Region F
Water Planning Group

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MEMORANDUM

To: Ms. Carolyn Brittin

From: Jon S. Albright – Freese and Nichols, Inc.

Re: Errata in the January 5, 2006 Region F Regional Water Plan

Date: March 22, 2006

Several errata in the January 5, 2006 Region F Regional Water Plan (Plan) have come to our attention, specifically:

- Deletion of Lake Alan Henry as a strategy considered in the Plan,
- Corrections to supplies from Lake Ivie for the City of Midland,
- Corrections to Appendix 4A, and
- Miscellaneous typographic errors and adjustments to match DB07 input.

Table 1 is a summary of the changes to the plan. The errata are described in more detail below.

Deletion of Lake Alan Henry as a Considered Strategy

At the time of development of the Plan, Lake Alan Henry was recommended as a potential supply for the Colorado River Municipal Water District (CRMWD). However, since completion of the Plan, it has come to our attention that the City of Lubbock plans to develop supplies from this source earlier than expected and supplies will no longer be available for CRMWD. As a result, this strategy is no longer considered to be feasible and has been deleted from the Region F Plan. A new Section 4.8.1 is included in Attachment 1 of this memorandum. Other pages in the main report impacted by the

Table 1
Errata in the January 5, 2006 Region F Regional Water Plan

Page(s)	Location	Description
ES-9	Second sentence in ES.3.2	Should read "238,000" instead of "38,000"
4-4 to 4-5	Figures 4.1-2 to 4.1-4	Replace figures 4.1-2 to 4.1-4 to reflect final distribution of supplies in DB07
4-6 to 4-8	Tables 4.1-1 to 4.1-3	Replace tables to reflect final distribution of supplies in DB07
4-91	Table 4.3-46	Ivie contract amount incorrect.
4-97	Table 4.3-49	Ivie contract amount incorrect.
4-162	First bullet under "Voluntary Redistribution"	Delete reference to Lake Alan Henry as a considered water management strategy.
4-166	First sentence under "Other Water Management Strategies Affected"	Delete reference to Lake Alan Henry
4-171 to 4-174	Description of Lake Alan Henry strategy	Delete from plan
4-184	Recommended Strategies for CRMWD	Delete Lake Alan Henry
4-185	Tables 4.8-15 and 4.8-16	Delete Lake Alan Henry
4-230 to 4-234	Table 4.10-1	Corrections for removal of Lake Alan Henry, addition of Weather Modification strategy, and adjustments to match redistribution of supplies as a result of DB07 comments
4-235	Table 4.10-2	Deletion of Lake Alan Henry strategy. Addition of strategies recommended for San Angelo. These strategies are also shown on Table 4.10-1 for the city of San Angelo. Corrected supplies to UCRA from subordination.
9-4	Table 9.1-2	Corrected cost estimates for Andrews, Robert Lee and CRMWD
Appendix 4A		Several supply, demand and needs sections corrected
Appendix 4F		Remove cost estimates for Lake Alan Henry strategy
Appendix 4H	Strategy Evaluation Matrix and Environmental Matrix	Remove Lake Alan Henry strategy. Removal of wetland acreage column in Environmental Matrix.

removal of this strategy may be found in Attachment 2. Changes to Appendices may be found in Attachment 3. Please note that pages ES-9 through ES-11 in the Executive Summary have been changed as a result of deletion of this strategy.

Corrections for Supplies from Lake Ivie for the City of Midland

The supply from Lake Ivie in Tables 4.3-46 and 4.3-49 in the Plan did not include the amount of supply allocated to outside sales by the City of Midland. This amount has been corrected in revised tables found in Attachment 2.

Corrections to Appendix 4A

The supply and demand columns were scrambled for several Water User Groups in Appendix 4A, resulting in incorrect matching of supply, demand and needs. A new version of Appendix 4A may be found in Attachment 3.

Corrections to Table 9.1-2

The cost estimates for the City of Andrews and Robert Lee are not the final cost estimates presented in Chapter 4. Also, costs for CRMWD needed adjustment because of deletion of the Lake Alan Henry strategy. A new Table 9.1-2 may be found in Attachment 2.

Other Corrections

Figures 4.1-2 through 4.1-4 and Tables 4.1-1 through 4.1-3 were modified due to changes in supply distribution in DB07. The corrected figures and tables may be found in Attachment 2.

The Weather Modification strategy was left out of the original version of Table 4.10-1. Although the plan does not assign supplies for this strategy to a particular water user group, the costs of the strategy are included in the plan and therefore should be in this table. It is noted on Table 4.10-1 that supplies from brush control and weather modification are not considered firm supplies. The associated total costs for these strategies are shown at the end of the table.

Other changes to this table are the result of redistribution of supplies among multi-county water user groups as a result of addressing comments in DB07. A revised version of Table 4.10-1 may be found in Attachment 2.

Changes to Table 4.10-2 as noted in Table 1 of this errata memorandum may be found in Attachment 2.

The Environmental Quantification Matrix in Appendix 4H inadvertently included a column for impacts on wetland acres. It is assumed that all of the projects will have minimal impacts on wetlands.

Attachment 1
New Section 4.8.1

4.8 Strategies for Wholesale Water Providers

Strategies have been developed for the Colorado River Municipal Water District, the Brown County Water Improvement District No. 1, and the City of San Angelo. For the purposes of this plan, contracts between University Lands and CRMWD, the City of Andrews and the City of Midland are expected to be renewed when they expire. If these contracts are not renewed, the timing of recommended strategies for the City of Midland and CRMWD may be impacted. The City of Andrews may not have sufficient supplies even with the contract renewal and may require a new source of water.

4.8.1 Colorado River Municipal Water District

The Colorado River Municipal Water District (CRMWD), the largest water supplier in Region F, provides raw water from both groundwater and surface water sources. CRMWD owns and operates three major reservoirs, Lake J.B. Thomas, E.V. Spence Reservoir, and O.H. Ivie Reservoir, as well as several chloride control reservoirs. Groundwater sources include well fields in Ward, Scurry and Martin Counties. CRMWD member cities include Big Spring, Odessa and Snyder. CRMWD also supplies water to Midland, San Angelo and Abilene (through West Central Texas MWD) as well as several smaller cities in Ward, Martin, Howard and Coke Counties.

Table 4.8-1 compares supplies to projected demands for CRMWD customers. As shown in Table 4.8-1, CRMWD has needs throughout the planning period. These needs are the result of the use of the Colorado WAM as the basis for water availability. Supplies from the Colorado WAM are discussed in Appendix 3C.

Potentially Feasible Strategies for CRMWD

The following potentially feasible strategies have been identified for CRMWD:

- Subordination of downstream senior water rights
- Water conservation
- Drought management
- Reuse

Table 4.8-1
Comparison of Supply and Demand for CRMWD
(Values in Acre-Feet per Year)

Supplies	2010	2020	2030	2040	2050	2060
Thomas	0	0	0	0	0	0
Spence	560	560	560	560	560	560
Ivie	66,350	65,000	63,650	62,300	60,950	59,600
Ward County Well Field (Cenozoic Pecos Alluvium) *	5,200	0	0	0	0	0
Scurry County Well Field (Dockum)	900	900	900	900	900	900
Ector County Well Field (Edwards-Trinity)	440	440	440	440	440	440
Martin County Well Field (Ogallala)	1,035	1,035	1,035	1,035	1,035	1,035
Total	*74,485*	*67,935*	*66,585*	*65,235*	*63,885*	*62,535*
Demands	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Member Cities	34,108	35,599	36,744	37,912	39,358	41,064
Others	59,928	61,264	42,637	42,255	41,106	40,732
Total	*94,036*	*96,863*	*79,381*	*80,167*	*80,464*	*81,796*
Surplus (Need)	*(19,551)*	*(28,928)*	*(12,796)*	*(14,932)*	*(16,579)*	*(19,261)*

* The contract with University Lands for the Ward County Well Field expires in 2019.

- Voluntary redistribution
  - Roberts County groundwater
  - Renew contract with University Lands
  - New contracts to provide water
- New groundwater
  - Winkler County Well Field
  - Groundwater from southwestern Pecos County
- Desalination – Capitan Reef Complex

Precipitation enhancement and brush control are discussed in Section 4.9.

With subordination agreements CRMWD will have sufficient water to meet projected demands throughout the planning period. However, new supplies are needed to increase the reliability of the CRMWD system and to improve water quality. Water quality considerations often prevent CRMWD from operating its system at full capacity. The total dissolved solids (TDS) concentration of water varies among CRMWD's sources of water, ranging from less than 500 mg/l in Lake Thomas to up to 4,000 mg/l in Lake Spence. The CRMWD system is operated

so that all of its customers receive water of approximately the same quality. To fully utilize the yield of Spence Reservoir and maintain water quality, additional low TDS water is needed.

Subordination of Downstream Senior Water Rights

TWDB requires the use of the TCEQ WAM for regional water planning. In the Colorado WAM, most reservoirs in Region F with a priority date after 1926 do not have a firm or safe yield. This result is largely due to the assumptions used in the Colorado WAM. The priority dates for CRMWD reservoirs are 1946 for Lake Thomas, 1964 for Spence Reservoir and 1978 for Ivie Reservoir. However, TCEQ modeled Ivie Reservoir so that it can impound water at a 1926 priority date as the Highland Lakes. As a result, Thomas and Spence have little or no yield, while Lake Ivie has a safe yield of over 66,000 acre-feet. The assumptions used in the Colorado WAM are discussed in more detail in Appendix 3C.

In order to address water availability issues resulting from the Colorado WAM model, Region F and the Lower Colorado Region (Region K) participated in a joint modeling effort to evaluate a strategy in which lower basin senior water rights do not make priority calls on major upstream water rights. This strategy also assumes that major water rights in Region F do not make priority calls on each other. The subordination strategy is discussed in Section 4.2.3. Table 4.8-2 is a summary of the impacts of the subordination strategy on CRMWD supplies.

Table 4.8-2
Impact of Subordination Strategy on CRMWD Water Supplies [a]
(Values in acre-feet per year)

Reservoir	Priority Date	Permitted Diversion	2010 Supply WAM Run 3	2010 Supply with Subord-ination	2060 Supply WAM Run 3	2060 Supply with Subord-ination
Lake Thomas	5/08/1946	23,000	0	10,013	0	10,130
Spence Reservoir	8/17/1964	41,573	560	38,472	560	37,330
Ivie Reservoir	2/21/1978 [b]	113,000	66,350	66,452	59,600	56,260
Total		*177,573*	*66,910*	*114,937*	*60,160*	*103,720*

a Water supply is defined as the safe yield of the reservoir.

b Although Ivie Reservoir has a junior priority date, in the Colorado WAM TCEQ assumed that the reservoir could store water at a 1926 priority date because of the subordination of Ivie to the Highland Lakes. Water supplies in the Colorado WAM are discussed in separate memoranda.

The joint modeling between the two regions was conducted for planning purposes only. Neither Region F nor the Lower Colorado Region mandates the adoption of this strategy by individual water right holders. A subordination agreement is not within the authority of the Region F Water Planning Group. Such an agreement must be developed by the water rights holders themselves, including CRMWD.

Impacts of the subordination strategy are discussed in Section 4.2.3.

CRMWD Reclamation Project

Wastewater reuse is becoming an increasingly important source of water across the state, especially in West Texas where there are few new water sources. Reuse provides a reliable source that remains available in a drought. The quantity of available reuse increases as water demands increase. This strategy also represents an effective means of conserving existing water sources, which can defer development of new water sources.

CRMWD serves several large municipal areas that could potentially benefit from wastewater reuse, reducing the demand for water from CRMWD's existing sources. To evaluate a regional reclamation project, three reuse projects were studied to serve the District's primary customers: Snyder, Big Spring and Odessa-Midland. Each of these projects could be implemented independently or collectively as a regional wastewater reuse plan for the District. A discussion of each proposed reuse project is presented in the following sections. Additional information on these projects may be found in the report *Regional Water Reclamation Project Feasibility Study*[43].

