2.3**		RWPGs must evaluate potential future sources of direct and/or indirect reuse that will require new permits and additional reclamation infrastructure as WMSs and must provide adequate justification to explain methods for estimating the amount of future direct and/or indirect reuse water available from such sources, including consideration of the population/demand projections for each decade associated with the WMS.	Chapter 5
119	**Contract Exhibit C, Section 2.5.2.14**		***[Related to § 357.34(e)(3)(A):]*** Regional and state water plans may not include the cost of distribution of water within a WUG service area. The exception regarding the inclusion of costs associated with direct reuse projects may only include the costs specifically listed in Contract Exhibit C, Section 2.5.2.14.	The cost of distribution of water within a WUG service area was not included in the Region B Water Plan.
120	**Contract Exhibit C, Section 2.5.2.13**	SOW Task 5B	RWPGs must utilize this WMSP costing tool for every cost estimate presented in the RWPs [in the absence of more accurate and detailed, project-specific cost estimates], including updating project cost estimates previously developed in the 2021 RWPs. RWPGs must present the costing tool's standardized, automated cost output report for each WMSP evaluated in the IPP and final adopted RWP. If a different format is utilized, the RWPG must apply the data and procedures used in the costing tool, and present the resulting output as analogous to the costing tool, for example breaking out capital cost estimates for each project component.	Appendix C
121	**Contract Exhibit C, Section 2.5.2.12**		Costs of WMSPs must be prepared and presented separately and discretely for each separate WMSP and may not be aggregated and presented as a single capital cost representing multiple WMSPs that would actually be located in multiple locations and funded by separate sponsors or implemented separately. Each project with a capital cost should have an associated volume of water or annual capacity presented in the plan. RWPGs may not, in general, aggregate multiple facilities into a single cost estimate and then allocate shares of the resulting total cost, for example, pro rata across several entities or locations.	Appendix C
122	**Contract Exhibit C, Section 2.5.2.12**		The plan must present the following capital costs for each WMSP, as applicable: construction costs, engineering and feasibility studies, legal assistance, financing, bond counsel and contingencies (30% total for pipeline projects, 35% for other unless more detailed info available); permitting and mitigation activities, land purchase costs not associated with mitigation; easement costs; and purchases of water rights.	Appendix C
123	**Contract Exhibit C, Section 2.5.2.12**		Construction costs, if applicable, must be based on September 2023 price indices for commodities such as cement and steel as reported in the Engineering News Record (ENR) Construction Cost Index.	Appendix C
124	**Contract Exhibit C, Section 2.5.2.12**		Capital costs and land areas associated with development of reservoirs must be broken out to show separate lines items for 1) the land area of the reservoir footprint (conservation pool only) alongside the estimated land purchase cost; 2) mitigation land area and associated estimate of purchase cost; and, 3) construction costs of embankment/dam facilities (separate from transmission facilities).	Chapter 5 and Appendix C
125	**Contract Exhibit C, Section 2.5.2.12**		For WMSs other than reservoirs the length of debt service is 20 years unless otherwise justified. For reservoirs, the period is 40 years. Level debt service applies to all projects, and the annual interest rate for project financing is 3.5 percent. Terms of debt service must be reported in the evaluation of each project.	Appendix C

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126	**Contract Exhibit C, Section 2.5.2.12**		Operations and maintenance unit costs shall be based on the associated quantity of water supplied. Unless more accurate, project-specific data are accessible, RWPGs shall calculate annual operating and maintenance costs as 1.0 percent of total estimated construction cost for pipelines, 2.5 percent of estimated construction costs for pump stations, and 1.5 percent of estimated construction costs for dams. Costs must include labor and materials required to maintain projects such as regular repair and/or replacement of equipment. Power costs shall be calculated on an annual basis using calculated horsepower input and a power purchase cost of $0.09 per kilowatt hour; however, **each RWPG may adjust this figure based on local and regional conditions if they specify and document their reasons**. RWPGs shall include costs of water if WMSs involve purchases of raw or treated water on an annual basis (e.g. leases of water rights).	Appendix C
127	**Contract Exhibit C, Section 2.5.2.12**		At a minimum, annual costs should be presented by debt service, operation and maintenance cost as a percentage of total construction cost, power costs, and cost of purchasing water (if applicable). If precise information on the cost of purchasing water is not available, the plan should include a best estimate (e.g., as a percent markup) or an estimated range of the raw or treated water cost and the water management strategy evaluation can state the average cost is an estimate.	Appendix C
128	**Contract Exhibit C, Section 2.5.2.12**		The RWP must present the unit costs of the net volume of water anticipated to be delivered to water users (after water losses) in dollars per acre-foot. Unit costs of WMSs must be evaluated, compared, and presented in an 'apples-to-apples' manner.	Appendix C
129	**Contract Exhibit C, Section 2.5.2.15**		If an infrastructure component is not required to increase the treated water supply volume delivered to an entity either as new supply or through demand reduction, then the component and its costs may not be included in the RWP. **Infrastructure costs that may not be included in RWP are listed in Exhibit C, Section 2.5.2.15.**	Project components or costs that do not increase treated water supplies were not included in the Region B Water Plan.
130	**Contract Scope of Work, Task 5B**	**Contract Exhibit C, Section 2.5.2**	***[Related to technical evaluations:]*** WMS and WMSP documentation must include a strategy description, discussion of associated facilities, project map, and technical evaluation addressing all considerations and factors required under 31 TAC §357.34(e)-(i) and §357.35. If an identified potentially feasible WMS is, at any point, determined to be not potentially feasible by the planning group and therefore not evaluated, the plan must provide documentation of why the WMS was not evaluated.	Chapter 5, electronic GIS deliverable
131	**Contract Scope of Work, Task 5B**	**Contract Exhibit C, Section 2.5.4**	[If applicable] Alternative water management strategies must be fully evaluated in accordance with 31 TAC §357.34(e)-(i). Technical evaluations of alternative WMSs must be included in the plans and the data associated with alternative WMS must be entered into DB27. Technical evaluations of each alternative WMS must have a generally defined delivery point for the water.	N/A. No alternative WMS in Region B
132	**Contract Scope of Work, Task 5B**		RWPGs must evaluate all WMSs that were scoped by the RWPG under Task 5B. Analyses of each of those potentially feasible WMSs must be presented in the plan; even if a WMS analysis is brief (i.e., ended up not being fully evaluated for reasons of ultimately being found infeasible.) This includes technical evaluations of all WMSs that were evaluated but not recommended.	Chapter 5
Header	**§ 357.35**	**SOW Task 5B**	**Recommended and Alternative Water Management Strategies and Projects**	
133	**§ 357.35(a)**	Contract Exhibit C, Section 2.5.4; Scope of Work, Task 5B	RWPGs shall recommend WMSs and the WMSPs required to implement those WMSs to be used during a Drought of Record based on the potentially feasible WMSs evaluated under § 357.34 of this title (relating to Identification and Evaluation of Potentially Feasible Water Management Strategies and Water Management Strategy Projects).	Chapter 5
134	**§ 357.35(b)**	Contract Exhibit C, Section 2.5.4; Scope of Work, Task 5B	RWPGs shall recommend specific water management strategies based upon the identification, analysis, and comparison of water management strategies by the RWPG that the RWPG determines are potentially feasible so that the cost effective water management strategies that are environmentally sensitive are considered and adopted unless a RWPG demonstrates that adoption of such strategies is inappropriate. To determine cost-effectiveness and environmental sensitivity, RWPGs shall follow processes described in § 357.34 of this title. The RWP may include alternative water management strategies evaluated by the processes described in § 357.34 of this title.	Chapter 5, Appendix C
135	**§ 357.35(c)**	Contract Exhibit C, Section 2.5.4	Strategies shall be selected by the RWPGs so that cost effective water management strategies, which are consistent with long-term protection of the state's water resources, agricultural resources, and natural resources are adopted.	Chapter 5, Appendix C

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136	§ 357.35(d)	Contract Exhibit C, Section 2.5.1	RWPGs shall identify and recommend water management strategies for all WUGs and WWPs with identified water needs and that meet all water needs during the drought of record except in cases where:	Chapter 5, Attachment 5-3
137	§ 357.35(d)(1)	Contract Exhibit C, Section 2.5.1	**[Except in cases where:]** no WMS is feasible. In such cases, RWPGs must explain why no WMS are feasible; or	N/A
138	§ 357.35(d)(2)	Contract Exhibit C, Section 2.5.1	**[Except in cases where:]** a political subdivision that provides water supply other than water supply corporations, counties, or river authorities explicitly does not participate in the regional water planning process for needs located within its boundaries or extraterritorial jurisdiction.	No applicable subdivisions in Region B
139	§ 357.35(e)		Specific recommendations of WMSs to meet an identified need shall not be shown as meeting a need for a political subdivision if the political subdivision in question objects to inclusion of the strategy for the political subdivision and specifies its reasons for such objection. This does not prevent the inclusion of the strategy to meet other needs.	No applicable subdivisions in Region B
140	§ 357.35(f)	Contract Exhibit C, Section 2.5.2	Recommended strategies shall protect existing water rights, water contracts, and option agreements, but may consider potential amendments of water rights, contracts and agreements, which would require the eventual consent of the owner.	Chapter 5
141	§ 357.35(g)(1)	Contract Exhibit C, Section 2.5.2	**[RWPGs shall report:]** Recommended WMSs, recommended WMSPs, and the associated results of all the potentially feasible WMS evaluations by WUG and MWP. If a WUG lies in one or more counties or RWPAs or river basins, data shall be reported for each river basin, RWPA, and county.	DB27 Reports
142	§ 357.35(g)(2)	Contract Exhibit C, Section 2.5.4.1	**[RWPGs shall report:]** Calculated planning management supply factors for each WUG and MWP included in the RWP assuming all recommended WMSs are implemented. This calculation shall be based on the sum of: the total existing water supplies, plus all water supplies from recommended WMSs for each entity; divided by that entity's total projected Water Demand, within the Planning Decade. The resulting calculated management supply factor shall be presented in the plan by entity and decade for every WUG and MWP. Calculating planning management supply factors is for reporting purposes only.	DB27 Reports (Report 14)
143	Contract Exhibit C, Section 2.5.4.1		RWPGs must provide an explanation for any <u>predetermined</u> management supply factors and may present these factors based, for example, on sizes of water users, types of water use, water availability conditions, types of WMSs, or any other factors the RWPG considers relevant at the project or water user level.	N/A, no predetermined management supply factors
144	§ 357.35(g)(3)		**[RWPGs shall report:]** Fully evaluated Alternative WMSs and associated WMSPs included in the adopted RWP shall be presented together in one place in the RWP.	N/A. No alternative WMS in Region B
145	Contract Scope of Work, Task 5B	Contract Exhibit C, Section 2.5.4	The IPP and final adopted RWP must include documentation of the RWPG's process for selecting recommended WMSs and associated WMSPs including development of WMS evaluations matrices and other tools required to assist the RWPG in comparing and selecting recommended WMSs and WMSPs.	Chapter 5 and Appendix D
146	Contract Exhibit C, Section 2.5.3		For any recommended water management strategies where the strategy supply volume remains 100 percent unallocated to water user groups, the RWPG must explain in the RWP why the strategy is recommended but not assigned to any beneficiaries.	N/A
147	Contract Exhibit C, Section 2.5.4		RWPGs must recommend WMSs separately from WMSPs although they are often interrelated.	DB27
Header	**§ 357.40**	**SOW Task 6**	**Impacts of Regional Water Plan**	
148	§ 357.40(a)	Exhibit C, Section 2.6.4; SOW Task 6	RWPs shall include a quantitative description of the socioeconomic impacts of not meeting the identified Water Needs pursuant to § 357.33(c) of this title (relating to Needs Analysis: Comparison of Water Supplies and Demands).	Chapter 6 and Appendix E
149	§ 357.40(b)(1)	Exhibit C, Section 2.6.1; SOW Task 6	**[RWPs shall include a description of the impacts of the RWP regarding:]** Agricultural resources pursuant to § 357.34(e)(3)(C) of this title (relating to Identification and Evaluation of Potentially Feasible Water Management Strategies);	Chapter 6
150	§ 357.40(b)(2)	Exhibit C, Section 2.6.1; SOW Task 6	**[RWPs shall include a description of the impacts of the RWP regarding:]** Other water resources of the state including other water management strategies and groundwater and surface water interrelationships pursuant to § 357.34(e)(4) of this title;	Chapter 6
151	§ 357.40(b)(3)	Exhibit C, Section 2.6.1; SOW Task 6	**[RWPs shall include a description of the impacts of the RWP regarding:]** Threats to agricultural and natural resources identified pursuant to § 357.34(e)(5) of this title;	Chapter 6