Snyder Reuse Project

The City of Snyder is a CRMWD member city and obtains all of its water from Lake J.B. Thomas. During times of drought and low water levels in the lake CRMWD must move water from its other sources through Lake Thomas to serve Snyder. This operation is less than desirable due to increased water losses and higher TDS concentrations of the transferred water. The proposed Snyder Reclamation Project would provide additional water to the city and minimize the transfer of water from other sources.

The proposed Snyder Reclamation Project would blend the city's treated effluent, which is currently discharged to Deep Creek, with raw water from Lake Thomas. Approximately 0.9 MGD of wastewater effluent would be subjected to advanced treatment using membrane

filtration, reverse osmosis and ultraviolet oxidation, and then blended with raw surface water in a new 15 million gallon terminal storage facility.

Treated effluent that is not needed during wet seasons or periods of low demand would be stored underground at a suitable site with an aquifer storage and recovery (ASR) system. An 8-inch transmission pipeline would be constructed to move the treated effluent to and from the ASR facility. Two new wells would be used for injection and extraction of the water.

Quantity, Reliability and Cost of Snyder Reuse Project

This strategy would provide approximately 726 acre-feet per year of additional supply to Snyder, or about 22 percent of the maximum expected demand for the city and its customers during the planning period. The reliability of this water source is high. Table 4.8-4 is a summary of the costs of the project. Capital costs are estimated at $7.5 million, with a unit cost of $3.61 per 1,000 gallons of reclaimed water.

Table 4.8-3
Snyder Reuse Project

Supply from Strategy	726 acre-feet per year
Total Capital Costs (2002 Prices)	$ 7,499,000
Annual Costs	$ 854,000
Unit costs (before amortization)	$ 1,176 per acre-foot
	$ 3.61 per 1,000 gallons
Unit Costs (after amortization)	$ 275 per acre-foot
	$ 0.85 per 1,000 gallons

Environmental Issues Associated with Snyder Reuse Project

Wastewater reuse will reduce low flows in Deep Creek and, to a much lesser extend, flows in the Colorado River below Lake Thomas. The advanced treatment will produce a reject stream that will be blended with other wastewater effluent and discharged to Deep Creek, which may increase TDS levels. However, TDS levels in Deep Creek and this portion of the Colorado River are already very high, and downstream impacts will be mitigated by diversion of high TDS water at the existing chloride control project near Colorado City and stored in Barber Reservoir.

Because of the relatively small volume of effluent currently discharged, the impact on overbanking flows is expected to be minimal. There is no impact on bays and estuaries because

all of the current discharge is lost, impounded or used before reaching the Colorado estuary or Matagorda Bay.

This strategy should have a positive impact on water quality in Lake Thomas because the need to pass water from other sources through the reservoir during drought will be reduced or eliminated.

The project does not require a bed-and-banks permit because the reuse occurs prior to discharge.

Agricultural and Rural Issues Associated with Snyder Reuse Project

There are no agricultural or rural issues associated with this project.

Other Natural Resource Issues Associated with Snyder Reuse Project

This strategy will provide an alternative source of water for Snyder, which will conserve water from CRMWD sources that otherwise would be needed to meet Snyder's water needs.

Significant Issues Affecting Feasibility of Snyder Reuse Project

Public acceptability of wastewater reuse for municipal use may affect the feasibility of this project. Also, current TCEQ rules for use of reclaimed water do not address its use for supplementing municipal water supplies. Changes to TCEQ rules may change the feasibility of this strategy.

Other Water Management Strategies Directly Affected by Snyder Reuse Project

None identified.

Big Spring Reuse Project

Similar to the Snyder Reclamation Project, the Big Spring Reclamation Project would blend treated wastewater effluent from Big Spring with raw water from Spence Reservoir. This project proposes to treat 2.3 MGD of wastewater effluent with advanced treatment (membrane filtration, reverse osmosis and UV oxidation) and blend the treated water directly with raw water in the District's Spence Pipeline that runs along the northeast side of Big Spring. The raw water/effluent blend would then be treated at the city's water treatment plant for municipal and industrial use. Water from Spence Reservoir has historically been high in TDS and the reclaimed water should improve the quality of the water from this source.

The reject water from the reverse osmosis treatment would be discharged to Beals Creek and subsequently re-diverted at the existing Beals Creek chloride control project and stored in Red Draw Reservoir.

An alternative to the proposed project is to use all or a portion of the reclaimed water for industrial purposes. The industrial water will require less treatment.

Quantity, Reliability and Cost of the Big Spring Reuse Project

The annual yield of the project is estimated at 1,855 acre-feet per year, which is approximately 25 percent of the maximum projected municipal demand for the city and its customers. The reliability of the water source is high. Capital costs are estimated at $7.6 million, with unit costs for the reclaimed water at $1.92 per 1,000 gallons. Table 4.8-4 summarizes the costs for the project.

Table 4.8-4
Big Spring Reuse Project

Supply from Strategy	1,855 acre-feet per year
Total Capital Costs (2002 Prices)	$ 7,606,000
Annual Costs	$ 1,168,000
Unit costs (before amortization)	$ 630 per acre-foot
	$ 1.93 per 1,000 gallons
Unit Costs (after amortization)	$ 272 per acre-foot
	$ 0.84 per 1,000 gallons

Environmental Issues Associated with the Big Spring Reuse Project

Currently almost all of the treated wastewater discharge from the City of Big Spring is re-diverted at the Beals Creek chloride control project, and this operation is not expected to change with the proposed project. Except for the short reach between the existing discharge point and the diversion project, there should be little impact on instream flows. The water quality of this stream reach is already high in TDS and the discharge is expected to have little impact on water quality. The existing chloride control project will mitigate any impacts on downstream water quality.

Because of the relatively small volume of effluent currently discharged, the impact on overbanking flows is expected to be minimal. There will be no impact on bays and estuaries because all of the water currently discharged is lost, diverted or stored in reservoirs before

reaching the Colorado estuary or Matagorda Bay. The project does not require a bed-and-banks permit because the reuse occurs prior to discharge.

Agricultural and Rural Issues Associated with the Big Spring Reuse Project

There are no agricultural or rural issues associated with this project.

Other Natural Resource Issues Associated with the Big Spring Reuse Project

This strategy will provide an alternative source of water for Big Spring, which will conserve water from CRMWD sources that would be needed to meet the city's water needs.

Significant Issues Affecting Feasibility of the Big Spring Reuse Project

Public acceptability of wastewater reuse for municipal use may affect the feasibility of this project. Current TCEQ rules for use of reclaimed water do not address its use for supplementing municipal water supplies. Changes to TCEQ rules may change the feasibility of this strategy.

Other Water Management Strategies Directly Affected by the Big Spring Reuse Project

No other water management strategies are impacted by this project.

Odessa-Midland Reuse Project

The proposed Odessa-Midland Reuse Project would utilize wastewaters from both cities and reclaim approximately 10.8 MGD of treated wastewater. The effluent would undergo advanced treatment at a Regional Reclamation Facility prior to blending with raw water at the District's 100 million gallon terminal storage reservoir between the two cities. The City of Odessa already has an extensive water reclamation system which could be used as part of this project. Treatment will consist of membrane filtration, reverse osmosis and ultraviolet oxidation. This strategy includes ASR using the City of Midland's abandoned McMillan well field for underground storage.

Handling and disposal of the brine reject from the treatment process is a large part of the cost of this project. The disposal process includes a combination of disposal wells, storage and evaporation reservoirs, and transfers to oil operations at the Mabee Oil Field. The strategy also calls for construction of secondary treatment facilities at the City of Midland's existing treatment plant.

Quantity, Reliability and Cost of the Odessa/Midland Reuse Project

The annual yield of the project is estimated at 9,799 acre-feet per year, or about 17 percent of the combined demand for the cities of Odessa and Midland and their municipal customers. The reliability of the water source is high. Capital costs are estimated at $82.1 million, with unit costs for the reclaimed water at $3.13 per 1,000 gallons. Table 4.8-5 summarizes the costs for the project.

Table 4.8-5
Odessa-Midland Reuse Project

Supply from Strategy	9,799 acre-feet per year
Total Capital Costs (2002 Prices)	$ 82,144,000
Annual Costs	$ 10,013,000
Unit costs (before amortization)	$ 1,022 per acre-foot
	$ 3.14 per 1,000 gallons
Unit Costs (after amortization)	$ 291 per acre-foot
	$ 0.89 per 1,000 gallons

Environmental Issues Associated with the Odessa/Midland Reuse Project

Currently the City of Midland disposes of treated effluent using land application; none of the treated effluent is discharged. The City of Odessa also uses a large part of its treated effluent for irrigation, with some water contracted for industrial use. Unused treated wastewater is discharged into Monahans Draw. Almost all of the flow in Monahans Draw is treated wastewater, and during the summer very little treated wastewater is discharged. Although reuse will reduce current flows in Monahans Draw, most of the current discharge is lost due to evapotranspiration and infiltration before reaching Beals Creek just above Big Spring. Therefore downstream impacts will be negligible.

Reuse is expected to have minimal impacts on overbank flows and no impact on bays and estuaries.

The proposed project does not call for discharge of the waste stream from treatment, so implementation will not cause a degradation of water quality because of the waste stream. The project does not require a bed-and-banks permit.

Agricultural and Rural Issues Associated with the Odessa/Midland Reuse Project

The City of Midland currently irrigates with treated effluent. Therefore, this project may make less water available for irrigation in Midland County.

Other Natural Resource Issues Associated with the Odessa/Midland Reuse Project

This strategy will provide an alternative source of water for the cities of Odessa and Midland, which will conserve water from CRMWD sources.

Significant Issues Affecting Feasibility of the Odessa/Midland Reuse Project

Public acceptability of wastewater reuse for municipal use may affect the feasibility of this project. Also, current TCEQ rules for use of reclaimed water do not address its use for supplementing municipal water supplies. Changes to TCEQ rules may change the feasibility of this strategy.

Other Water Management Strategies Directly Affected by the Odessa/Midland Reuse Project

CRMWD Winkler County Well Field project.

New Groundwater Development - Winkler Well Field

CRMWD owns water rights to an undeveloped well field in southern Winkler County. The well field will produce water from the Cenozoic Pecos Alluvium aquifer. For the purposes of this plan it has been assumed that water from the well field would be pumped approximately 43 miles directly to the City of Odessa. At Odessa the water could be blended with other sources and distributed to CRMWD's customers.

The proposed well field is near the City of Midland's undeveloped T-Bar Well Field. As an alternative, these two projects could use the same transmission facilities.

Quantity, Reliability and Cost of Winkler County Well Field

CRMWD estimates that the Winkler County Well Field could provide 6,000 acre-feet per year. Water from this source is considered to be very reliable. Table 4.8-6 summarizes the expected costs of developing the well field.

Table 4.8-6
Costs for CRMWD Winkler County Well Field

Supply from Strategy	6,000 acre-feet per year
Total Capital Costs (2002 Prices)	$ 39,934,000
Annual Costs	$ 4,987,000
Unit costs (before amortization)	$ 831 per acre-foot
	$ 2.55 per 1,000 gallons
Unit Costs (after amortization)	$ 251 per acre-foot
	$ 0.77 per 1,000 gallons

Environmental Issues Associated with Winkler County Well Field

Winkler County has no flowing water. Therefore development of this source has very little potential of impacting springflow, baseflow in rivers, or habitats. Based on the available data, it is unlikely that pumping limits will be needed to prevent impacts on aquatic or terrestrial ecosystems. It is not anticipated that groundwater development will cause subsidence.

Agricultural and Rural Issues Associated with Winkler County Well Field

The Region F water supply analysis shows sufficient water supply in Winkler County to meet local agricultural and municipal needs and support well field development by CRMWD and the City of Midland. Therefore, this strategy should have minimal effects on agriculture and rural areas. The right of way for the transmission line may temporarily affect a small amount of agricultural acreage during construction.