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152	**§ 357.40(b)(4)**	Exhibit C, Section 2.6.1; SOW Task 6	**[RWPs shall include a description of the impacts of the RWP regarding:]** Third-party social and economic impacts resulting from voluntary redistributions of water including analysis of third-party impacts of moving water from rural and agricultural areas pursuant to § 357.34(e)(7) of this title;	Chapter 6
153	**§ 357.40(b)(5)**	Exhibit C, Section 2.6.1; SOW Task 6	**[RWPs shall include a description of the impacts of the RWP regarding:]** Major impacts of recommended water management strategies on key parameters of water quality pursuant to § 357.34(e)(8) of this title; and	Chapter 6
154	**§ 357.40(b)(6)**	Exhibit C, Section 2.6.1; SOW Task 6	**[RWPs shall include a description of the impacts of the RWP regarding:]** Effects on navigation.	Chapter 6 - The Region B Plan does not have an impact on navigation
155	**§ 357.40(c)**	Exhibit C, Section 2.6.3; SOW Task 6	RWPs shall include a summary of the identified water needs that remain unmet by the RWP.	Chapter 6
156	**§ 357.50(j)**	Contract Exhibit C, Section 2.6.3	The RWPGs must provide adequate justification of any unmet municipal needs. **For each municipal WUG with unmet needs, the RWPG shall include**: 1. documentation that all potentially feasible WMS were considered to meet the need, including drought management WMS; 2. explanations as to why additional conservation and/or drought management WMS were not recommended to address the need; 3. descriptions of how, in the event of a repeat of the drought of record, the WUG associated with the unmet need shall ensure the public health, safety, and welfare in each planning decade with an unmet need; and, 4. explanation as to whether there may be occasion, prior to the development of the next IPP, to amend the RWP to address all or a portion of the unmet municipal need.	Chapter 6
Header	**§ 357.41**	**SOW Task 6**	**Consistency with Long-Term Protection of Water Resources, Agricultural Resources, and Natural Resources**	
157	**§ 357.41**	Exhibit C, Section 2.6.2, SOW Task 6	RWPGs shall describe how RWPs are consistent with the long-term protection of the state's water resources, agricultural resources, and natural resources as embodied in the guidance principles in § 358.3(4) and (8) of this title (relating to Guidance Principles).	Chapter 6
Header	**§ 357.42**	**SOW Task 7**	**Drought Response Information, Activities, and Recommendations**	
158	**§ 357.42(a)**	Exhibit C, Section 2.7; SOW Task 7	RWPs shall consolidate and present information on current and planned preparations for, and responses to, drought conditions in the region including, but not limited to, drought of record conditions based on the following subsections.	Chapter 7
159	**Contract Exhibit C, Section 2.7.1**	Exhibit C, Section 2.7.1; SOW Task 7	The RWP must present and summarize information regarding the current Drought(s) of Record for the region and any other relevant sub-regional or basin-specific drought of record periods that impact the existing RWPA water supplies. This summary may include relevant sub-regional, basin-based, and/or sub-basin droughts of record.	Chapter 7
160	**§ 357.42(b)(1)**	Exhibit C, Section 2.7.3; SOW Task 7	**[RWPGs shall conduct an assessment of current preparations for drought within the RWPA. This may include information from local Drought Contingency Plans. The assessment shall include]:** A description of how water suppliers in the RWPA identify and respond to the onset of drought; and	Chapter 7
161	**§ 357.42(b)(2)**	Exhibit C, Section 2.7.3; SOW Task 7	**[RWPGs shall conduct an assessment of current preparations for drought within the RWPA. This may include information from local Drought Contingency Plans. The assessment shall include]:** Identification of unnecessary or counterproductive variations in drought response strategies among water suppliers that may confuse the public or impede drought response efforts. At a minimum, RWPGs shall review and summarize drought response efforts for neighboring communities including the differences in the implementation of outdoor watering restrictions.	Chapter 7
162	**§ 357.42(c)(1); § 357.42(c)(3)**	Exhibit C, Section 2.7.4; SOW Task 7	**[RWPGs shall identify drought response triggers and actions regarding the management of existing groundwater and surface water sources in the RWPA designated in accordance with § 357.32, including:]** Factors specific to each source of water supply to be considered in determining whether to initiate a drought response for each water source including specific recommended drought response triggers. *Triggers and actions developed in paragraphs (1) and (2) of this subsection may consider existing triggers and actions associated with existing drought contingency plans.*	Chapter 7

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163	**§ 357.42(c)(2); § 357.42(c)(3)**	Exhibit C, Section 2.7.4; SOW Task 7	**[RWPGs shall identify drought response triggers and actions regarding the management of existing groundwater and surface water sources in the RWPA designated in accordance with § 357.32, including:]** Actions to be taken as part of the drought response by the manager of each water source and the entities relying on each source, including the number of drought stages. *Triggers and actions developed in paragraphs (1) and (2) of this subsection may consider existing triggers and actions associated with existing drought contingency plans.*	Chapter 7
164	**§ 357.42(d)**	Exhibit C, Section 2.7.5; SOW Task 7	RWPGs shall collect information on existing major water infrastructure facilities that may be used for interconnections in event of an emergency shortage of water. **At a minimum, the RWP shall include a general description of the methodology used to collect the information, the number of existing and potential emergency interconnects in the RWPA, and a list of which entities are connected to each other.** In accordance with Texas Water Code §16.053(r), certain information regarding water infrastructure facilities is excepted from the Public Information Act, Texas Government Code, Chapter 552. Any excepted information collected shall be submitted separately to the EA in accordance with guidance to be provided by EA.	Chapter 7
165	**§ 357.42(e)**	Exhibit C, Section 2.7.5; SOW Task 7	RWPGs may provide general descriptions of local Drought Contingency Plans that involve making emergency connections between water systems or WWP systems that do not include locations or descriptions of facilities that are disallowed under subsection (d) of this section.	Chapter 7
166	**§ 357.42(f)(1)**	Exhibit C, Section 2.7.6; SOW Task 7	**[RWPGs may designate recommended and alternative drought management water management strategies and other recommended drought measures in the RWP, including:]** List and description of the recommended drought management water management strategies and associated WUGs and WWPs, if any, that are recommended by the RWPG. Information to include associated triggers to initiate each of the recommended drought management water management strategies;	N/A, there are no drought water management strategies in Region B
167	**§ 357.42(f)(2)**	Exhibit C, Section 2.7.6; SOW Task 7	**[RWPGs may designate recommended and alternative drought management water management strategies and other recommended drought measures in the RWP, including:]** List and description of alternative drought management water management strategies and associated WUGs and WWPs, if any, that are included in the plan. Information to include associated triggers to initiate each of the alternative drought management water management strategies;	N/A, there are no drought water management strategies in Region B
168	**§ 357.42(f)(3)**	Exhibit C, Section 2.7.6; SOW Task 7	**[RWPGs may designate recommended and alternative drought management water management strategies and other recommended drought measures in the RWP, including:]** List of all potentially feasible drought management water management strategies that were considered or evaluated by the RWPG but not recommended; and	N/A, there are no drought water management strategies in Region B
169	**§ 357.42(f)(4)**	Exhibit C, Section 2.7.8; SOW Task 7	**[RWPGs may designate recommended and alternative drought management water management strategies and other recommended drought measures in the RWP, including:]** List and summary of any other recommended drought management measures, if any, that are included in the RWP, including associated triggers if applicable.	N/A, there are no drought water management strategies in Region B
170	**§ 357.42(g)**	Exhibit C, Section 2.7.7; SOW Task 7	The RWPGs shall evaluate potential emergency responses to local drought conditions or loss of existing water supplies; the evaluation shall include identification of potential alternative water sources that may be considered for temporary emergency use by WUGs and WWPs in the event that the existing water supply sources become temporarily unavailable to the WUGs and WWPs due to unforeseeable hydrologic conditions such as emergency water right curtailment, unanticipated loss of reservoir conservation storage, or other localized drought impacts. **RWPGs shall evaluate, at a minimum, municipal WUGs that:**	Chapter 7
171	**§ 357.42(g)(1)**	Exhibit C, Section 2.7.7	**[Evaluation includes municipal WUGS that:]** have existing populations less than 7,500;	Chapter 7
172	**§ 357.42(g)(2)**	Exhibit C, Section 2.7.7	**[Evaluation includes municipal WUGS that:]** rely on a sole source for its water supply regardless of whether the water is provided by a WWP; and	Chapter 7
173	**§ 357.42(g)(3)**	Exhibit C, Section 2.7.7	**[Evaluation includes municipal WUGS that:]** all county-other WUGs.	Chapter 7

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174	**Contract Exhibit C, Section 2.7.7**		For the purpose of this [emergency responses to local drought conditions or loss of municipal supply] analysis, it will be assumed that the entities being evaluated have approximately 180 days or less of water supply remaining.	Chapter 7
175	**§ 357.42(h)**	Exhibit C, Section 2.7.8	RWPGs shall consider any relevant recommendations from the Drought Preparedness Council.	Chapter 7
176	**§ 357.42(i)(1)**	Exhibit C, Section 2.7.8	**[RWPGs may make drought preparation and response recommendations regarding:]** Development of, content contained within, and implementation of local drought contingency plans required by the Commission;	Chapter 7, https://regionbwater.org/
177	**§ 357.42(i)(2)(A)**	Exhibit C, Section 2.7.8	**[RWPGs may make drought preparation and response recommendations regarding:]** Current drought management preparation in the RWPA including: drought response triggers; and	Chapter 7
178	**§ 357.42(i)(2)(B)**	Exhibit C, Section 2.7.8	**[RWPGs may make drought preparation and response recommendations regarding:]** Current drought management preparation in the RWPA including: responses to drought conditions;	Chapter 7
179	**§ 357.42(i)(3)**	Exhibit C, Section 2.7.8	**[RWPGs may make drought preparation and response recommendations regarding:]** The Drought Preparedness Council and the State Drought Preparedness Plan; and	Chapter 7
180	**§ 357.42(i)(4)**	Exhibit C, Section 2.7.8	**[RWPGs may make drought preparation and response recommendations regarding:]** Any other general recommendations regarding drought management in the region or state.	Chapter 7
181	**§ 357.42(j)**	Exhibit C, Section 2.7.9; SOW Task 7	The RWPGs shall develop region-specific model drought contingency plans.	Chapter 7, https://regionbwater.org/
182	**Contract Exhibit C, Section 2.7.9**	SOW Task 7	At a minimum, **two model plans must be developed** and may be based, for example, on different water use categories, user sizes, and/or types of water source. Model plans for municipal users must address triggers for and responses to severe and critical/emergency drought conditions. It is at the discretion of the RWPG on the type of models plans developed but is recommended that RWPGs develop plans that would be of use to the types of water users within the RWPA.	Chapter 7, https://regionbwater.org/
183	**Contract Scope of Work, Task 7**	Exhibit C, Section 2.7.2	Include a separate Chapter 7 subsection that provides documentation of how the planning group addressed uncertainties in the RWP (if applicable), how the planning group addressed a drought worse than the DOR in the RWP (if applicable), and potential measures and responses that would likely be available to users in the region, in the event of a drought worse than the DOR.	Chapter 7
184	**Contract Exhibit C, Section 2.7.2**		Summarize, in general, how the region incorporated planning for uncertainty in its RWP and the region's basis, or policy, for inclusion. This could include general discussion on planning factors, any drivers of uncertainty associated with those factors, and how the RWPG made planning decisions to acknowledge or address that uncertainty. If the RWP does not include any measures to address uncertainty, this subsection must include a statement to that effect.	Chapter 7
185	**Contract Exhibit C, Section 2.7.2**		Summarize, in general, the key assumptions, analyses, strategies, and projects that are already included in the 2026 RWP calculations and recommendations (if applicable) that go beyond just meeting identified water needs anticipated under a DOR (i.e., those things that will provide some additional measure of protection to withstand a DWDOR such as use of safe-yield or inclusion of strategies that provide water volumes in excess of the identified water need, such as management supply factor, etc.). The summary should include describing which water users in the region, in general, are associated with those additional measures of protection (e.g., list of WUGs and WWPs and their associated water supplies to which these assumptions apply). If the RWP does not include any planning measures to address a DWDOR, this subsection must include a statement to that effect.	Chapter 7

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186	**Contract Exhibit C, Section 2.7.2**		Summarize, in general, the potential additional types of measures and responses, that are not part of the recommendations in the 2026 RWP, but that would likely be available to certain water providers/users in the event of the near-term onset of a DWDOR and that would be capable of providing additional, potential capacity for those water providers and users to withstand a DWDOR (i.e., additional or deeper drought management measures - if not a recommended WMS - that could be employed). The summary should include describing which water providers/users in the region, in general, the additional measures and responses would be associated with (e.g., list of WUGs and WWPs and their associated water supplies to which these assumptions apply). This information may be presented at a high-level as provided in the examples in the 2026 RWP Exhibit C Tables Excel file.	Chapter 7
Header	**§ 357.43**	**SOW Task 8**	**Regulatory, Administrative, or Legislative Recommendations**	
187	**§ 357.43(a)**	Exhibit C, Section 2.8.3; SOW Task 8	The RWPs shall contain any regulatory, administrative, or legislative recommendations developed by the RWPGs.	Chapter 8
188	**§ 357.43(b)**	SOW Task 8; Exhibit C, Section 2.8.1	Ecologically Unique River and Stream Segments. RWPGs may include in adopted RWPs recommendations for all or parts of river and stream segments of unique ecological value located within the RWPA 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 recommendation package shall address each of the criteria for designation of river and stream segments of ecological value found in this subsection. The RWPG shall forward the recommendation package to the Texas Parks and Wildlife Department and allow the Texas Parks and Wildlife Department 30 days for its written evaluation of the recommendation. The adopted RWP shall include, if available, Texas Parks and Wildlife Department's written evaluation of each river and stream segment recommended as a river or stream segment of unique ecological value.	Chapter 8
189	**§ 357.43(b)(1)**	SOW Task 8; Exhibit C, Section 2.8.1	An RWPG may recommend a river or stream segment as being of unique ecological value based upon the criteria set forth in § 358.2 of this title (relating to Definitions).	Chapter 8
190	**Contract Scope of Work, Task 8**	Exhibit C, Section 2.8.1	An updated Texas Parks and Wildlife Department evaluation must be included in each RWP, even for those stream segments that have been recommended in previous plans but not designated by the Legislature.	Chapter 8
191	**Contract Exhibit C, Section 2.8.1**		If a river or stream segment has been recommended in a previous plan, the planning group may incorporate references of supporting materials developed for the previous plan into the current plan. References must be precise and include a summary of the information presented in the previous plan.	Chapter 8
192	**Contract Exhibit C, Section 2.8.1**		Recommendations regarding unique river or stream segments presented in the RWPs must be specific as to a) which unique river or stream segments have been previously designated by the legislature and b) which are being recommended for designation by the planning group.	Chapter 8
193	**§ 357.43(b)(2)**	Exhibit C, Section 2.8.1; SOW Task 8	For every river and stream segment that has been designated as a unique river or stream segment by the legislature, including during a session that ends not less than one year before the required date of submittal of an adopted RWP to the Board, or recommended as a unique river or stream segment in the RWP, the RWPG shall assess the impact of the RWP on these segments. The assessment shall be a quantitative analysis of the impact of the plan on the flows important to the river or stream segment, as determined by the RWPG, comparing current conditions to conditions with implementation of all recommended water management strategies. The assessment shall also describe the impact of the plan on the unique features cited in the region's recommendation of that segment.	Chapter 8
194	**§ 357.43(c)**	Exhibit C, Section 2.8.2; SOW Task 8	Unique Sites for Reservoir Construction. A RWPG 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 criteria at § 358.2 of this title shall be used to determine if a site is unique for reservoir construction.	Chapter 8 - Region B WPG recommends protecting the Ringgold reservoir site
195	**Contract Exhibit C, Section 2.8.2**		For recommendations regarding unique reservoir sites, the RWP must be specific as to a) which unique reservoir sites have been previously designated by the legislature; b) which are being recommended for designation by the RWPG; and c) whether the RWPG is recommending that the legislature re-designate a previously designated unique reservoir site.	Chapter 8 - Region B WPG recommends protecting the Ringgold reservoir site

2026 IPP Review Item Number	Key Requirement Citation: TWC, 31 TAC Rule, or Contract Exhibit	Corresponding Contract Guidance and SOW Task *(if applicable)*	Requirement (see published rule and other contract documents for full context)	Location(s) in Regional Plan and/or Commentary
196	**§ 357.43(d)**	Exhibit C, Section 2.8.3; SOW Task 8	Any other recommendations that the RWPG believes are needed and desirable to achieve the stated goals of state and regional water planning including to facilitate the orderly development, management, and conservation of water resources and prepare for and respond to drought conditions. This may include recommendations that the RWPG believes would improve the state and regional water planning process.	Chapter 8
197	**§ 357.43(e)**	Exhibit C, Section 2.8.3	RWPGs may develop information as to the potential impacts of any proposed changes in law prior to or after changes are enacted.	Chapter 8
198	**§ 357.43(f)**	Exhibit C, Section 2.8.3	RWPGs should consider making legislative recommendations to facilitate more voluntary water transfers in the region.	Chapter 8
199	**Contract Scope of Work, Task 8**	Exhibit C, Section 2.8.3	Receive and consider recommendations from the Interregional Planning Council to the RWPGs.	Chapter 8
Header	**§ 357.45**	**SOW Task 9**	**Implementation and Comparison to Previous RWP**	
200	**§ 357.45(a)**	Exhibit C, Section 2.9.1; SOW Task 9	RWPGs shall describe the level of implementation of previously recommended WMSs and associated impediments to implementation in accordance with guidance provided by the board. Information on the progress of implementation of all WMSs that were recommended in the previous RWP, including conservation and Drought Management WMSs; and the implementation of WMSPs that have affected progress in meeting the state's future water needs.	Appendix G - Implementation Survey
201	**§ 357.45(b)(1)**	Exhibit C, Section 2.9.2; SOW Task 9	**[RWPGs shall assess the progress of the RWPA in encouraging cooperation between WUGs for the purpose of achieving economies of scale and otherwise incentivizing WMSs that benefit the entire RWPA. This assessment of regionalization shall include:]** The number of recommended WMSs in the previously adopted and current RWPs that serve more than one WUG;	Chapter 9
202	**§ 357.45(b)(2)**	Exhibit C, Section 2.9.2; SOW Task 9	**[RWPGs shall assess the progress of the RWPA in encouraging cooperation between WUGs for the purpose of achieving economies of scale and otherwise incentivizing WMSs that benefit the entire RWPA. This assessment of regionalization shall include:]** The number of recommended WMSs in the previously adopted RWP that serve more than one WUG and have been implemented since the previously adopted RWP; and	Chapter 9
203	**§ 357.45(b)(3)**	Exhibit C, Section 2.9.2; SOW Task 9	**[RWPGs shall assess the progress of the RWPA in encouraging cooperation between WUGs for the purpose of achieving economies of scale and otherwise incentivizing WMSs that benefit the entire RWPA. This assessment of regionalization shall include:]** A description of efforts the RWPG has made to encourage WMSs and WMSPs that serve more than one WUG, and that benefit the entire region.	Chapter 9
204	**§ 357.45(c)(1)**	Exhibit C, Section 2.9.3, SOW Task 9	**[RWPGs shall provide a brief summary of how the RWP differs from the previously adopted RWP with regards to:]** Water demand projections;	Chapter 9
205	**§ 357.45(c)(2)**	Exhibit C, Section 2.9.3, SOW Task 9	**[RWPGs shall provide a brief summary of how the RWP differs from the previously adopted RWP with regards to:]** Drought of Record and hydrologic and modeling assumptions used in planning for the region;	Chapter 9
206	**§ 357.45(c)(3)**	Exhibit C, Section 2.9.3, SOW Task 9	**[RWPGs shall provide a brief summary of how the RWP differs from the previously adopted RWP with regards to:]** Groundwater and surface water availability, existing water supplies, and identified water needs for WUGs and WWPs; and	Chapter 9
207	**§ 357.45(c)(4)**	Exhibit C, Section 2.9.3, SOW Task 9	**[RWPGs shall provide a brief summary of how the RWP differs from the previously adopted RWP with regards to:]** Recommended and Alternative Water Management Strategies and Projects	Chapter 9
Header	**§ 357.50**	**SOW Task 10**	**Adoption, Submittal, and Approval of Regional Water Plans - Includes Public Participation and Notice Items relevant to IPP review**	
208	**§ 357.12(i), § 357.21(a), and § 357.21(j)**	Contract Exhibit C, Section 2.12.2	Each RWPG and any committee or subcommittee of an RWPG are subject to Chapters 551 and 552, Government Code. A copy of all materials presented or discussed at an open meeting shall be made available for public inspection prior to and following the meetings and shall meet the additional notice requirements when specifically referenced as required under other subsections. **Plan includes a statement confirming that the planning group met all requirements under the Texas Open Meetings Act and Public Information Act in accordance with 31 TAC §§357.12 and 357.21**.	Chapter 10