Other Natural Resource Issues Associated with Winkler County Well Field

None identified.

Significant Issues Affecting Feasibility of Winkler County Well Field

None identified.

Other Water Management Strategies Directly Affected by Winkler County Well Field

Odessa-Midland Reuse project.

Table 4.8-7
Deleted from Final Plan

Pages 4-172 and 4-173 have been deleted from the Final Region F Plan

Water Marketing – Water from Southwestern Pecos County

A group of landowners in southwestern Pecos County has proposed selling groundwater from an unclassified aquifer in southwestern Pecos County. Initial estimates indicate that this area can produce a large quantity of water of acceptable quality.

Quantity, Reliability and Cost of Water from Pecos County

The sustainable quantity of water from Southwestern Pecos County has not been established, although preliminary estimates indicate that 50,000 to 100,000 acre-feet per year could be available from this source. This strategy assumes that CRMWD would take up to 15,000 acre-feet per year from this source. Because of the uncertainty associated with the sustained availability of water from this source, the reliability of supply is medium. Table 4.8-8 shows the estimated costs associated with this strategy.

Table 4.8-8
Costs for Water from Southwestern Pecos County

Supply from Strategy	15,000 acre-feet per year
Total Capital Costs (2002 Prices)	$ 150,150,000
Annual Costs	$ 18,726,000
Unit costs (before amortization)	$ 1,248 per acre-foot
	$ 3.83 per 1,000 gallons
Unit Costs (after amortization)	$ 376 per acre-foot
	$ 1.15 per 1,000 gallons

Environmental Issues Associated with Water from Pecos County

Information provided by the sponsors of this project indicates possible impacts on flow in the Pecos River from development of this strategy[47], which should be investigated if this strategy is pursued. If linkage between groundwater development and flows in the Pecos River can be established, the local groundwater conservation district may wish to impose pumping limits if needed to protect endangered and threatened species and environmental flows. It is unlikely that development of water from this source will cause subsidence.

Agricultural and Rural Issues Associated with Water from Pecos County

According to information provided by the developers of this project, the supply in the immediate area is primarily used for cattle ranching and development of the project will have minimal impact on existing uses. However, it is possible that large-scale production from this source could impact irrigation supplies in the Belding Farms area. Additional studies may be needed to quantify this impact.

Other Natural Resource Issues Associated with Water from Pecos County

None identified.

Significant Issues Affecting Feasibility of Water from Pecos County

The most significant issue facing this project is the lack of site-specific studies regarding supplies from this source and the potential impacts of large-scale groundwater development. These studies will be needed before this source can be recommended as a strategy. Also, the source is located more than 100 miles from the nearest potential user and will require a significant investment in infrastructure to make the water available.

Other Water Management Strategies Directly Affected by Water from Pecos County

Winkler Well Field, Odessa-Midland Reuse.

Water Marketing – Water from Roberts County

In the year 2000, Mesa Water, Inc., published a study that included an evaluation of delivery of Ogallala aquifer water from Roberts County in the Texas Panhandle to CRMWD and other users in Texas[48]. Delivery of water from this source requires construction of over 300 miles of pipeline.

Quantity, Reliability and Cost of Water from Roberts County

According to previous studies, there is a substantial amount of water available in Roberts County and this supply is very reliable[49]. For the purposes of this plan, this strategy assumes that CRMWD would take up to 25,000 acre-feet per year from this source. Table 4.8-8 shows the estimated costs associated with this strategy. Capital costs include the estimated development fee for this project. Costs are dependent upon the amount of water assumed to be used from this project. If other entities would participate in the project, costs could be lower.

Table 4.8-9
Costs for Water from Roberts County

Supply from Strategy	25,000 acre-feet per year
Total Capital Costs (2002 Prices)	$ 583,627,000
Annual Costs	$ 52,659,000
Unit costs (before amortization)	$ 2,106 per acre-foot
	$ 6.46 per 1,000 gallons
Unit Costs (after amortization)	$ 410 per acre-foot
	$ 1.26 per 1,000 gallons

Environmental Issues Associated with Water from Roberts County

There is some concern that large-scale groundwater use from Roberts County could impact baseflow of the Canadian River, potentially impacting habitat of the Arkansas River Shiner, a threatened species. If this strategy is implemented, mitigation may be required. It is unlikely that development of water from this source will cause subsidence.

Agricultural and Rural Issues Associated with Water from Roberts County

According to previous studies, only a small amount of water from this portion of Roberts County is currently being used for local purposes. There is no irrigated agriculture in the area.

Other Natural Resource Issues Associated with Water from Roberts County

None identified.

Significant Issues Affecting Feasibility of Water from Roberts County

The most significant issue facing this project is the significant investment in infrastructure needed to deliver water from Roberts County. Without the participation of other large water users it may not be cost-effective to deliver water from Roberts County to Region F.

Other Water Management Strategies Directly Affected by Water from Roberts County

Other CRMWD strategies.

Water Conservation

Potential water savings due to implementation of the recommended Region F conservation practices has been evaluated for the CRMWD member cities: Big Spring, Odessa and Snyder. Water conservation savings for the cities of Midland and San Angelo may be found in the Section 4.3.6 and 4.8.3, respectively. Water conservation for smaller customer cities which have

needs that are met through subordination and contract renewal have not been evaluated because of the small quantity of water used by these entities.

Region F recognizes that it has no authority to implement, enforce or regulate water conservation practices. The water conservation practices in this plan are guidelines. Region F considers water conservation strategies determined and implemented by the CRMWD, the CRMWD member cities and CRMWD customers to supersede the recommendations in this plan and to meet regulatory requirements for consistency with this plan.

Quantity, Reliability and Cost

Table 4.8-10, Table 4.8-11 and Table 4.8-12 show potential water conservation savings and costs of water conservation programs for the cities of Snyder, Big Spring and Odessa, respectively. Potential savings range from approximately 14 percent to 18 percent of the demand with no conservation. The reliability of this supply is classified as medium because of the uncertainty involved in the analysis used to calculate the savings. Site specific data regarding residential, commercial, industrial and other types of use would give a better estimate of the reliable supply from this strategy.

Environmental Issues

Most of the CRMWD's water supply comes from reservoirs which spill infrequently. Therefore water conservation could result in more water remaining in reservoir storage, and will have minimal impact on downstream flows. Much of the conserved water in storage will be used for other purposes or lost to evaporation. The additional water in storage may result in a minimal positive impact on recreation use and environmental water needs associated with those reservoirs.

Much of the new water supply development for CRMWD is driven by water quality concerns. CRMWD needs additional high-quality water sources to blend with existing water of lesser quality. As a result, water conservation may not delay or eliminate the need for new water supply development.

Table 4.8-10
Potential Water Conservation Summary for the City of Snyder [a]

Per Capita Demand (gpcd)								
		2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
No Conservation	Projections	194	227	227	227	227	227	227
Plumbing Code	Projections	227 [b]	223	219	216	213	212	212
	Savings	0	4	8	11	14	15	15
Region F Estimate	Projections	227 [b]	217	207	201	197	195	194
	Savings (Region F practices)	0	6	12	15	16	17	18
	Savings (Total)	0	10	20	26	30	32	33
Water Demand (Ac-Ft/Yr)								
		2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
No Conservation	Projections	2,343	2,843	2,938	2,988	3,015	3,033	3,033
Plumbing Code	Projections	2,742	2,792	2,834	2,844	2,829	2,832	2,832
	Savings	0	51	104	144	186	201	201
Region F Estimate	Projections	2,742	2,722	2,680	2,653	2,624	2,612	2,598
	Savings (Region F practices)	0	70	154	191	205	220	234
	Savings (Total)	0	121	258	335	391	421	435
Costs								
Annual Costs			$46,943	$51,385	$50,089	$48,426	$46,643	$45,378
Cost per Acre-Foot [c]			$671	$334	$262	$236	$212	$194
Cost per 1,000 Gal [c]			$2.06	$1.02	$0.80	$0.72	$0.65	$0.60

a Costs and water saving are based on data from TWDB *Report 362 Water Conservation Task Force Water Conservation Best Management Practices Guide*, November 2004.

b Year 2000 water use is based on a per capita water use of 227 gpcd. Actual year 2000 use was 2,343 acre-feet, equivalent to a per capita water demand of 194 gpcd.

c Costs for implementing recommended practices. Costs of implementing plumbing code savings not included in unit cost calculations.

Table 4.8-11
Potential Water Conservation Summary for the City of Big Spring [a]

Per Capita Demand (gpcd)								
		2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
No Conservation	Projections	198	210	210	210	210	210	210
Plumbing Code	Projections	210	207	204	201	198	197	197
	Savings	0	3	6	9	12	13	13
Region F Estimate	Projections	210	199	184	178	175	173	172
	Savings (Region F practices)	0	8	20	23	23	24	25
	Savings (Total)	0	11	26	32	35	37	38
Water Demand (Ac-Ft/Yr)								
		2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
No Conservation	Projections	5,596	6,103	6,255	6,305	6,305	6,305	6,305
Plumbing Code	Projections	5,936	6,016	6,077	6,035	5,945	5,915	5,915
	Savings	0	87	178	270	360	390	390
Region F Estimate	Projections	5,936	5,775	5,474	5,359	5,247	5,190	5,161
	Savings (Region F practices)	0	241	603	676	698	725	754
	Savings (Total)	0	328	781	946	1,058	1,115	1,144
Costs								
Annual Costs			$108,944	$112,960	$109,009	$104,321	$99,734	$96,894
Cost per Acre-Foot [c]			$452	$187	$161	$149	$138	$129
Cost per 1,000 Gal [c]			$1.39	$0.57	$0.49	$0.46	$0.42	$0.39

a Costs and water saving are based on data from TWDB *Report 362 Water Conservation Task Force Water Conservation Best Management Practices Guide*, November 2004.

b Year 2000 water use is based on a per capita water use of 210 gpcd. Actual year 2000 use was 5,596 acre-feet, equivalent to a per capita water demand of 198 gpcd.

c Costs for implementing recommended practices. Costs of implementing plumbing code savings not included in unit cost calculations.

Table 4.8-12
Potential Water Conservation Summary for the City of Odessa [a]

Per Capita Demand (gpcd)								
		2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
No Conservation	Projections	208	208	208	208	208	208	208
Plumbing Code	Projections	208	205	202	198	195	194	194
	Savings	0	3	6	10	13	14	14
Region F Estimate	Projections	208	200	191	185	181	179	178
	Savings (Region F practices)	0	5	11	13	14	15	16
	Savings (Total)	0	8	17	23	27	29	30
Water Demand (Ac-Ft/Yr)								
		2000	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
No Conservation	Projections	21,189	22,248	23,361	24,528	25,755	27,043	28,394
Plumbing Code	Projections	21,189	21,927	22,687	23,350	24,145	25,222	26,484
	Savings	0	321	674	1,178	1,610	1,821	1,910
Region F Estimate	Projections	21,189	21,376	21,487	21,814	22,430	23,302	24,335
	Savings (Region F practices)	0	551	1,200	1,536	1,715	1,920	2,149
	Savings (Total)	0	872	1,874	2,714	3,325	3,741	4,059
Costs								
Annual Costs			$400,979	$416,656	$418,272	$419,543	$420,351	$428,145
Cost per Acre-Foot [c]			$728	$347	$272	$245	$219	$199
Cost per 1,000 Gal [c]			$2.23	$1.07	$0.84	$0.75	$0.67	$0.61

a Costs and water saving are based on data from TWDB *Report 362 Water Conservation Task Force Water Conservation Best Management Practices Guide*, November 2004.

b Year 2000 water use is based on a per capita water use of 210 gpcd. Actual year 2000 use was 5,596 acre-feet, equivalent to a per capita water demand of 198 gpcd.

c Costs for implementing recommended practices. Costs of implementing plumbing code savings not included in unit cost calculations.