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209	**§ 357.50(b)**		Prior to the adoption of the RWP, the RWPGs shall submit concurrently to the EA and the public an IPP. The IPP submitted to the EA must be in the electronic and paper format specified by the EA. Each RWPG must certify that the IPP is complete and adopted by the RWPG**. In the instance of a recommended WMS proposed to be supplied from a different RWPA, the RWPG recommending such strategy shall submit, concurrently with the submission of the IPP to the EA, a copy of the IPP, or a letter identifying the WMS in the other region along with an internet link to the IPP, to the RWPG associated with the location of such strategy.**	Chapter 10
210	**§ 357.50(c)**		The RWPGs shall distribute the IPP in accordance with §357.21(h)(7) of this title (relating to Notice and Public Participation).	Chapter 10
211	**§ 357.50(g)(1)(A)**	Contract Exhibit C, Section 2.12.2; SOW, Task 10	**[RWPs shall include:]** The technical report and data prepared in accordance with this chapter and the EA's specifications;	The technical report and data were prepared in accordance with Chapter 10 and the EA specifications
212	**§ 357.50(g)(1)(B)**	Contract Exhibit C, Section 2.12.2; SOW, Task 10	**[RWPs shall include:]** An executive summary that documents key RWP findings and recommendations;	An executive summary is included documenting key RWP findings and recommendations
213	**§ 357.50(g)(1)(C)**	Contract Exhibit C, Section 2.10, Section 2.12.2; SOW, Task 10	**[RWPs shall include:]** Documentation of the RWPG's interregional coordination efforts;	There are no known interregional conflicts between RWPs.
214	**Contract Exhibit C, Section 2.13.2**		In the 2026 RWPs, the required DB27 data reports must be included in the IPP and final RWP via reference to the TWDB Database Reports application in lieu of including electronic versions of the reports as an appendix to the plan. **Each Executive Summary of the IPP and RWP must include a section that lists the DB27 reports that will be available through the TWDB Database Reports application and instructions on how the public can access the reports, including a direct hyperlink to the TWDB Database Reports application.** The DB27 reports that will be accessible in the application are listed in Contract Exhibit C, Table 3. Section 2.13.2 of Exhibit C lists the required instructions to include in the IPP and final plans. *Please note that regions may include the DB27 reports as appendices, should they choose to, but at minimum, each Executive Summary must include the SARA access information and the report list as specified in guidance.*	Executive Summary
215	**Contract Scope of Work, Task 10**	Contract Exhibit C, Section 2.10	Conduct and/or enhance existing outreach specifically to rural entities in the planning area to collect and evaluate information to support plan development, including keeping track of which rural entities were contacted by the RWPG/Consultant, which entities were not responsive to RWPG contact efforts, and including a summary of the region's rural outreach efforts in Chapter 10 of the IPP and final RWP.	Chapter 10 and Appendix J
216	**§ 357.50(g)(2)(B)**	Contract Exhibit C, Section 2.13.2	**[RWPGs shall submit RWPs to the EA according to the following schedule:]** Prior to submission of the IPP, the RWPGs shall upload all required data, metadata and all other relevant digital information supporting the plan to the Board's State Water Planning Database. All changes and corrections to this information must be entered into the Board's State Water Planning Database prior to submittal of a final adopted plan.	All required data has been uploaded
Header	**§ 357.60**		**Consistency of Regional Water Plans - Items relevant to IPP review**	
217	**§ 357.60(a)**		RWPGs shall submit to the development Board a RWP that is consistent with the guidance principles and guidelines outlined in § 357.20 of this title (relating to Guidance Principles for State and Regional Water Planning). Information provided shall be based on data provided or approved by the Board in a format consistent with the guidelines of Subchapters C and D of this chapter and guidance by the EA.	A RWP consistent with the required guidance principles and guidelines has been submitted to the Development Board.
218	**§ 357.60(c)**		Relation to state and local plans. RWPs shall be consistent with Chapter 358 of this title (relating to State Water Planning Guidelines) and this chapter. RWPGs shall consider and use as a guide the state water plan and local water plans provided for in the Texas Water Code § 16.054 (relating to Local Water Planning).	Region B considered and used as a guide the state water plan and local water plans
Header	**§ 358.3**		**State Water Plan Guidance Principles**	
219	**§ 358.3(1)**		The state water plan shall provide for the preparation for and response to drought conditions.	Chapters 2, 3, 5, 7
220	**§ 358.3(2)**		The regional water plans and state water plan shall serve as water supply plans under drought of record conditions. RWPGs may, at their discretion, plan for drought conditions worse than the drought of record.	The Region B Water Plan serves as a water supply plan under drougt of record conditions.

2026 IPP Review Item Number	Key Requirement Citation: TWC, 31 TAC Rule, or Contract Exhibit	Corresponding Contract Guidance and SOW Task *(if applicable)*	Requirement (see published rule and other contract documents for full context)	Location(s) in Regional Plan and/or Commentary
221	§ 358.3(3)		Consideration shall be given to the construction and improvement of surface water resources and the application of principles that result in voluntary redistribution of water resources.	Chapter 5
222	§ 358.3(4)		Regional water plans shall provide for the orderly development, management, and conservation of water resources and preparation for and response to drought conditions so that sufficient water will be available at a reasonable cost to satisfy a reasonable projected use of water to ensure public health, safety, and welfare; further economic development; and protect the agricultural and natural resources of the affected regional water planning areas and the state.	Chapters 5, 6 and 7, Appendices C and D
223	§ 358.3(5)		Regional water plans shall include identification of those policies and action that may be needed to meet Texas' water supply needs and prepare for and respond to drought conditions.	Chapters 5, 7 and 8
224	§ 358.3(6)		RWPG decision-making shall be open to and accountable to the public with decisions based on accurate, objective and reliable information with full dissemination of planning results except for those matters made confidential by law.	Chapter 10
225	§ 358.3(7)		The RWPG shall establish terms of participation in its water planning efforts that shall be equitable and shall not unduly hinder participation.	Chapter 10
226	§ 358.3(8)		Consideration of the effect of policies or water management strategies on the public interest of the state, water supply, and those entities involved in providing this supply throughout the entire state.	Chapters 5 and 8
227	§ 358.3(9)		Consideration of all water management strategies the RWPG determined to be potentially feasible when developing plans to meet future water needs and to respond to drought so that cost effective water management strategies and water management strategy projects which are consistent with long-term protection of the state's water resources, agricultural resources, and natural resources are considered and approved.	Chapters 5 and 6
228	§ 358.3(10)		Consideration of opportunities that encourage and result in voluntary transfers of water resources, including but not limited to regional water banks, sales, leases, options, subordination agreements, and financing agreements.	Chapter 5
229	§ 358.3(11)		Consideration of a balance of economic, social, aesthetic, and ecological viability.	Chapter 5 and Appendix D
230	§ 358.3(12)		For regional water planning areas without approved regional water plans or water providers for which revised plans are not developed through the regional water planning process, the use of information from the adopted state water plan and other completed studies that are sufficient for water planning shall represent the water supply plan for that area or water provider.	N/A
231	§ 358.3(13)		All surface waters are held in trust by the state, their use is subject to rights granted and administered by the Commission, and the use of surface water is governed by the prior appropriation doctrine, unless adjudicated otherwise.	Chapter 3 and Appendix B
232	§ 358.3(14)		Existing water rights, water contracts, and option agreements shall be protected. However, potential amendments of water rights, contracts and agreements may be considered and evaluated. Any amendments will require the eventual consent of the owner.	Chapters 3 and 5
233	§ 358.3(15)		The production and use of groundwater in Texas is governed by the rule of capture doctrine unless and to the extent that such production and use is regulated by a groundwater conservation district, as codified by the legislature at Texas Water Code § 36.002 (relating to Ownership of Groundwater).	Chapter 3
234	§ 358.3(16)		Consideration of recommendations of river and stream segments of unique ecological value to the legislature for potential protection.	Chapter 8
235	§ 358.3(17)		Consideration of recommendation of sites of unique value for the construction of reservoirs to the legislature for potential protection.	Chapter 8
236	§ 358.3(18)		Consideration of water planning and management activities of local, regional, state, and federal agencies, along with existing local, regional, and state water plans and information and existing state and federal programs and goals.	Chapters 1 and 5
237	§ 358.3(19)		Designated water quality and related water uses as shown in the state water quality management plan shall be improved or maintained.	Chapter 6
238	§ 358.3(20)		RWPGs shall actively coordinate water planning and management activities to identify common needs, issues, and opportunities for interregional water management strategies and water management strategy projects to achieve efficient use of water supplies. The Board will support RWPGs coordination to identify common needs, issues, and opportunities while working with RWPGs to resolve conflicts in a fair, equitable, and efficient manner.	Entire RWP

2026 IPP Review Item Number	Key Requirement Citation: TWC, 31 TAC Rule, or Contract Exhibit	Corresponding Contract Guidance and SOW Task *(if applicable)*	Requirement (see published rule and other contract documents for full context)	Location(s) in Regional Plan and/or Commentary
239	**§ 358.3(21)**		The water management strategies and water management strategy projects identified in approved RWPs to meet needs shall be described in sufficient detail to allow a state agency making a financial or regulatory decision to determine if a proposed action before the state agency is consistent with an approved RWP. (also see § 357.34(f))	Chapter 5, Attachment 5-3
240	**§ 358.3(22)**		The evaluation of water management strategies and water management strategy projects shall use environmental information in accordance with the Commission's adopted environmental flow standards under 30 TAC Chapter 298 (relating to Environmental Flow Standards for Surface Water) where applicable or, in basins where standards are not available or have not been adopted, information from existing site-specific studies or state consensus environmental planning criteria.	Chapter 5 and Chapter 6
241	**§ 358.3(23)**		Consideration of environmental water needs including instream flows and bay and estuary inflows, including adjustments by the RWPGs to water management strategies to provide for environmental water needs including instream flows and bay and estuary needs. Consideration shall be consistent with the Commission's adopted environmental flow standards under 30 TAC Chapter 298 in basins where standards have been adopted.	Chapter 5 and Chapter 6
242	**§ 358.3(24)**		Planning shall be consistent with all laws applicable to water use for the state and regional water planning area.	Entire RWP
243	**§ 358.3(25)**		The inclusion of ongoing water development projects that have been permitted by the Commission or a predecessor agency.	None in Region B
244	**§ 358.3(26)**		Specific recommendations of water management strategies shall be based upon identification, analysis, and comparison of all water management strategies the RWPG determines to be potentially feasible so that the cost effective water management strategies which are environmentally sensitive are considered and adopted unless the RWPG demonstrates that adoption of such strategies is not appropriate. To determine cost-effectiveness, the RWPGs will use the process described in § 357.34(e)(3)(A) of this title (relating to Identification and Evaluation of Potentially Feasible Water Management Strategies) and, to determine environmental sensitivity, the RWPGs shall use the process described in § 357.34(e)(3)(B) of this title.	Chapter 5, and Attachement 5-1
245	**§ 358.3(27)**		RWPGs shall conduct their planning to achieve efficient use of existing water supplies, explore opportunities for and the benefits of developing regional water supply facilities or providing regional management of water facilities, coordinate the actions of local and regional water resource management agencies, provide substantial involvement by the public in the decision-making process, and provide full dissemination of planning results.	Chapters 5 and 10
246	**§ 358.3(28)**		RWPGs must consider existing regional water planning efforts when developing their plans.	Chapters 1 and 5

APPENDIX G

IMPLEMENTATION SURVEY

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

Planning Region	WMS or WMS Project Name	Database Online Decade	Related Sponsor Entity and/or Benefitting WUGs	Implementation Survey Record Type	Database ID	Has the sponsor taken affirmative vote or actions? (TWC 16.053(h)(10))	What is the status of the WMS project or WMS recommended in the 2022 SWP?	If the project has not been started or no longer is being pursued, please explain why by adding information in this column.	Please select one or more project impediments. If an impediment is not listed, select "Other" and provide information in Column K.	If you selected "Other" in Column J, please provide information about project impediments not shown in the impediment list provided.	What funding type(s) are being used for the project? (Select all that apply)	Optional Comments
B	Additional Groundwater Supply - Baylor County SUD	2020	Project Sponsor(s): Baylor SUD	Recommended WMS Project	3793	Yes	Project/WMS completed				Unknown	
B	Additional Seymour Aquifer - Vernon	2020	Project Sponsor(s): Vernon	Recommended WMS Project	1177	Yes	Project/WMS completed				Unknown	
B	Alternative Cooling Technology - Steam-Electric Power Wilbarger County	2020	Project Sponsor(s): Steam-electric power (Wilbarger)	Recommended WMS Project	1179	No	Project/WMS not started	SEP facility in Wilbarger County is currently inactive	Other	SEP facility in Wilbarger County is currently inactive	Unknown	
B	Automated Meter Infrastructure (AMI) - Red River Authority	2030	Project Sponsor(s): Red River Authority of Texas	Recommended WMS Project	3967	Yes	Project/WMS started				Unknown	
B	Chloride Control Project	2020	Project Sponsor(s): Red River Authority of Texas	Recommended WMS Project	1275	Yes	Project/WMS started				Unknown	
B	Conservation - Red River Authority of Texas	2020	WUG Reducing Demand: Red River Authority of Texas	Recommended Demand Reduction Strategy Without WMS Project	23754	Yes	Project/WMS started				Unknown	
B	Indirect Reuse - Bowie	2030	Project Sponsor(s): Bowie	Recommended WMS Project	3794	No	Project/WMS not started	Sponsor has yet to take affirmative action	Shift in timeline		Unknown	
B	Iowa Park Voluntary Transfer	2020	WMS Seller: Iowa Park; WMS Supply Recipient: Electra	Recommended WMS Supply Without WMS Project	110164	Yes	Project/WMS started				Unknown	
B	Iowa Park Voluntary Transfer	2020	WMS Seller: Iowa Park; WMS Supply Recipient: Harrold WSC	Recommended WMS Supply Without WMS Project	110167	Yes	Project/WMS started				Unknown	
B	Irrigation Conservation - Archer	2030	WUG Reducing Demand: Irrigation, Archer	Recommended Demand Reduction Strategy Without WMS Project	12771	No	Project/WMS started				Unknown	
B	Irrigation Conservation - Wichita	2030	WUG Reducing Demand: Irrigation, Wichita	Recommended Demand Reduction Strategy Without WMS Project	12817	No	Project/WMS started				Unknown	
B	Lake Ringgold	2040	Project Sponsor(s): Wichita Falls	Recommended WMS Project	1174	Yes	Project/WMS started				Unknown	
B	Lakeside City Voluntary Transfer	2020	WMS Seller: Lakeside City; WMS Supply Recipient: County-Other, Archer	Recommended WMS Supply Without WMS Project	110151	Yes	Project/WMS started				Unknown	
B	Mining Conservation - Archer	2020	Project Sponsor(s): Mining (Archer)	Recommended WMS Project	2764	No	Project/WMS started				Unknown	
B	Mining Conservation - Baylor	2020	Project Sponsor(s): Mining (Baylor)	Recommended WMS Project	2765	No	Project/WMS started				Unknown	
B	Mining Conservation - Clay	2020	Project Sponsor(s): Mining (Clay)	Recommended WMS Project	2766	No	Project/WMS started				Unknown	
B	Mining Conservation - Cottle	2020	Project Sponsor(s): Mining (Cottle)	Recommended WMS Project	2767	No	Project/WMS started				Unknown	
B	Mining Conservation - Foard	2020	Project Sponsor(s): Mining (Foard)	Recommended WMS Project	2768	No	Project/WMS started				Unknown	
B	Mining Conservation - Hardeman	2020	Project Sponsor(s): Mining (Hardeman)	Recommended WMS Project	2769	No	Project/WMS started				Unknown	
B	Mining Conservation - King	2020	Project Sponsor(s): Mining (King)	Recommended WMS Project	2770	No	Project/WMS started				Unknown	
B	Mining Conservation - Montague	2020	Project Sponsor(s): Mining (Montague)	Recommended WMS Project	2771	No	Project/WMS started				Unknown	
B	Mining Conservation - Wichita	2020	Project Sponsor(s): Mining (Wichita)	Recommended WMS Project	2772	No	Project/WMS started				Unknown	
B	Mining Conservation - Wilbarger	2020	Project Sponsor(s): Mining (Wilbarger)	Recommended WMS Project	2773	No	Project/WMS started				Unknown	
B	Municipal Conservation - Archer City	2020	WUG Reducing Demand: Archer City	Recommended Demand Reduction Strategy Without WMS Project	11529	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Archer County MUD 1	2020	WUG Reducing Demand: Archer County MUD 1	Recommended Demand Reduction Strategy Without WMS Project	27497	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Archer County Other	2020	WUG Reducing Demand: County-Other, Archer	Recommended Demand Reduction Strategy Without WMS Project	27502	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Baylor SUD	2020	WUG Reducing Demand: Baylor SUD	Recommended Demand Reduction Strategy Without WMS Project	27511	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Bowie	2020	WUG Reducing Demand: Bowie	Recommended Demand Reduction Strategy Without WMS Project	11585	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Clay County Other	2020	WUG Reducing Demand: County-Other, Clay	Recommended Demand Reduction Strategy Without WMS Project	11557	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Crowell	2020	WUG Reducing Demand: Crowell	Recommended Demand Reduction Strategy Without WMS Project	11573	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Electra	2020	WUG Reducing Demand: Electra	Recommended Demand Reduction Strategy Without WMS Project	11603	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Harrold WSC	2020	WUG Reducing Demand: Harrold WSC	Recommended Demand Reduction Strategy Without WMS Project	27572	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Holliday	2020	WUG Reducing Demand: Holliday	Recommended Demand Reduction Strategy Without WMS Project	11533	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Iowa Park	2020	WUG Reducing Demand: Iowa Park	Recommended Demand Reduction Strategy Without WMS Project	11607	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Lakeside City	2020	WUG Reducing Demand: Lakeside City	Recommended Demand Reduction Strategy Without WMS Project	11537	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Montague County Other	2020	WUG Reducing Demand: County-Other, Montague	Recommended Demand Reduction Strategy Without WMS Project	11589	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Nocona Hills WSC	2020	WUG Reducing Demand: Nocona Hills WSC	Recommended Demand Reduction Strategy Without WMS Project	27567	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Olney	2020	WUG Reducing Demand: Olney	Recommended Demand Reduction Strategy Without WMS Project	27584	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Quannah	2020	WUG Reducing Demand: Quanah	Recommended Demand Reduction Strategy Without WMS Project	11581	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Scotland	2020	WUG Reducing Demand: Scotland	Recommended Demand Reduction Strategy Without WMS Project	11541	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Sheppard Air Force Base	2020	WUG Reducing Demand: Sheppard Air Force Base	Recommended Demand Reduction Strategy Without WMS Project	27579	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Vernon	2040	WUG Reducing Demand: Vernon	Recommended Demand Reduction Strategy Without WMS Project	11625	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Wichita Falls	2020	WMS Seller: Wichita Falls; WMS Supply Recipient: Archer County MUD 1	Recommended WMS Supply Without WMS Project	110178	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Wichita Falls	2030	WMS Seller: Wichita Falls; WMS Supply Recipient: Scotland	Recommended WMS Supply Without WMS Project	110175	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Wichita Falls	2020	WMS Seller: Wichita Falls; WMS Supply Recipient: Windthorst WSC	Recommended WMS Supply Without WMS Project	110171	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Wichita Falls	2020	WUG Reducing Demand: Wichita Falls	Recommended Demand Reduction Strategy Without WMS Project	6693	Yes	Project/WMS started				Unknown	
B	Municipal Conservation - Windthorst WSC	2020	WUG Reducing Demand: Windthorst WSC	Recommended Demand Reduction Strategy Without WMS Project	27621	Yes	Project/WMS started				Unknown	
B	Steam-Electric Power Conservation	2020	WUG Reducing Demand: Steam-Electric Power, Wichita	Recommended Demand Reduction Strategy Without WMS Project	27699	No	Project/WMS started				Unknown	
B	Treated Water Line - RRA Clay County	2020	Project Sponsor(s): Red River Authority of Texas	Recommended WMS Project	3817	Yes	Project/WMS completed				Unknown	
B	Water Conservation (Replace Transmission Pipeline) - Vernon	2020	Project Sponsor(s): Vernon	Recommended WMS Project	2755	Yes	Project/WMS started				Unknown	
B	WCWID 2 Canal Conversion To Pipeline	2020	Project Sponsor(s): Wichita WCID 2	Recommended WMS Project	2187	Yes	Project/WMS started				Unknown	Completed some canal segments to date
B	Wichita Falls Voluntary Transfer (Archer County MUD 1)	2030	WMS Seller: Wichita Falls; WMS Supply Recipient: Archer County MUD 1	Recommended WMS Supply Without WMS Project	110181	Yes	Project/WMS started				Unknown	
B	Wichita Falls Voluntary Transfer (Olney)	2050	WMS Seller: Wichita Falls; WMS Supply Recipient: Olney	Recommended WMS Supply Without WMS Project	111478	Yes	Project/WMS started				Unknown	

APPENDIX H

COMMENTS RECEIVED ON THE INITIALLY PREPARED PLAN

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

Will include comments received on IPP in the Final Plan

APPENDIX I

INTERREGIONAL COORDINATION

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

5100 E. Skelly Dr., Suite 602 + Tulsa, Oklahoma 74135 + 539-444-8677 + FAX 817-735-7491 www.freese.com

TO: Simone Kiel, Region A Consultant

CC: Kristal Williams

FROM: Jeremy Rice and Walter Chandler

SUBJECT: Issues of Interest to Region B and Region A

DATE: 1/18/2024

PROJECT: RRG21896

This is one of a series of memoranda on issues of mutual interest to Region B and other regions in the current round of regional water planning. This memorandum is intended to begin a discussion between Region B and Region A consultants. After reviewing this memorandum, please contact me to discuss how the memorandum should be revised. I can be reached at:

Jeremy Rice
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The memorandum includes the following sections:

- Shared Water User Groups and Shared Supplies
- Shared Wholesale Water Providers
- Supplies Located in Region A That Are Used in Region B
- Supplies Located in Region B That Are Used in Region A
- Potential Supplies in Region A Being Studied for Use in Region B
- New Supplies in Region B Being Studied for Use in Region A
- Other Issues of Mutual Interest

Please review this memorandum and contact us with your thoughts on the issues covered and other issues that should have been included. We are looking forward to working with you as we complete this round of regional water planning.