Agricultural and Rural Issues

None identified.

Other Natural Resource Issues

None identified.

Significant Issues Affecting Feasibility

This strategy is based on a generalized assessment of water conservation practices and may not accurately reflect the actual costs or water savings that can be achieved by the CRMWD and its member cities. Site-specific data will be required for a better assessment of the potential for water conservation by the city. Technical assistance and funding by the state may be required to implement this strategy.

Other Water Management Strategies Directly Affected

Timing and quantity from other CRMWD strategies.

Drought Management

Drought management strategies are designed to temporarily reduce water demand during extreme drought periods. The April 2005 Draft CRMWD Drought Contingency Plan, drought contingency plans developed by CRMWD customers, and subsequent revisions of these plans determine drought management strategies for CRMWD and its customers. Region F has not identified additional drought management strategies.

Voluntary Redistribution – Renew Contract with University Lands

CRMWD's Ward County Well Field is leased from University Lands, the managing agency for properties belonging to the University of Texas System. The contract expires in 2019. For the purposes of this plan it is assumed that CRMWD and University Lands will renew the contract without change in the quantity of water available from the source. Actual quantities and costs will be determined at the time of renewal.

Renewals of existing contracts for the same quantity of water are not evaluated for impacts.

Voluntary Redistribution – New Contracts to Provide Water

The planning process has identified several new CRMWD contracts to provide water, which are shown in Table 4.8-13. All of these contracts are the result of expiration of existing

customer contracts. The amounts shown in Table 4.8-13 are for planning purposes. The actual amount of water and cost for the water will be negotiated between the contracting parties.

Other CRMWD contracts do not expire during the planning period.

Table 4.8-13
New CRMWD Contracts to Supply Water

Water User	Amount (Acre-Feet per Year)						Comments
	2010	2020	2030	2040	2050	2060	
Midland			10,000	9,800	9,600	9,400	8.45 percent of system yield
Stanton	392	422	429	430	415	393	Set to demands
Millersview-Doole WSC					600	600	
Ballinger					165	219	Set to demands
Total	*392*	*422*	*10,429*	*10,230*	*10,780*	*10,612*	

Desalination – Capitan Reef Complex

The Capitan Reef aquifer has been identified as a potential source of brackish groundwater for CRMWD. In Region F, the Capitan Reef aquifer extends from the New Mexico border in Winkler County, through Ward County and into Pecos County. The Region F water supply analysis shows about 27,000 acre-feet of water per year available from this source. Development of this aquifer could occur concurrently with development of the CRMWD well field in Winkler County. Brackish water production from the Dockum or Cenozoic Pecos Alluvium aquifer could also be developed as an alternative or in conjunction with brackish water from the Capitan Reef aquifer.

Additional information on the Capitan Reef aquifer may be found in Section 3.1.11.

Quantity, Reliability and Cost of Capitan Reef Desalination Project

For the purposes of this plan it is assumed that a 10 MGD desalination plant delivering up to 9,500 acre-feet of water per year would be constructed in Winkler County near the proposed Winkler County Well Field. A parallel pipeline would be constructed to deliver the water to CRWMD customers. Disposal of brine reject would be through deep well injection. Because of

the uncertainty involved with development of this source for municipal water use, the reliability of this source is considered to be moderate. Table 4.8-14 summarized the expected costs for the project.

Table 4.8-14
Capitan Reef Brackish Water Desalination Project

Supply from Strategy	9,500 acre-feet per year
Total Capital Costs (2002 Prices)	$ 86,183,530
Annual Costs	$ 12,352,556
Unit costs (before amortization)	$ 1,300 per acre-foot
	$ 3.99 per 1,000 gallons
Unit Costs (after amortization)	$ 509 per acre-foot
	$ 1.56 per 1,000 gallons

Environmental Issues Associated with Capitan Reef Desalination Project

This strategy relies on brackish groundwater from formations which have no surface outflow in the vicinity of the proposed project. It is unlikely that pumping from these formations will result in any alteration of terrestrial habitats. The conceptual design for the project uses deep well injection for brine disposal. A properly designed and maintained facility should have minimal environmental impact. Well field development and construction of the treatment facility should have minimal environmental impact as well.

Agricultural and Rural Issues of Capitan Reef Desalination Project

Water from the Capitan Reef aquifer is currently used only for oil field flooding. No competition is expected with municipal or agricultural water users. Therefore agricultural and rural impacts are expected to be minimal.

Other Natural Resource Issues Associated with Capitan Reef Desalination Project

None identified.

Significant Issues Affecting Feasibility

Because this source of water is only used for oil field flooding, very little is known about the suitability of this source for municipal water supply. Additional studies will be required to evaluate the merit of this source.

Other Water Management Strategies Directly Affected by Capitan Reef Desalination Project

None identified.

Recommended Strategies for CRMWD

Recommended strategies for CRMWD include:

- Subordination of downstream senior water rights
- New groundwater – Winkler Well Field
- Reuse – CRMWD Reclamation Project
- Renew contract with University Lands
- Desalination – Capitan Reef Complex
- Water conservation

Table 4.8-15 compares the supply from the strategies to demands with these strategies in place, and Table 4.8-16 summarizes the capital costs for the recommended strategies. For the purposes of this plan, it has been assumed that water conservation activities will be financed by the member cities, so costs for water conservation do not appear in Table 4.8-16.

Table 4.8-15
Recommended Water Management Strategies for CRMWD
(Values in Acre-Feet per Year)

Supplies	2010	2020	2030	2040	2050	2060
Existing Supplies	*74,485*	*67,935*	*66,585*	*65,235*	*63,885*	*62,535*
Subordination	48,027	47,134	46,240	45,347	44,453	43,560
Winkler County Well Field	0	0	0	6,000	6,000	6,000
CRMWD Reclamation Project	0	12,380	12,380	12,380	12,380	12,380
Renew Contract with University Lands	0	5,200	5,200	5,200	5,200	5,200
Desalination			9,500	9,500	9,500	9,500
Total Supplies	*122,512*	*132,649*	*139,905*	*143,662*	*141,418*	*139,175*
Conservation	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Potential Savings [a]	862	1,957	2,403	2,618	2,865	3,137
Demands	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Existing customers	94,036	96,863	79,381	80,167	80,464	81,796
New Contracts	392	422	10,429	10,230	10,780	10,612
Total Demand	*94,428*	*97,285*	*89,810*	*90,397*	*91,244*	*92,408*
Surplus (Need) without Conservation	*28,084*	*35,364*	*50,095*	*53,265*	*50,174*	*46,767*
Surplus (Need) with Conservation	*28,946*	*37,321*	*52,498*	*55,883*	*53,039*	*49,904*

a Savings for member cities only. Does not include plumbing code savings, which are already included in the water demand projections.

Table 4.8-16
Capital Costs for Recommended Strategies *

Strategy	Capital Costs	Annual Costs					
		2010	2020	2030	2040	2050	2060
Winkler County Well Field	$ 39,934,000	$-	$-	$-	$ 4,987,000	$ 4,987,000	$ 1,505,000
CRMWD Reclamation Project	$ 97,249,000	$-	$12,035,000	$12,035,000	$ 3,556,000	$ 3,556,000	$ 3,556,000
Subordination	$9,605,400	$837,443	$837,443	$0	$0	$0	$0
Desalination	$86,183,530	$0	$12,352,556	$12,352,556	$4,838,556	$4,838,556	$4,838,556
Total	*$232,971,930*	*$837,443*	*$25,224,999*	*$24,387,556*	*$13,381,556*	*$13,381,556*	*$9,899,556*

* Water conservation would be implemented by individual member cities and would not be a CRMWD cost

Attachment 2
Miscellaneous Corrections

Freese and Nichols, Inc.
LBG-Guyton Associates, Inc.
Alan Plummer Associates, Inc.

Executive Summary
January 2006

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EXECUTIVE SUMMARY

This report presents the *Region F Water Plan* developed in the second round of Senate Bill One regional water planning process. Region F includes all of 32 counties in West Texas, as shown in Figure ES-1. This report presents the results of a five-year planning effort to develop a plan for water supply for the region through 2060.

The Region F water plan was developed under the direction of the 21-member Region F Water Planning Group. An initially prepared plan was presented for review by the public and state and federal agencies. Following a public hearing and comment period, the plan was amended based on comments received from the public and state agencies. The final plan was adopted by the Region F Water Planning Group on November 28, 2005 and submitted to the Texas Water Development Board in early January 2006.

The Region F Plan includes the following chapters:

1. Description of Region
2. Current and Projected Population and Water Demand Data for the Region
3. Water Supply Analysis
4. Identification, Evaluation, and Selection of Water Management Strategies Based on Needs
5. Impacts of Water Management Strategies on Key Parameters of Water Quality and Impacts of Moving Water from Rural and Agricultural Areas
6. Water Conservation and Drought Management Recommendations
7. Description of How the Regional Water Plan is Consistent with long-Term Protection of the State's Water Resources, Agricultural Resources, and Natural Resources
8. Unique Stream Segments/Reservoir Sites/Legislative Recommendations
9. Infrastructure Financing Recommendations
10. Plan Adoption and Public Participation

N

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SCURRY

BORDEN

Colorado River

LAKE J.B THOMAS

LAKE COLORADO CITY

MITCHELL

HOWARD

CHAMPION CREEK RESERVOIR

MARTIN

ANDREWS

NATURAL DAM LAKE

Beals Creek

MITCHELL COUNTY RESERVOIR

OAK CREEK RESERVOIR

LAKE WINTERS

LAKE COLEMAN

LAKE BROWNWOOD

New Mexico

Texas

Midland

20

Big Spring

RED BLUFF RESERVOIR

Salt Creek

ECTOR

STERLING

North Concho River

E.V SPENCE RESERVOIR

Oak Creek

Valley Creek

Elm Creek

Jim Ned Creek

LOVING

WINKLER

Odessa

GLASSCOCK

COKE

RUNNELS

HORDS CREEK LAKE

MIDLAND

LAKE BALLINGER

Colorado River

Pecan Bayou

Monahans

REEVES

COLEMAN

BROWN

Pecos River

WARD

CRANE

REAGAN

O.C FISHER LAKE

Concho River

San Angelo

Middle Concho River

O.H IVIE RESERVOIR

UPTON

LAKE NASWORTHY

CONCHO

THAN BUTTES RESERVOIR

Pecan Creek

IRION

McCULLOCH

Brady Creek

TOM GREEN

BRADY CREEK RESERVOIR

Dove Creek

North Concho River

San Saba River

LAKE BALMORHEA

PECOS

SCHLEICHER

CROCKETT

10

MENARD

MASON

Llano River

James River

Pecos River

SUTTON

Devils River

KIMBLE

Texas

Mexico

Area of Enlargement

Legend

- Interstate
- Counties
- Lakes/Reservoirs
- Cities
- River Basin Boundary
- Streams and Rivers

10 0 10 20 30 Miles

N

W E

S

FN JOB NO	CMD01311
FILE	RegionF_Hillshade.mxd
DATE	January 11, 2005
SCALE	1:1,750,000
DESIGNED	BME
DRAFTED	BME

ES - 1

Figure

Region F

General Location Map

Freese and Nichols
4055 International Plaza Suite 200
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817-735-7300

ES.1 Current Water Needs and Supplies in Region F

As of the 2000 census, the population of Region F was 578,814. The three most populous counties in Region F, Ector, Midland, and Tom Green, have 59 percent of the region's population. Six cities in Region F had a population of more than 10,000 people as of year 2000. These six cities included 57 percent of the population in Region F.

ES.1.1 Physical Setting

Most of Region F is located in the upper portion of the Colorado Basin and in the Pecos portion of the Rio Grand Basin. A small portion of the region is in the Brazos Basin. Figure ES-1 shows the major streams in Region F. The precipitation increases from west to east across the region, as does the average runoff. Evaporation increases from southeast to northwest. The patterns of rainfall, runoff, and evaporation result in more abundant water supplies in the eastern portion of the region.

Region F includes 18 major water supply reservoirs that provide most of the regions' surface water supply. Four major aquifers and seven minor aquifers provide groundwater supplies to Region F.

ES.1.2 Water Use

Water use in Region F increased significantly between 1990 and 1995, primarily due to increases in irrigated agriculture. The total water use has decreased some since 1995. However, the year 2000 use was still 15 percent higher than the amount of water used in 1990. In the year 2000, Region F used 595,696 acre-feet of water. Approximately 66 percent of the current water use in Region F is for irrigated agriculture, followed by municipal, mining, steam electric power generation, livestock watering, and manufacturing.

ES.1.3 Current Sources of Water

The Region F surface water supplies are associated primarily with the major reservoirs. Region F does not import a significant amount of surface water. However, Region F exports a significant amount of surface water to Sweetwater and Abilene, both in the Brazos G Region. The City of Sweetwater owns and operates Oak Creek Reservoir in Region F. The City of Abilene has a contract to purchase water out of O.H. Ivie Reservoir in Region F.

Approximately 70 percent of the water use in Region F is supplied by groundwater. Eleven aquifers provide groundwater supplies in Region F. Region F has 15 Underground Water Conservation Districts (GCDs) that oversee the use of water from the aquifers in the region. Ten of these GCDs formed an alliance known as the West Texas Regional Groundwater Alliance that promotes conservation, preservation, and beneficial use of water in Region F.

Region F has identified 13 "major springs" in the region that are important for water supply or other natural resources protection. These major springs include: San Solomon, Giffin, Sandia, Comanche, Diamond Y, Spring Creek, Dove Creek, Rocky Creek, Anson, Lipan, Kickapoo, Clear Creek, and San Saba Springs.

ES.1.4 Water Providers in Region F

Water providers in Region F include 202 water user groups and seven wholesale water providers. The wholesale water providers include the Colorado River Municipal Water District, Brown County Water Improvement District Number 1, Upper Colorado River Authority, the City of Odessa, the City of San Angelo, the Great Plains Water System, and University Lands.

ES.2 Projected Need for Water

ES.2.1 Population Projections

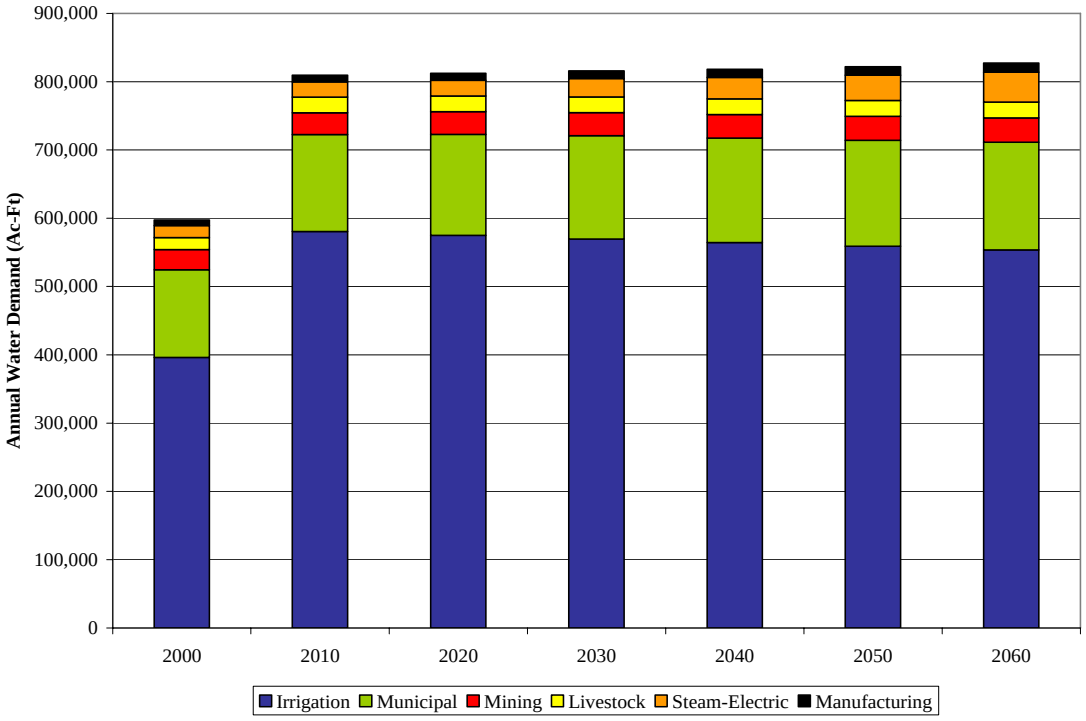
The population of Region F is projected to grow from 578,814 in the year 2000 to 724,094 in 2060, an average growth rate of 0.37 percent per year. The population projections were developed by the Texas Water Development Board (TWDB). The relative distribution of population in Region F is expected to remain stable throughout the planning period. All but three of the counties are generally rural counties and are expected to remain so into the future. The distribution of the projected population by county and city is included in Chapter 2.

ES.2.2 Demand Projections

Figure ES-2 shows the projected demands for water by category of use in Region F. The total historical water use was 595,696 acre-feet in the year 2000 and is projected to be 807,453 acre-feet in 2010 and 825,581 in 2060. The significant increase in water use between the historical year 2000 data and the year 2010 projections is due to irrigation demands. Region F believes that historical year 2000 water use for irrigation is not indicative of the potential for irrigation water use in the region. During the recent drought demand was suppressed because of

low prices and reduced water supply. The adopted projections are an estimate of what the irrigation demand would have been with higher crop prices and sufficient water supplies. Irrigation water demands are projected to make up the majority of the water use in Region F.

Figure ES-2
Projected Water Demand in Region F by Use Category



ES.2.3 Water Supply Analysis

As required by TWDB rules, all surface water supplies in this chapter are derived from Water Availability Models (WAMs), Full Authorization Run (Run 3). The WAMs were developed by the Texas Commission on Environmental Quality (TCEQ). Three WAMs are available in Region F: (a) the Colorado WAM, which covers most of the central and eastern portions of the region, (b) the Rio Grande WAM, which covers the Pecos Basin, and (c) the Brazos WAM. The WAMs allocates water based strictly on priority without regard to geographic location, agreements between water right holders, or type of use. As a result, the Colorado WAM significantly underestimates the amount of water available in Region F.

Groundwater provides most of the irrigation water used in the region, as well as a significant portion of the water used for municipal and other purposes. Groundwater is primarily found in

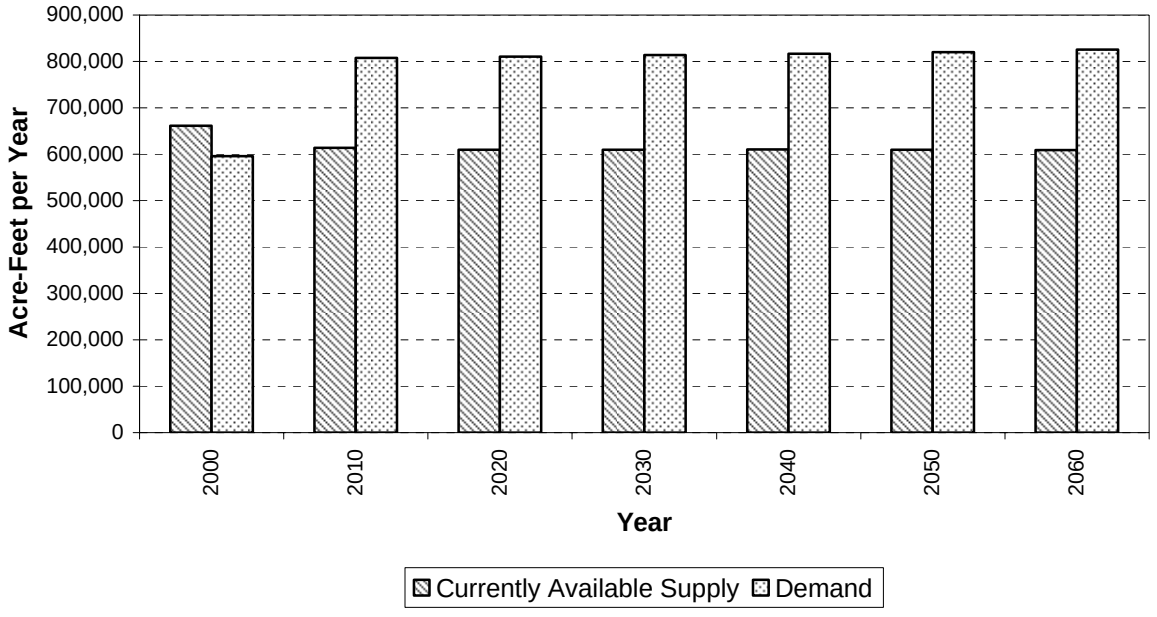
four major and seven minor aquifers that vary in quantity and quality (Figures 1.2-1 and 1.2-2). Groundwater availability is based on recharge plus a portion of the water in storage. The portion of groundwater available from storage is based on either management policies of the various groundwater conservation districts in the region, or on historical trends in areas with no groundwater conservation district.

Not all of the water supplies in the region are currently available to users. Water supply may be limited by the yield of reservoirs, well field capacity, aquifer characteristics, water quality, water rights, permits, contracts, regulatory restrictions, raw water delivery infrastructure or water treatment capacity. Based on current limitations, in 2060 there will be about 609,000 acre-feet per year of water available to water users in the Region.

ES.2.4 Comparison of Supply and Demand

Figure ES-3 shows a comparison of supplies currently available to Region F and projected demands. Surface water supplies are significantly reduced from the historical year 2000 use because of the assumptions used in the Colorado WAM (see Section 3.2). With a projected 2060 demand of 825,581 acre-feet per year, Region F has a shortage of almost 217,000 acre-feet per year by 2060.

Figure ES-3
Comparison of Currently Available Supplies and Projected Demands



Irrigation, municipal, and steam-electric demands have the largest shortages. Typically, the counties with the largest irrigation needs are those with large irrigation demands and limited groundwater supplies. Most of the municipal needs are a result of underestimation of available supply according to the Colorado WAM. Steam-electric generation needs are a result of projected growth in demands that exceeds the supply, as well as the impacts on supply due to the Colorado WAM.

ES.2.5 Socio-Economic Impact of Not Meeting Projected Water Needs

According to the comparison of supply and demand, Region F will face substantial shortages in water supply over the planning period. The Texas Water Development Board developed information on the potential socio-economic impacts of failing to meet projected water needs. The full report may be found in Appendix 4B. The TWDB's findings can be summarized as follows:

- Without implementing any water management strategies, the currently available supplies in Region F meet only 72 percent of the projected 2010 demand, decreasing to 69 percent by 2060.
- Without any water management strategies, the projected water needs would reduce the region's projected 2060 employment by 15,855 jobs, a reduction of 4.7 percent.
- Without any water management strategies, the projected water needs would reduce the region's projected annual income in 2060 by $962.72 million, a reduction of 4.9 percent.

Many of the shortages in supply are the results of the assumptions used in the Colorado WAM, which are explained in detail in Appendix 3D of this report. With implementation of the subordination strategy impacts of water shortages for municipal and manufacturing demands are reduced substantially. Assuming subordination has been implemented has the following potential impacts:

- The currently available supplies in Region F meet 77 percent of the projected 2010 demand, decreasing to 73 percent by 2060.
- The projected 2060 employment loss is reduced from 15,855 jobs to 4,563 jobs because of subordination.
- The 2060 income loss is reduced from $962.72 million to $331.65 million because of subordination.

ES.3 Identification and Selection of Water Management Strategies

The Region F Water Planning Group identified and evaluated a wide variety of potentially feasible water management strategies in developing this plan. Water supply availability, costs and environmental impacts were determined for conservation and reuse efforts, the connection of existing supplies, and the development of new supplies. Almost every strategy suggested to the region during the planning process was analyzed.