Shared Water User Groups and shared supplies

Region B borders two counties of Region A along the northwestern boundary of Region B. Region B is the primary region for the Red River Authority of Texas (RRA) which has service areas in Regions A, B, C, G, O. As such Region B prepared the allocation of supplies for RRA.

It should be noted that Region B submitted revisions to the TWDB population and demands that were not accepted by TWDB but will be used for planning. All demands for Region B portions reflect the RWPG adopted demands with a 15% increase.

	2026 Plan RRA Demands (AF/Y)					
Customers	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Red River Authority - Clay County	491	488	486	485	484	482
Red River Authority - Childress County	382	358	352	361	369	378
Red River Authority - Collingsworth County	90	88	83	79	75	72
Red River Authority - Cottle County	29	29	29	30	30	30
Red River Authority - Dickens County	1	1	1	1	1	0
Red River Authority - Donley County	82	76	70	67	64	60
Red River Authority - Foard County	73	73	74	75	77	78
Red River Authority - Grayson County	254	304	347	390	436	486
Red River Authority - Hall County	51	48	45	42	39	36
Red River Authority - Hardeman County	195	193	192	189	186	184
Red River Authority - King County	61	62	62	64	65	66
Red River Authority - Knox County	13	13	12	11	10	8
Red River Authority - Montague County	44	45	46	48	50	50
Red River Authority - Motley County	2	1	1	1	1	1
Red River Authority - Wilbarger County	316	316	318	318	318	318
Total	**1,593**	**1,607**	**1,632**	**1,676**	**1,721**	**1,767**

	RRA Currently Available Supplies (AF/Y)					
Sources	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Wichita Falls Supply	383	363	344	326	309	293
Greenbelt Reservoir	532	507	501	507	515	529
Lake Texoma	254	304	347	390	436	486
Ogallala Aquifer - Donley County from Greenbelt MIWA	271	270	270	271	269	263
Ogallala Aquifer - Donley County	52	46	40	37	34	30
Other Aquifer - Cottle County	29	29	29	30	30	30
Other Aquifer - Dickens County	62	63	63	65	66	66
Other Aquifer - Motley County	2	1	1	1	1	1
Seymour Aquifer - Collingsworth County	74	72	67	63	59	56
Seymour Aquifer - Knox County	13	13	12	11	10	8
Seymour Aquifer - Hardeman County	46	46	47	47	47	47
Seymour Aquifer - from Vernon	263	263	264	264	264	264
Trinity Aquifer - Montague County	44	45	46	48	50	50
Total	**2,025**	**2,022**	**2,031**	**2,060**	**2,090**	**2,123**
Surplus or (Shortage)	**432**	**415**	**400**	**384**	**369**	**357**

Shared Wholesale Water Providers

RRA and other Region B WUGs are served water supply through Greenbelt Municipal and Industrial Water Authority (GMIWA) in both regions A and Region B. The following sections discuss the assumed supply amounts for planning purposes.

Region B consultants are coordinating with Region A on Greenbelt. The following reflects our understanding of GMIWA Allocation from Region A.

Panhandle Regional Water Plan						
	2026 Plan DRAFT Demands on Greenbelt (AF/Y)					
Customers	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
City of Childress	1,274	1,315	1,296	1,261	1,224	1,186
City of Chillicothe	29	29	28	28	27	27
City of Clarendon	298	281	262	251	239	227
City of Crowell	120	119	117	115	113	110
City of Hedley (Donley County-Other)	56	56	56	56	56	56
City of Memphis	37	37	37	37	37	37
City of Quanah	347	343	340	336	331	327
Red River Authority - Childress County	382	358	352	361	369	378
Red River Authority - Collingsworth County	16	16	16	16	16	16
Red River Authority - Donley County	30	30	30	30	30	30
Red River Authority - Foard County	73	73	74	75	77	78
Red River Authority - Hall County	100	100	100	100	100	100
Red River Authority - Hardeman County	195	193	192	189	186	184
Red River Authority - Wilbarger County	7	7	7	7	7	7
Hardeman County Manufacturing	50	50	50	50	50	50
Total	**3,013**	**3,006**	**2,957**	**2,912**	**2,862**	**2,812**

	2026 Plan Currently Available Supply (AF/Y)					
Sources	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Ogallala groundwater	1,600	1,577	1,484	1,370	1,245	1,090
Greenbelt Reservoir	3,140	2,947	2,754	2,561	2,368	2,175
Total	**4,740**	**4,524**	**4,238**	**3,931**	**3,613**	**3,265**
Surplus or (Shortage)	**1,727**	**1,518**	**1,281**	**1,019**	**751**	**453**

Supplies in Region A used by RRA in Region A

- RRA – Childress County

Source	2030	2040	2050	2060	2070	2080
Greenbelt Reservoir	253	233	229	235	242	252
Ogalla Aquifer Donley County from Greenbelt	129	125	123	126	127	126
Total	**382**	**358**	**352**	**361**	**369**	**378**

- RRA – Collingsworth

Source	2030	2040	2050	2060	2070	2080
Greenbelt Reservoir	11	10	10	10	10	11
Ogalla Aquifer Donley County from Greenbelt	5	6	6	6	6	5
Seymour Aquifer Collingsworth County	74	72	67	63	59	56
Total	**90**	**88**	**83**	**79**	**75**	**72**

- RRA – Donley County

Source	2030	2040	2050	2060	2070	2080
Greenbelt Reservoir	20	20	19	20	20	20
Ogalla Aquifer Donley County from Greenbelt	10	10	11	10	10	10
Ogallala Aquifer Donley County	52	46	40	37	34	30
Total	**82**	**76**	**70**	**67**	**64**	**60**

- RRA – Hall County

Source	2030	2040	2050	2060	2070	2080
Greenbelt Reservoir	66	65	65	65	66	67
Ogalla Aquifer Donley County from Greenbelt	34	35	35	35	34	33
Total	**100**	**100**	**100**	**100**	**100**	**100**

Supplies Located in Region A That Are Used in Region B

Region B WUGs served by GMIWA

- City of Chillicothe

Water User Group:	**Chillicothe - Hardeman**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	72	71	71	70	69	68
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	19	19	18	18	18	18
Current Supply (Greenbelt MIWA) Ogallala Donley County (ac-ft/yr)	10	10	10	10	9	9
Current Supply Seymour Aquifer (ac-ft/yr)	43	43	42	42	41	41

- City of Crowell

Water User Group:	**Crowell - Foard**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	120	119	117	115	113	110
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	80	77	76	75	74	74
Current Supply (Greenbelt MIWA) Ogallala Aquifer Donley County (ac-ft/yr)	41	41	41	40	39	37

- City of Quannah

Water User Group:	**Quanah - Hardeman**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	347	343	340	336	331	327
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	230	223	221	219	217	218
Current Supply (Greenbelt MIWA) Ogallala Donley County (ac-ft/yr)	117	119	119	117	114	109

- RRA – Foard County

Water User Group:	**Red River Authority - Foard**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	73	73	74	75	77	78
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	48	48	48	49	50	52
Current Supply (Greenbelt MIWA) Ogallala Aquifer Donley County (ac-ft/yr)	25	25	26	26	26	26

- RRA – Hardeman County

Water User Group:	**Red River Authority - Hardeman**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	195	193	192	189	186	184
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	129	126	125	123	122	122
Current Supply (Greenbelt MIWA) Ogallala Donley County (ac-ft/yr)	66	67	67	66	64	61

- RRA - Wilbarger County

Water User Group:	**Red River Authority - Wilbarger**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	316	316	318	318	318	318
Curren Supplies - Sales from Greenbelt MIWA	7	7	7	7	7	7
Current Supply - Sales from Vernon Seymour Aquifer	263	263	264	264	264	264
Current Supply -Seymour Aquifer (Hardeman County)	46	46	47	47	47	47

- Hardeman County Manufacturing

Water User Group:	**Manufacturing - Hardeman**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Water Demand (ac-ft/yr)	225	233	242	251	260	270
Current Supply Blaine Aquifer	175	183	192	201	210	220
Current Supply (Greenbelt MIWA) Greenbelt Reservoir (ac-ft/yr)	33	33	32	33	33	33
Current Supply (Greenbelt MIWA) Ogallala Donley County (ac-ft/yr)	17	17	18	17	17	17

Supplies Located in Region B That Are Used in Region A
To our knowledge there are no supplies originating in Region B being used in Region A.

Potential New Supplies in Region A Being Studied for Use in Region B
GMIWA is working to expand the Ogallala well field that would increase available supplies that may serve WUGs in Region B.

New Supplies in Region B Being Studied for Use in Region A
To our knowledge, there are no supplies being studied in Region B that could be used in Region A. Water demand reduction (conservation) may be applied to RRA WUGs in Region A.

MEMORANDUM

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www.freese.com

TO: Abigail Gardner, Region C Consultant

CC: Simone Kiel

FROM: Jeremy Rice and Walter Chandler

SUBJECT: Issues of Interest to Region B and Region C

DATE: 1/18/2024

PROJECT: RRG21896

This is one of a series of memoranda on issues of mutual interest to Region B and other regions in the current round of regional water planning. This memorandum is intended to begin a discussion between Region B and Region C consultants. After reviewing this memorandum, please contact me to discuss how the memorandum should be revised. I can be reached at:

Jeremy Rice
Freese and Nichols, Inc.
5100 E Skelly Dr. Suite 602
Tulsa, Oklahoma 74135
918-238-1930
jeremy.rice@freese.com

The memorandum includes the following sections:

- Shared Water User Groups and Shared Supplies
- Shared Wholesale Water Providers
- Supplies Located in Region C That Are Used in Region B
- Supplies Located in Region B That Are Used in Region C
- Potential Supplies in Region C Being Studied for Use in Region B
- New Supplies in Region B Being Studied for Use in Region C
- Other Issues of Mutual Interest

Please review this memorandum and contact us with your thoughts on the issues covered and other issues that should have been included. We are looking forward to working with you as we complete this round of regional water planning.

<u>Shared Water User Groups and shared supplies</u>

Region B borders three counties of Region C along the southeastern boundary of Region B. Region B is the primary region for the Red River Authority of Texas (RRA) which has service areas in Regions A, B, C, G, O. As such Region B prepared the allocation of supplies for RRA.

It should be noted that Region B submitted revisions to the TWDB population and demands that were not accepted by TWDB but will be used for planning. All demands for Region B portions reflect the RWPG adopted demands with a 15% increase.

	2026 Plan RRA Demands (AF/Y)					
Customers	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Red River Authority - Clay County	491	488	486	485	484	482
Red River Authority - Childress County	382	358	352	361	369	378
Red River Authority - Collingsworth County	90	88	83	79	75	72
Red River Authority - Cottle County	29	29	29	30	30	30
Red River Authority - Dickens County	1	1	1	1	1	0
Red River Authority - Donley County	82	76	70	67	64	60
Red River Authority - Foard County	73	73	74	75	77	78
Red River Authority - Grayson County	254	304	347	390	436	486
Red River Authority - Hall County	51	48	45	42	39	36
Red River Authority - Hardeman County	195	193	192	189	186	184
Red River Authority - King County	61	62	62	64	65	66
Red River Authority - Knox County	13	13	12	11	10	8
Red River Authority - Montague County	44	45	46	48	50	50
Red River Authority - Motley County	2	1	1	1	1	1
Red River Authority - Wilbarger County	316	316	318	318	318	318
Total	**1,593**	**1,607**	**1,632**	**1,676**	**1,721**	**1,767**

	RRA Currently Available Supplies (AF/Y)					
Sources	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Wichita Falls Supply	383	363	344	326	309	293
Greenbelt Reservoir	532	507	501	507	515	529
Lake Texoma	254	304	347	390	436	486
Ogallala Aquifer - Donley County from Greenbelt MIWA	271	270	270	271	269	263
Ogallala Aquifer - Donley County	52	46	40	37	34	30
Other Aquifer - Cottle County	29	29	29	30	30	30
Other Aquifer - Dickens County	62	63	63	65	66	66
Other Aquifer - Motley County	2	1	1	1	1	1
Seymour Aquifer - Collingsworth County	74	72	67	63	59	56
Seymour Aquifer - Knox County	13	13	12	11	10	8
Seymour Aquifer - Hardeman County	46	46	47	47	47	47
Seymour Aquifer - from Vernon	263	263	264	264	264	264
Trinity Aquifer - Montague County	44	45	46	48	50	50
Total	**2,025**	**2,022**	**2,031**	**2,060**	**2,090**	**2,123**
Surplus or (Shortage)	**432**	**415**	**400**	**384**	**369**	**357**

Shared Wholesale Water Providers
There are no shared wholesale water providers between Region B and Region C.

Supplies Located in Region C That Are Used in Region C by RRA

- RRA – Grayson County

Lake Texoma					
2030	**2040**	**2050**	**2060**	**2070**	**2080**
254	304	347	390	436	486

Supplies Located in Region B That Are Used in Region C
To our knowledge there are no supplies originating in Region B being used in Region C.

Potential New Supplies in Region C Being Studied for Use in Region B
To our knowledge, there are no supplies being studied in Region C that could be used in Region B. **There has been a request by RRA to include a strategy for treatment plant expansion to use additional Lake Texoma water.**

New Supplies in Region B Being Studied for Use in Region C
To our knowledge, there are no supplies being studied in Region B that could be used in Region C. Water demand reduction (conservation) may be applied to RRA WUGs in Region C.

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www.freese.com

TO: Tony Smith, Carollo, Region G Consultant

CC:

FROM: Jeremy Rice and Walter Chandler

SUBJECT: Issues of Interest to Region B and Region G

DATE: 1/31/2024

PROJECT: RRG21896

This is one of a series of memoranda on issues of mutual interest to Region B and other regions in the current round of regional water planning. This memorandum is intended to begin a discussion between Region B and Region G consultants. After reviewing this memorandum, please contact me to discuss how the memorandum should be revised. I can be reached at:

Jeremy Rice
Freese and Nichols, Inc.
5100 E Skelly Dr. Suite 602
Tulsa, Oklahoma 74135
918-238-1930
jeremy.rice@freese.com

The memorandum includes the following sections:

- Shared Water User Groups and Shared Supplies
- Shared Wholesale Water Providers
- Supplies Located in Region G That Are Used in Region B
- Supplies Located in Region B That Are Used in Region G
- Potential Supplies in Region G Being Studied for Use in Region B
- New Supplies in Region B Being Studied for Use in Region G
- Other Issues of Mutual Interest

Please review this memorandum and contact us with your thoughts on the issues covered and other issues that should have been included. We are looking forward to working with you as we complete this round of regional water planning.

Shared Water User Groups and shared supplies

Region B borders three counties of Region G along the southern boundary of Region B and Young County is partially shared between Region B and G. Region B is the primary region for the Red River Authority of Texas (RRA) which has service areas in Regions A, B, C, G, O. As such Region B prepared the allocation of supplies for RRA. Regions B and G also share the following WUGs located in Young County: Baylor County SUD, County Other, Irrigation, and Livestock.

It should be noted that Region B submitted revisions to the TWDB population and demands that were not accepted by TWDB but will be used for planning. All demands for Region B portions reflect the RWPG adopted demands with a 15% increase.

	2026 Plan RRA Demands (AF/Y)					
Customers	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Red River Authority - Clay County	491	488	486	485	484	482
Red River Authority - Childress County	382	358	352	361	369	378
Red River Authority - Collingsworth County	90	88	83	79	75	72
Red River Authority - Cottle County	29	29	29	30	30	30
Red River Authority - Dickens County	1	1	1	1	1	0
Red River Authority - Donley County	82	76	70	67	64	60
Red River Authority - Foard County	73	73	74	75	77	78
Red River Authority - Grayson County	254	304	347	390	436	486
Red River Authority - Hall County	51	48	45	42	39	36
Red River Authority - Hardeman County	195	193	192	189	186	184
Red River Authority - King County	61	62	62	64	65	66
Red River Authority - Knox County	*13*	*13*	*12*	*11*	*10*	*8*
Red River Authority - Montague County	44	45	46	48	50	50
Red River Authority - Motley County	2	1	1	1	1	1
Red River Authority - Wilbarger County	316	316	318	318	318	318
Total	**1,593**	**1,607**	**1,632**	**1,676**	**1,721**	**1,767**

	RRA Currently Available Supplies (AF/Y)					
Sources	**2030**	**2040**	**2050**	**2060**	**2070**	**2080**
Wichita Falls Supply	383	363	344	326	309	293
Greenbelt Reservoir	532	507	501	507	515	529
Lake Texoma	254	304	347	390	436	486
Ogallala Aquifer - Donley County from Greenbelt MIWA	271	270	270	271	269	263
Ogallala Aquifer - Donley County	52	46	40	37	34	30
Other Aquifer - Cottle County	29	29	29	30	30	30
Other Aquifer - Dickens County	62	63	63	65	66	66
Other Aquifer - Motley County	2	1	1	1	1	1
Seymour Aquifer - Collingsworth County	74	72	67	63	59	56
Seymour Aquifer - Knox County	*13*	*13*	*12*	*11*	*10*	*8*
Seymour Aquifer - Hardeman County	46	46	47	47	47	47
Seymour Aquifer - from Vernon	263	263	264	264	264	264
Trinity Aquifer - Montague County	44	45	46	48	50	50
Total	**2,025**	**2,022**	**2,031**	**2,060**	**2,090**	**2,123**
Surplus or (Shortage)	**432**	**415**	**400**	**384**	**369**	**357**

Shared Wholesale Water Providers

The Wholesale Water Providers shared between Regions B and G include RRA and Baylor SUD. RRA providers water to their systems in Knox County in Region G from their Seymour Aquifer supply in Knox County. The portion of Baylor SUD in Young County within Region B gets water supply from the Seymour Aquifer in Baylor County.

Supplies in Region G used by RRA in Region G

- RRA – Knox County

Source	2030	2040	2050	2060	2070	2080
Seymour Aquifer - Knox County	13	13	12	11	10	8

Supplies in Region B used by Baylor SUD in the Region B portion of Young County

- Baylor SUD – Young County

Source	2030	2040	2050	2060	2070	2080
Seymour Aquifer - Baylor County	59	60	60	62	64	66

Supplies Located in Region G That Are Used in Region B

Two WUGs get a portion of their water from supplies located in Region G. These include Baylor County SUD in Baylor County who purchases surface water from Millers Creek Lake from North Central Texas MWA, and the Region B portion of Young County Other who purchases surface water from the City of Graham.

Water User Group:	**Baylor County SUD - Baylor**					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	1,019	1,029	1,076	1,099	1,121	1,145
Water Demand (ac-ft/yr)	252	254	265	271	276	282
Current Supply - Millers Creek Lake - Sales from North Central Texas MWA (ac-ft/yr)	6	5	4	2	1	0
Current Supply - Seymour Aquifer Baylor County (ac-ft/yr)	246	249	261	269	275	282
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Water User Group:	County-Other - Young (Region B portion)					
	2030	**2040**	**2050**	**2060**	**2070**	**2080**
Population (number of persons)	626	626	626	624	621	618
Water Demand (ac-ft/yr)	85	84	84	84	83	83
Purchase from Graham	22	25	28	30	32	33
Current Supply - Cross Timbers Aquifer (ac-ft/yr)	63	59	56	54	51	50
Supply - Demand (ac-ft/yr)	0	0	0	0	0	0

Supplies Located in Region B That Are Used in Region G

Region B is currently assuming that supplies from Lakes Olney and Cooper located in Region B are being sold from the City of Olney to Manufacturing in Young County which is located entirely within Region G. Based on historical data reported in TWDB Water Use Surveys, the estimated amount being sold to Manufacturing in Young County is 68 AF/Y.

Potential New Supplies in Region G Being Studied for Use in Region B

To our knowledge, there are no supplies being studied in Region G that could be used in Region B.

New Supplies in Region B Being Studied for Use in Region G

To our knowledge, there are no supplies being studied in Region B that could be used in Region G. Water demand reduction (conservation) may be applied to WUGs in Region G.

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TO: Paula Jo Lemonds, HDR, Region O Consultant

CC:

FROM: Jeremy Rice and Walter Chandler

SUBJECT: Issues of Interest to Region B and Region O

DATE: 1/31/2024

PROJECT: RRG21896

This is one of a series of memoranda on issues of mutual interest to Region B and other regions in the current round of regional water planning. This memorandum is intended to begin a discussion between Region B and Region O consultants. After reviewing this memorandum, please contact me to discuss how the memorandum should be revised. I can be reached at:

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Tulsa, Oklahoma 74135
918-238-1930
jeremy.rice@freese.com

The memorandum includes the following sections:

- Shared Water User Groups and Shared Supplies
- Shared Wholesale Water Providers
- Supplies Located in Region O That Are Used in Region B
- Supplies Located in Region B That Are Used in Region O
- Potential Supplies in Region O Being Studied for Use in Region B
- New Supplies in Region B Being Studied for Use in Region O
- Other Issues of Mutual Interest

Please review this memorandum and contact us with your thoughts on the issues covered and other issues that should have been included. We are looking forward to working with you as we complete this round of regional water planning.