As required by the TWDB regulations, the evaluation of water management strategies was an equitable comparison of all feasible strategies and considered the following factors:

- Evaluation of quantity, reliability, and cost of water diverted and treated
- Environmental factors
- Impacts on other water resources and on threats to agricultural and natural resources
- Significant issues affecting feasibility
- Consideration of other water management strategies affected

ES.3.1 Water Conservation and Reuse

The Region F Water Planning Group considered three major categories of water conservation: municipal, irrigation and steam-electric power generation. Overall, in Region F more than 106,000 acre-feet of water could be conserved by 2060.

The recommended water conservation activities for municipal water users in Region F are:

- Education and public awareness programs,
- Reduction of unaccounted for water through water audits and maintenance of water systems, and
- Water rate structures that discourage water waste.

Irrigation is the largest water user in Region F and the category with the largest needs. The irrigation conservation activities evaluated in as part of this plan focus on efficient irrigation practices.

Much of the water conservation proposed for Region F is associated with steam-electric power generation. Region F identified alternative cooling technology that uses very little water as a means of reaching power generation goals. Alternative cooling technology is a water conservation strategy because it replaces a high water use technology, conventional steam-

electric power generation, with a very low water use technology. Therefore this strategy is included in the total water conservation savings for the region.

ES.3.2 Recommended Water Management Strategies

Table ES-1 lists the recommended water management strategies by type for Region F. In total, the Region F plan includes water management strategies to develop approximately 234,000 acre-feet per year of new supplies by 2060, including new well fields, desalination and reuse. The most significant strategy in the Region F plan is subordination of senior water rights. This strategy, which was developed in conjunction with the Lower Colorado Region (Region K), reserves over 39,000 acre-feet of water for use in Region F. Over 20,000 acre-feet of existing supplies will be made available to other water users through voluntary redistribution of existing supplies. Overall, with all strategies in place, by 2060 the total available supply for Region F is approximately 841,000 acre-feet per year. Irrigation demands in 16 counties are not met with this plan due to limited water supplies and lack of cost effective strategies.

Water quality is an important factor in Region F water supplies, particularly for municipal use. Communities in Region F are being pressured to expend limited public and private financial resources to meet water quality standards for arsenic, radionuclides, and secondary water constituents. Meeting these standards is particularly difficult for small communities in the region.

Figure ES-4 shows the comparison of surface water supply and demand for Region F with and without the subordination agreement. Figure ES-5 shows the makeup of the 841,000 acre-feet per year of supplies proposed for the region in 2060.

Table ES-1
Recommended Water Management Strategies by Type

Water Management Strategy	2060 Supply (Acre-Feet per Year)	Implementation Cost
Conservation	82,057	$43,152,601
Alternative Cooling Technology	24,306	$626,502,088
Desalination	16,221	$131,451,830
New Groundwater	31,860	$249,031,400
Infrastructure Improvements	2,406	$11,380,192
Reuse	12,710	$100,889,000
Subordination	39,106	$16,110,200
Voluntary Redistribution	17,132	$5,284,000
Other*	8,362	$24,157,784
Total	*234,160*	*$1,207,959,095*

* Includes brush control and bottled water programs

Figure ES-4
Comparison of Supplies and Demands in Region F
With and Without the Subordination Strategy

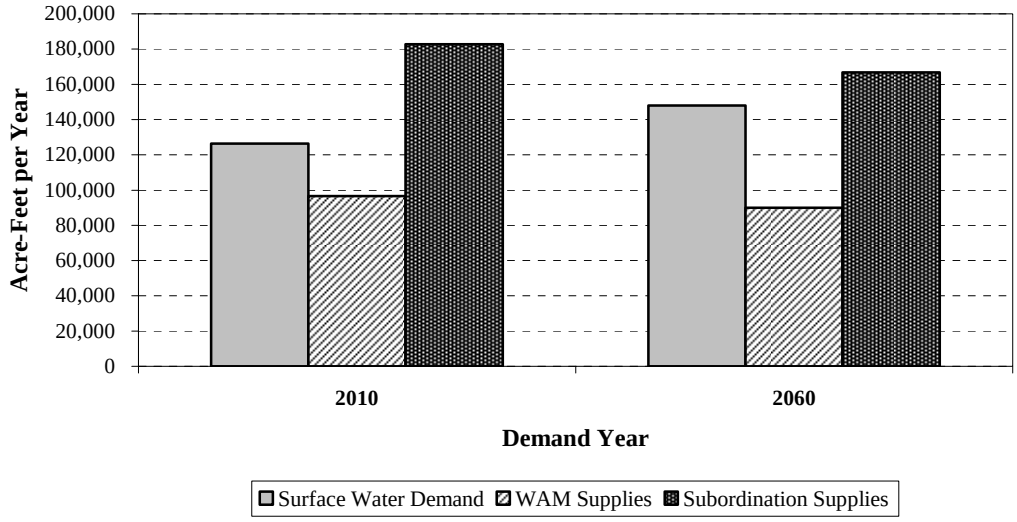


Figure ES-5
Current and Recommended Sources of Water Available to Region F as of 2060

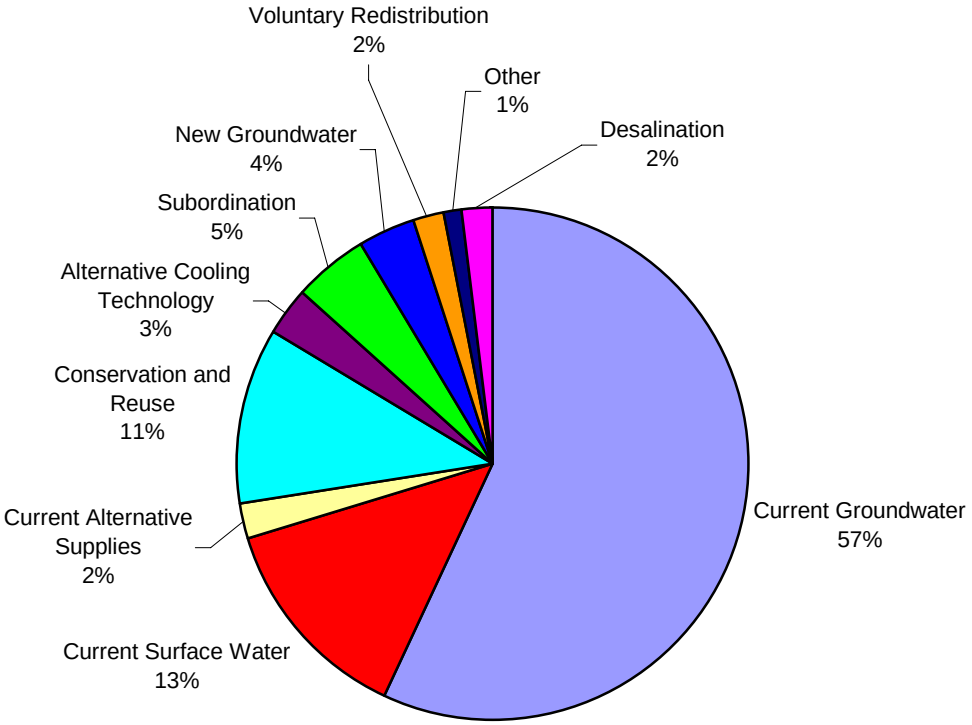


Figure 4.1-2
Comparison of Total Region F Supplies and Demands

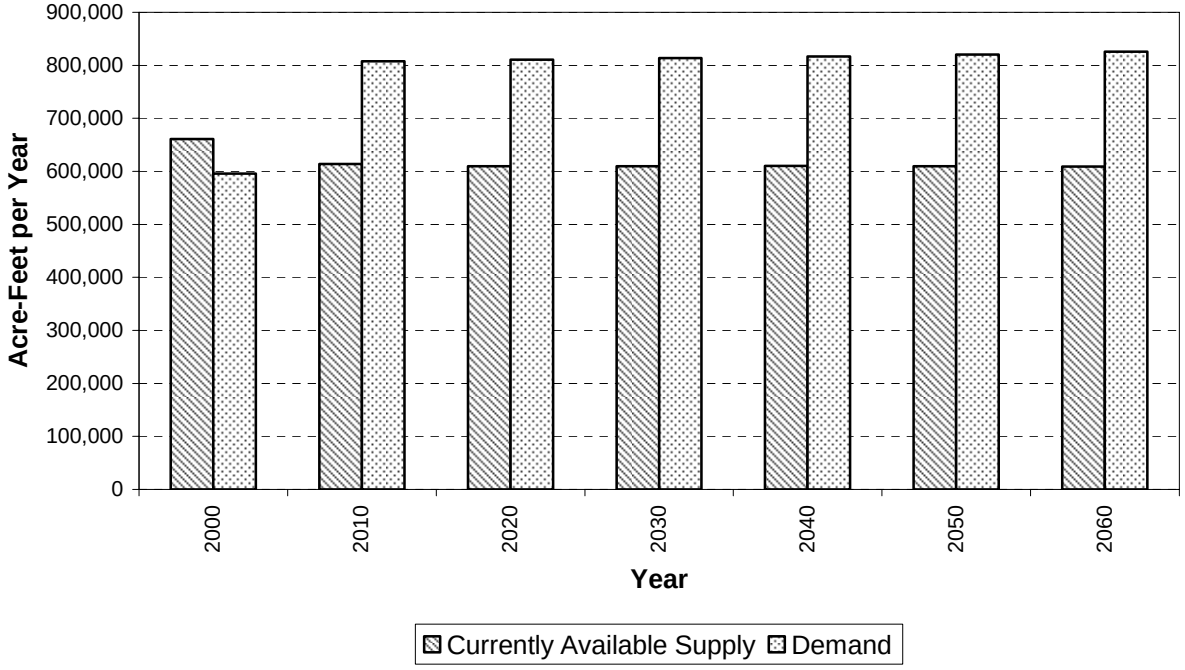
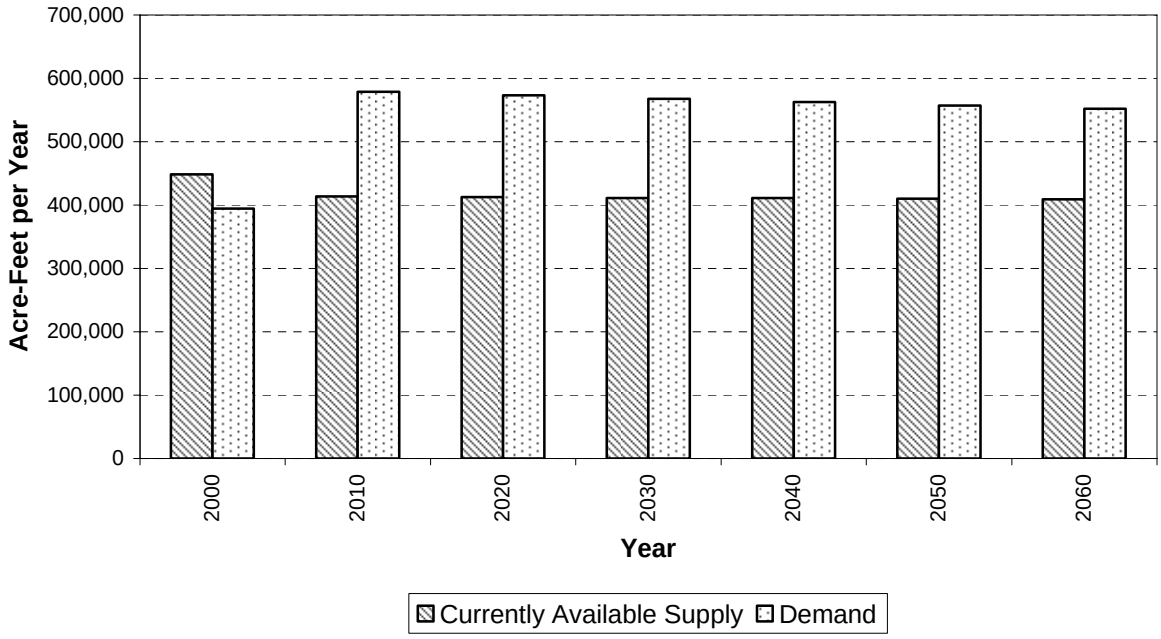


Figure 4.1-3
Comparison of Irrigation Supplies and Demands



Historical water demand data and projections are from the Texas Water Development Board.