Shared Water User Groups and shared supplies

Cottle and King Counties in Region B border Motely and Dickens Counites Region O along the western boundary of Region B. Region B is the primary region for the Red River Authority of Texas (RRA) which has service areas in Regions A, B, C, G, O. As such Region B prepared the allocation of supplies for RRA.

It should be noted that Region B submitted revisions to the TWDB population and demands that were not accepted by TWDB but will be used for planning. All demands for Region B portions reflect the RWPG adopted demands with a 15% increase.

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Red River Authority - Collingsworth County	90	88	83	79	75	72
Red River Authority - Cottle County	29	29	29	30	30	30
Red River Authority - Dickens County	*1*	*1*	*1*	*1*	*1*	*0*
Red River Authority - Donley County	82	76	70	67	64	60
Red River Authority - Foard County	73	73	74	75	77	78
Red River Authority - Grayson County	254	304	347	390	436	486
Red River Authority - Hall County	51	48	45	42	39	36
Red River Authority - Hardeman County	195	193	192	189	186	184
Red River Authority - King County	61	62	62	64	65	66
Red River Authority - Knox County	13	13	12	11	10	8
Red River Authority - Montague County	44	45	46	48	50	50
Red River Authority - Motley County	*2*	*1*	*1*	*1*	*1*	*1*
Red River Authority - Wilbarger County	316	316	318	318	318	318
Total	**1,593**	**1,607**	**1,632**	**1,676**	**1,721**	**1,767**

	RRA Currently Available Supplies (AF/Y)					
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Greenbelt Reservoir	532	507	501	507	515	529
Lake Texoma	254	304	347	390	436	486
Ogallala Aquifer - Donley County from Greenbelt MIWA	271	270	270	271	269	263
Ogallala Aquifer - Donley County	52	46	40	37	34	30
Other Aquifer - Cottle County	29	29	29	30	30	30
Other Aquifer - Dickens County	*62*	*63*	*63*	*65*	*66*	*66*
Other Aquifer - Motley County	*2*	*1*	*1*	*1*	*1*	*1*
Seymour Aquifer - Collingsworth County	74	72	67	63	59	56
Seymour Aquifer - Knox County	13	13	12	11	10	8
Seymour Aquifer - Hardeman County	46	46	47	47	47	47
Seymour Aquifer - from Vernon	263	263	264	264	264	264
Trinity Aquifer - Montague County	44	45	46	48	50	50
Total	**2,025**	**2,022**	**2,031**	**2,060**	**2,090**	**2,123**
Surplus or (Shortage)	**432**	**415**	**400**	**384**	**369**	**357**

Shared Wholesale Water Providers

RRA is the only Wholesale Water Provider shared between Regions B and O. RRA provides water to their systems in Dickens and Motely Counties in Region O from their Other Aquifer supply in both counties respectively.

Supplies in Region O used by RRA in Region O

- RRA – Dickens County

Source	2030	2040	2050	2060	2070	2080
Other Aquifer - Dickens County	1	1	1	1	1	0

- RRA – Motley County

Source	2030	2040	2050	2060	2070	2080
Other Aquifer - Motley County	2	1	1	1	1	1

Supplies Located in Region O That Are Used in Region B

To our knowledge, there are no supplies located in Region O that are used in Region B.

Supplies Located in Region B That Are Used in Region O

To our knowledge, there are no supplies located in Region B that are used in Region O.

Potential New Supplies in Region O Being Studied for Use in Region B

To our knowledge, there are no supplies being studied in Region O that could be used in Region B.

New Supplies in Region B Being Studied for Use in Region O

To our knowledge, there are no supplies being studied in Region B that could be used in Region O. Water demand reduction (conservation) may be applied to the RRA WUGs in Region O.

APPENDIX J

RURAL OUTREACH

2026 INITIALLY PREPARED PLAN

REGION B

MARCH 2025

WUG Related Planning Region(s)	Water User Group Name	RWPEntityId	PWSCodeTX	PWS Name	Entity has self-reported water use restrictions to TCEQ due to water supply issues during the current planning cycle	Entity has self-reported having less than 180 days of water supply remaining during the current planning cycle	Entity has not previously engaged in the regional planning process	Entity has identified as facing significant near-term shorages under drought conditions in previous regional water plans	Priority for Outreach	Outreach Measures Performed	Response Received from Entity
A; B	Red River Authority of Texas	6505	TX0380012	RRA KIRKLAND LAZARE WS	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
A; B	Red River Authority of Texas	6505	TX0380013	RRA TELL CEE VEE WS	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Archer City	196	TX0050001	CITY OF ARCHER CITY	yes	no	no	no	low	Purchased water from COWF which is on the RWPG	None
B	Archer County MUD 1	6200	TX0050014	ARCHER COUNTY MUD 1	no	no	no	no	very low	Purchased water from COWF which is on the RWPG	None
B	Bowie	275	TX1690001	CITY OF BOWIE	no	no	no	no	very low	Met with Montague County July 19, 2024	Provided WMS
B	Chillicothe	10081	TX0990001	CITY OF CHILLICOTHE	no	no	yes	no	low	None	None
B	County-Other, Archer	416	TX0050012	CITY OF MEGARGEL	no	no	yes	no	low	None	None
B	County-Other, Clay	450	TX0390002	CITY OF PETROLIA	no	no	yes	no	low	None	None
B	County-Other, Clay	450	TX0390003	CITY OF BYERS	no	no	yes	no	low	None	None
B	County-Other, Clay	450	TX0390013	CITY OF BELLEVUE	no	no	yes	no	low	None	None
B	County-Other, Clay	450	TX0390014	BLUEGROVE WSC	no	no	yes	no	low	None	None
B	County-Other, Clay	450	TX0390016	CHARLIE WSC	no	no	yes	no	low	None	None
B	County-Other, Foard	489	TX0780013	THALIA WSC	no	no	yes	no	low	None	None
B	County-Other, King	546	TX0510004	KING COTTLE WSC	no	no	yes	no	low	None	None
B	County-Other, Montague	580	TX1690003	FORESTBURG WSC	no	no	yes	no	low	Met with Montague County July 19, 2024	None
B	County-Other, Montague	580	TX1690023	AMON G CARTER LAKE WSC	no	no	no	no	very low	Met with Montague County July 19, 2024	None
B	County-Other, Wichita	654	TX2430012	TOWN OF PLEASANT VALLEY	no	no	no	no	very low	Purchased water from COWF which is on the RWPG	None
B	County-Other, Wilbarger	655	TX2440003	NORTHSIDE WSC	no	no	yes	no	low	None	None
B	County-Other, Wilbarger	655	TX2440009	OKLAUNION WSC	no	no	yes	no	low	None	None
B	Crowell	678	TX0780001	CITY OF CROWELL	no	no	no	no	very low	None	None
B	Electra	756	TX2430002	CITY OF ELECTRA	no	no	no	no	very low	Purchased water from COWF which is on the RWPG	None
B	Harrold WSC	6357	TX2440002	HARROLD WSC	no	no	no	no	very low	Purchased water from COWF which is on the RWPG	None
B	Henrietta	933	TX0390001	CITY OF HENRIETTA	no	no	yes	no	low	None	None
B	Holliday	953	TX0050002	CITY OF HOLLIDAY	no	no	no	no	very low	Purchased water from COWF which is on the RWPG	None
B	Iowa Park	978	TX2430003	CITY OF IOWA PARK	no	no	no	no	very low	Purchased water from COWF which is on the RWPG	None
B	Lakeside City	1301	TX0050015	CITY OF LAKESIDE CITY	no	no	no	no	very low	Purchased water from COWF which is on the RWPG	None
B	Nocona	2124	TX1690002	CITY OF NOCONA	no	no	no	no	very low	Met with Montague County July 19, 2024	Provided WMS
B	Nocona Hills WSC	6451	TX1690009	NOCONA HILLS WSC	no	no	no	no	very low	Met with Montague County July 19, 2024	Provided WMS
B	Olney	2155	TX2520003	CITY OF OLNEY	no	no	no	no	very low	City of Olney has a representative on the RWPG	None
B	Paducah	2167	TX0510001	CITY OF PADUCAH	no	no	yes	no	low	None	None
B	Quanah	2240	TX0990002	CITY OF QUANAH	no	no	yes	no	low	None	None
B	Red River Authority of Texas	6505	TX0390021	RRA ARROWHEAD LAKE LOTS	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Red River Authority of Texas	6505	TX0780014	RRA FOARD COUNTY WATER SYSTEM	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Red River Authority of Texas	6505	TX0990003	RRA NEW GOODLETT WATER SYSTEM	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Red River Authority of Texas	6505	TX0990004	RRA NORTHEAST QUANAH WATER SYSTEM	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Red River Authority of Texas	6505	TX0990012	RRA GOODLETT WATER SYSTEM	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Red River Authority of Texas	6505	TX0990013	RRA MEDICINE MOUND WATER SYSTEM	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Red River Authority of Texas	6505	TX0990044	RRA SOUTHWEST QUANAH WATER SYSTEM	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Red River Authority of Texas	6505	TX1690005	RRA RINGGOLD	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Red River Authority of Texas	6505	TX2440005	RRA HINDS WILDCAT WATER SYSTEM	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Red River Authority of Texas	6505	TX2440006	RRA BOX COMMUNITY WATER SYSTEM	yes	no	no	no	low	Red River Authority has representative on the RWPG	None
B	Red River Authority of Texas	6505	TX2440007	RRA FARMERS VALLEY WATER SYSTEM	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Red River Authority of Texas	6505	TX2440008	RRA LOCKETT WATER SYSTEM	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B	Saint Jo	2778	TX1690006	CITY OF SAINT JO	no	no	no	no	very low	Met with Montague County July 19, 2024	Provided WMS
B	Scotland	3136	TX0050003	CITY OF SCOTLAND	no	no	no	no	very low	Purchased water from COWF which is on the RWPG	None
B	Seymour	2346	TX0120001	CITY OF SEYMOUR	yes	no	yes	no	moderate	None	None
B	Vernon	2567	TX2440001	CITY OF VERNON	yes	no	no	no	low	City of Vernon has a representative on the RWPG	Provided WMS
B	Windthorst WSC	2633	TX0050013	WINDTHORST WSC	yes	no	no	no	low	Purchased water from COWF which is on the RWPG	None
B; G	Baylor SUD	6216	TX0120004	BAYLOR WSC	no	no	no	no	very low	None	None
B; G	Red River Authority of Texas	6505	TX1380006	RRA TRUSCOTT GILLILAND WATER SYSTEM	no	no	no	no	very low	Red River Authority has representative on the RWPG	None
B; O	Red River Authority of Texas	6505	TX1350001	RRA GUTHRIE DUMONT WATER SYSTEM	no	no	no	no	very low	Red River Authority has representative on the RWPG	None