Figure 4.1-4
Comparison of Municipal Supplies and Demands

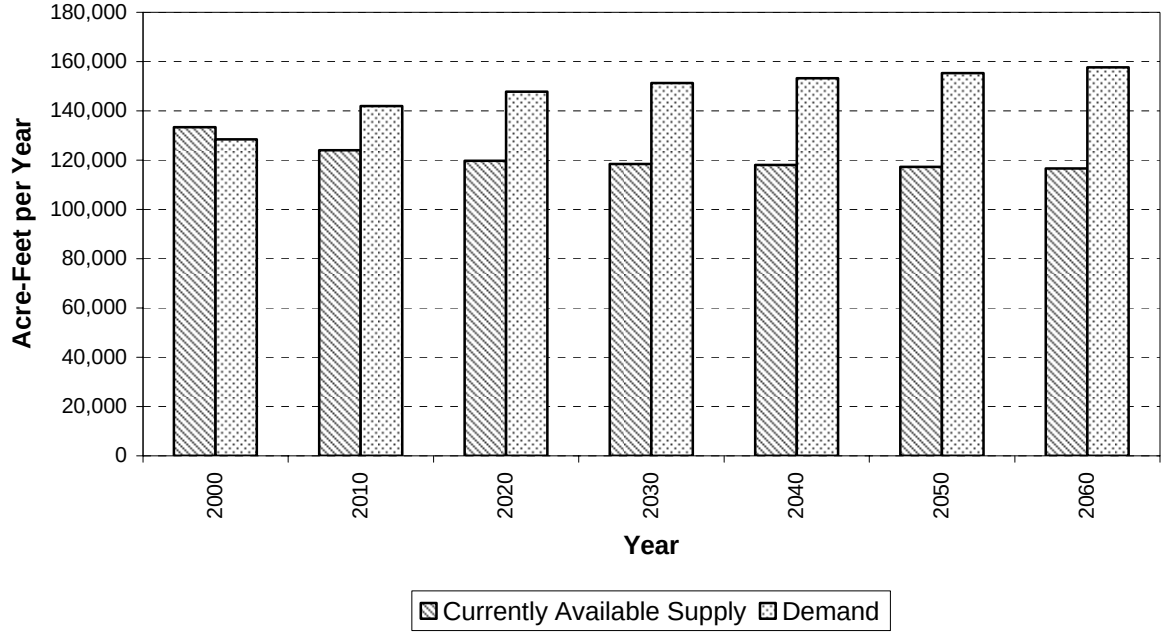


Figure 4.1-5
Comparison of Steam Electric Supplies and Demands

Historical water demand data and projections are from the Texas Water Development Board.

Table 4.1-1
Comparison of Currently Available Supply to Projected Demands by County and Category
Year 2010

County*	Irrigation			Manufacturing			Mining			Municipal			Steam Electric Power			Livestock			Total		
	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)
Andrews	18,514	32,608	(14,094)	0	0	0	1,965	1,908	57	2,954	3,625	(671)	0	0	0	438	438	0	23,871	38,579	(14,708)
Borden	843	2,690	(1,847)	0	0	0	1,014	690	324	178	175	3	0	0	0	281	281	0	2,316	3,836	(1,520)
Brown	9,307	12,313	(3,006)	577	577	0	2,487	2,487	0	7,687	7,106	581	0	0	0	1,636	1,636	0	21,694	24,119	(2,425)
Coke	573	936	(363)	0	0	0	402	488	(86)	526	771	(245)	0	310	(310)	593	593	0	2,094	3,098	(1,004)
Coleman	31	1,379	(1,348)	0	6	(6)	1	18	(17)	1,615	1,874	(259)	0	0	0	1,259	1,259	0	2,906	4,536	(1,630)
Concho	5,265	4,297	968	0	0	0	0	0	0	961	873	88	0	0	0	775	775	0	7,001	5,945	1,056
Crane	337	337	0	0	0	0	2,221	2,221	0	1,256	1,256	0	0	0	0	155	155	0	3,969	3,969	0
Crockett	535	525	10	0	0	0	402	402	0	2,546	1,707	839	1,500	973	527	997	997	0	5,980	4,604	1,376
Ector	5,533	5,533	0	2,693	2,759	(66)	10,074	9,888	186	24,159	28,708	(4,549)	6,375	6,375	0	293	293	0	49,127	53,556	(4,429)
Glasscock	24,488	52,272	(27,784)	0	0	0	5	5	0	181	181	0	0	0	0	232	232	0	24,906	52,690	(27,784)
Howard	4,862	4,799	63	1,471	1,648	(177)	1,383	1,783	(400)	5,958	7,308	(1,350)	0	0	0	366	366	0	14,040	15,904	(1,864)
Irion	1,501	2,803	(1,302)	0	0	0	122	122	0	248	238	10	0	0	0	460	460	0	2,331	3,623	(1,292)
Kimble	1,771	985	786	3	702	(699)	104	71	33	203	1,148	(945)	0	0	0	668	668	0	2,749	3,574	(825)
Loving	583	581	2	0	0	0	3	2	1	11	11	0	0	0	0	70	70	0	667	664	3
Martin	13,536	14,324	(788)	39	39	0	705	674	31	396	788	(392)	0	0	0	273	273	0	14,949	16,098	(1,149)
Mason	16,099	10,079	6,020	0	0	0	6	6	0	956	932	24	0	0	0	1,036	1,036	0	18,097	12,053	6,044
McCulloch	6,103	2,824	3,279	844	844	0	154	154	0	1,516	2,252	(736)	0	0	0	1,027	1,027	0	9,644	7,101	2,543
Menard	3,620	6,061	(2,441)	0	0	0	0	0	0	388	458	(70)	0	0	0	642	642	0	4,650	7,161	(2,511)
Midland	25,260	41,493	(16,233)	164	164	0	677	677	0	26,604	32,568	(5,964)	0	0	0	904	904	0	53,609	75,806	(22,197)
Mitchell	5,564	5,534	30	0	0	0	141	115	26	1,728	1,703	25	0	9,100	(9,100)	449	449	0	7,882	16,901	(9,019)
Pecos	82,583	79,681	2,902	3	2	1	286	159	127	7,660	4,816	2,844	0	0	0	1,240	1,239	1	91,772	85,897	5,875
Reagan	25,600	36,597	(10,997)	0	0	0	2,036	2,036	0	1,035	1,035	0	0	0	0	279	272	7	28,950	39,940	(10,990)
Reeves	66,972	103,069	(36,097)	720	720	0	182	182	0	3,846	3,834	12	0	0	0	2,283	2,283	0	74,003	110,088	(36,085)
Runnels	2,973	4,331	(1,358)	0	63	(63)	44	44	0	307	2,091	(1,784)	0	0	0	1,530	1,530	0	4,854	8,059	(3,205)
Schleicher	3,132	2,108	1,024	0	0	0	150	125	25	852	723	129	0	0	0	787	787	0	4,921	3,743	1,178
Scurry	3,529	2,815	714	0	0	0	3,880	3,107	773	3,101	3,666	(565)	0	0	0	629	629	0	11,139	10,217	922
Sterling	745	648	97	0	0	0	590	590	0	349	349	0	0	0	0	503	503	0	2,187	2,090	97
Sutton	1,812	1,811	1	0	0	0	80	80	0	2,196	1,472	724	0	0	0	796	796	0	4,884	4,159	725
Tom Green	57,531	104,621	(47,090)	0	2,226	(2,226)	150	73	77	14,857	23,494	(8,637)	0	543	(543)	1,978	1,978	0	74,516	132,935	(58,419)
Upton	6,119	16,759	(10,640)	0	0	0	2,662	2,662	0	1,550	942	608	0	0	0	212	212	0	10,543	20,575	(10,032)
Ward	8,266	13,793	(5,527)	7	7	0	153	153	0	3,484	3,484	0	4,914	4,914	0	126	126	0	16,950	22,477	(5,527)
Winkler	10,000	10,000	0	0	0	0	1,878	928	950	4,721	2,377	2,344	0	0	0	169	151	18	16,768	13,456	3,312
Total	*413,587*	*578,606*	*(165,019)*	*6,521*	*9,757*	*(3,236)*	*33,957*	*31,850*	*2,107*	*124,029*	*141,965*	*(17,936)*	*12,789*	*22,215*	*(9,426)*	*23,086*	*23,060*	*26*	*613,969*	*807,453*	*(193,484)*

* County shown is the county where the supply is used. The actual supply may come from a different county.

Table 4.1-2
Comparison of Currently Available Supply to Projected Demands by County and Category
Year 2030

County*	Irrigation			Manufacturing			Mining			Municipal			Steam Electric Power			Livestock			Total		
	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)
Andrews	18,136	32,062	(13,926)	0	0	0	2,031	1,976	55	3,207	3,937	(730)	0	0	0	438	438	0	23,812	38,413	(14,601)
Borden	843	2,682	(1,839)	0	0	0	1,014	646	368	178	169	9	0	0	0	281	281	0	2,316	3,778	(1,462)
Brown	9,284	12,230	(2,946)	686	686	0	2,510	2,510	0	7,671	7,111	560	0	0	0	1,636	1,636	0	21,787	24,173	(2,386)
Coke	573	934	(361)	0	0	0	548	550	(2)	631	755	(124)	0	289	(289)	593	593	0	2,345	3,121	(776)
Coleman	31	1,379	(1,348)	0	6	(6)	1	19	(18)	1,597	1,814	(217)	0	0	0	1,259	1,259	0	2,888	4,477	(1,589)
Concho	5,265	4,262	1,003	0	0	0	0	0	0	992	884	108	0	0	0	775	775	0	7,032	5,921	1,111
Crane	337	337	0	0	0	0	2,214	2,214	0	1,453	1,453	0	0	0	0	155	155	0	4,159	4,159	0
Crockett	535	508	27	0	0	0	431	431	0	2,543	1,865	678	1,500	907	593	997	997	0	6,006	4,708	1,298
Ector	5,402	5,402	0	3,122	3,125	(3)	11,078	10,911	167	27,794	32,271	(4,477)	6,375	10,668	(4,293)	293	293	0	54,064	62,670	(8,606)
Glasscock	24,466	51,438	(26,972)	0	0	0	5	5	0	203	203	0	0	0	0	232	232	0	24,906	51,878	(26,972)
Howard	4,862	4,690	172	1,843	1,832	11	1,915	1,924	(9)	7,346	7,310	36	0	0	0	366	366	0	16,332	16,122	210
Irion	1,501	2,682	(1,181)	0	0	0	122	122	0	242	227	15	0	0	0	460	460	0	2,325	3,491	(1,166)
Kimble	1,771	913	858	3	823	(820)	104	65	39	200	1,129	(929)	0	0	0	668	668	0	2,746	3,598	(852)
Loving	583	576	7	0	0	0	3	2	1	10	10	0	0	0	0	70	70	0	666	658	8
Martin	13,500	13,822	(322)	42	42	0	705	634	71	429	858	(429)	0	0	0	273	273	0	14,949	15,629	(680)
Mason	16,099	9,792	6,307	0	0	0	6	6	0	956	916	40	0	0	0	1,036	1,036	0	18,097	11,750	6,347
McCulloch	6,103	2,754	3,349	1,004	1,004	0	162	162	0	1,593	2,236	(643)	0	0	0	1,027	1,027	0	9,889	7,183	2,706
Menard	3,620	6,022	(2,402)	0	0	0	0	0	0	384	446	(62)	0	0	0	642	642	0	4,646	7,110	(2,464)
Midland	24,500	40,848	(16,348)	198	198	0	846	846	0	14,819	35,301	(20,482)	0	0	0	904	904	0	41,267	78,097	(36,830)
Mitchell	5,564	5,479	85	0	0	0	141	108	33	1,704	1,621	83	0	8,910	(8,910)	449	449	0	7,858	16,567	(8,709)
Pecos	82,583	77,191	5,392	3	2	1	286	158	128	7,689	5,071	2,618	0	0	0	1,240	1,239	1	91,801	83,661	8,140
Reagan	25,269	35,385	(10,116)	0	0	0	2,235	2,235	0	1,167	1,167	0	0	0	0	279	272	7	28,950	39,059	(10,109)
Reeves	66,936	101,323	(34,387)	756	756	0	175	175	0	4,288	4,272	16	0	0	0	2,283	2,283	0	74,438	108,809	(34,371)
Runnels	2,973	4,298	(1,325)	0	76	(76)	45	45	0	351	2,174	(1,823)	0	0	0	1,530	1,530	0	4,899	8,123	(3,224)
Schleicher	3,132	2,024	1,108	0	0	0	150	139	11	834	795	39	0	0	0	787	787	0	4,903	3,745	1,158
Scurry	3,477	2,630	847	0	0	0	3,880	3,413	467	3,711	3,721	(10)	0	0	0	629	629	0	11,697	10,393	1,304
Sterling	745	595	150	0	0	0	605	605	0	387	387	0	0	0	0	503	503	0	2,240	2,090	150
Sutton	1,794	1,742	52	0	0	0	83	83	0	2,206	1,539	667	0	0	0	796	796	0	4,879	4,160	719
Tom Green	57,531	104,107	(46,576)	0	2,737	(2,737)	150	85	65	14,527	24,648	(10,121)	0	909	(909)	1,978	1,978	0	74,186	134,464	(60,278)
Upton	6,099	16,285	(10,186)	0	0	0	2,687	2,687	0	1,551	1,024	527	0	0	0	212	212	0	10,549	20,208	(9,659)
Ward	7,733	13,454	(5,721)	7	7	0	156	156	0	3,122	3,522	(400)	4,937	4,937	0	126	126	0	16,081	22,202	(6,121)
Winkler	10,000	10,000	0	0	0	0	1,878	883	995	4,721	2,444	2,277	0	0	0	169	151	18	16,768	13,478	3,290
Total	*411,247*	*567,846*	*(156,599)*	*7,664*	*11,294*	*(3,630)*	*36,166*	*33,795*	*2,371*	*118,506*	*151,280*	*(32,774)*	*12,812*	*26,620*	*(13,808)*	*23,086*	*23,060*	*26*	*609,481*	*813,895*	*(204,414)*

* County shown is the county where the supply is used. The actual supply may come from a different county.

Table 4.1-3
Comparison of Currently Available Supply to Projected Demands by County and Category
Year 2060

County*	Irrigation			Manufacturing			Mining			Municipal			Steam Electric Power			Livestock			Total		
	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)	Supply	Demand	Surplus (Need)
Andrews	19,080	31,245	(12,165)	0	0	0	2,089	2,036	53	3,400	4,173	(773)	0	0	0	438	438	0	25,007	37,892	(12,885)
Borden	847	2,673	(1,826)	0	0	0	1,014	612	402	174	123	51	0	0	0	281	281	0	2,316	3,689	(1,373)
Brown	9,264	12,105	(2,841)	837	837	0	2,530	2,530	0	7,554	6,932	622	0	0	0	1,636	1,636	0	21,821	24,040	(2,219)
Coke	573	933	(360)	0	0	0	542	614	(72)	545	737	(192)	0	477	(477)	593	593	0	2,253	3,354	(1,101)
Coleman	31	1,379	(1,348)	0	6	(6)	1	19	(18)	1,590	1,766	(176)	0	0	0	1,259	1,259	0	2,881	4,429	(1,548)
Concho	5,265	4,213	1,052	0	0	0	0	0	0	869	865	4	0	0	0	775	775	0	6,909	5,853	1,056
Crane	337	337	0	0	0	0	2,208	2,208	0	1,623	1,623	0	0	0	0	155	155	0	4,323	4,323	0
Crockett	535	482	53	0	0	0	459	459	0	2,539	1,949	590	1,500	1,500	0	997	997	0	6,030	5,387	643
Ector	5,204	5,204	0	3,333	3,491	(158)	12,117	11,970	147	28,542	36,725	(8,183)	6,375	17,637	(11,262)	293	293	0	55,864	75,320	(19,456)
Glasscock	24,468	50,190	(25,722)	0	0	0	5	5	0	201	201	0	0	0	0	232	232	0	24,906	50,628	(25,722)
Howard	4,862	4,527	335	1,879	2,099	(220)	1,767	2,052	(285)	6,420	7,140	(720)	0	0	0	366	366	0	15,294	16,184	(890)
Irion	1,501	2,501	(1,000)	0	0	0	122	122	0	222	185	37	0	0	0	460	460	0	2,305	3,268	(963)
Kimble	1,771	807	964	3	1,002	(999)	104	60	44	200	1,104	(904)	0	0	0	668	668	0	2,746	3,641	(895)
Loving	583	572	11	0	0	0	3	2	1	10	10	0	0	0	0	70	70	0	666	654	12
Martin	13,075	13,075	0	47	47	0	705	603	102	396	789	(393)	0	0	0	273	273	0	14,496	14,787	(291)
Mason	16,099	9,363	6,736	0	0	0	6	6	0	956	900	56	0	0	0	1,036	1,036	0	18,097	11,305	6,792
McCulloch	6,103	2,649	3,454	1,233	1,233	0	171	171	0	1,355	2,190	(835)	0	0	0	1,027	1,027	0	9,889	7,270	2,619
Menard	3,620	5,962	(2,342)	0	0	0	0	0	0	384	435	(51)	0	0	0	642	642	0	4,646	7,039	(2,393)
Midland	23,891	39,884	(15,993)	245	245	0	1,046	1,046	0	14,574	37,180	(22,606)	0	0	0	904	904	0	40,660	79,259	(38,599)
Mitchell	5,564	5,398	166	0	0	0	141	104	37	1,639	1,409	230	0	14,730	(14,730)	449	449	0	7,793	22,090	(14,297)
Pecos	82,583	73,475	9,108	3	2	1	286	158	128	7,670	4,980	2,690	0	0	0	1,240	1,239	1	91,782	79,854	11,928
Reagan	25,186	33,579	(8,393)	0	0	0	2,436	2,436	0	1,049	1,049	0	0	0	0	279	272	7	28,950	37,336	(8,386)
Reeves	66,863	98,710	(31,847)	825	825	0	170	170	0	4,731	4,713	18	0	0	0	2,283	2,283	0	74,872	106,701	(31,829)
Runnels	2,973	4,241	(1,268)	0	94	(94)	45	45	0	308	2,319	(2,011)	0	0	0	1,530	1,530	0	4,856	8,229	(3,373)
Schleicher	3,132	1,897	1,235	0	0	0	154	154	0	824	824	0	0	0	0	787	787	0	4,897	3,662	1,235
Scurry	3,400	2,355	1,045	0	0	0	3,947	3,693	254	3,348	3,696	(348)	0	0	0	629	629	0	11,324	10,373	951
Sterling	745	518	227	0	0	0	620	620	0	379	379	0	0	0	0	503	503	0	2,247	2,020	227
Sutton	1,794	1,639	155	0	0	0	86	86	0	2,196	1,499	697	0	0	0	796	796	0	4,872	4,020	852
Tom Green	57,531	103,338	(45,807)	0	3,425	(3,425)	150	99	51	13,567	24,888	(11,321)	0	1,502	(1,502)	1,978	1,978	0	73,226	135,230	(62,004)
Upton	6,081	15,576	(9,495)	0	0	0	2,708	2,708	0	1,553	1,088	465	0	0	0	212	212	0	10,554	19,584	(9,030)
Ward	6,059	12,947	(6,888)	7	7	0	159	159	0	3,069	3,469	(400)	6,189	8,162	(1,973)	126	126	0	15,609	24,870	(9,261)
Winkler	10,000	10,000	0	0	0	0	1,878	847	1,031	4,721	2,292	2,429	0	0	0	169	151	18	16,768	13,290	3,478
Total	*409,020*	*551,774*	*(142,754)*	*8,412*	*13,313*	*(4,901)*	*37,669*	*35,794*	*1,875*	*116,608*	*157,632*	*(41,024)*	*14,064*	*44,008*	*(29,944)*	*23,086*	*23,060*	*26*	*608,859*	*825,581*	*(216,722)*

* County shown is the county where the supply is used. The actual supply may come from a different county.

Table 4.3-46
Comparison of Current Supplies to Projected Demands for the City of Midland
(Values in Acre-Feet per Year)

Supplies	2010	2020	2030	2040	2050	2060
CRMWD 1966 Contract [a,b]	12,034	12,099	0	0	0	0
Ivie Contract [c]	10,974	10,751	10,528	10,304	10,081	9,858
Paul Davis Well Field [d]	4,722	4,722	4,722	0	0	0
Total Supplies	*27,730*	*27,572*	*15,250*	*10,304*	*10,081*	*9,858*
Demands	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Midland	28,939	30,056	30,804	31,246	31,631	32,112
Outside Sales	49	52	55	58	60	63
Total Demand	*28,988*	*30,108*	*30,859*	*31,304*	*31,691*	*32,175*
Surplus (Need)	*(1,209)*	*(2,484)*	*(15,554)*	*(20,942)*	*(21,550)*	*(22,254)*

a Actual contract amounts for the 1966 Contract are 16,624 acre-feet per year in 2010 and 18,257 acre-feet per year in 2020. Surface water supplies for all CRMWD customers have been reduced to reflect lower supplies from the CRMWD system from the Colorado WAM. With implementation of the subordination strategy, supplies from the 1966 Contract will be increased to current levels because of the additional supply available from the system.

b The 1966 Contract will expire in 2026.

c The Ivie Contract amount has been reduced to 16.54 percent of the safe yield of the reservoir using the Colorado WAM. Currently, the contract is set at 15,000 acre-feet per year. CRMWD has the option to reduce this contract if the safe yield of Ivie Reservoir has been reduced because of sedimentation, drought or other conditions.

d The Paul Davis Well Field is expected to be depleted by 2035.

Table 4.3-49
Recommended Water Management Strategies for the City of Midland
(Values in Acre-Feet per Year)

Supplies	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
CRMWD 1966 Contract	12,034	12,099	0	0	0	0
Ivie Contract	10,974	10,751	10,528	10,304	10,081	9,858
Subordination Strategy [a]	4,656	6,113	(156)	(266)	(378)	(490)
Paul Davis Well Field	4,722	4,722	4,722	0	0	0
T-Bar Well Field	0	0	13,600	13,600	13,600	13,600
Voluntary Redistribution	0	0	10,000	9,800	9,600	9,400
Total Supplies	32,386	33,685	38,694	33,438	32,903	32,368
Conservation	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
Potential Savings [b]	930	2,320	2,903	3,110	3,310	3,521
Demands	**2010**	**2020**	**2030**	**2040**	**2050**	**2060**
City of Midland	28,939	30,056	30,804	31,246	31,631	32,112
Outside Sales	49	52	55	58	60	63
Total Demand	*28,988*	*30,108*	*30,859*	*31,304*	*31,691*	*32,175*
Surplus (Need) without Conservation	*3,398*	*3,577*	*7,835*	*2,134*	*1,212*	*193*
Surplus (Need) with Conservation	*4,328*	*5,897*	*10,738*	*5,244*	*4,522*	*3,714*

a With implementation of the subordination strategy, near-term supplies are increased. Subordination decreases long-term supplies because of the reduced yield in Ivie Reservoir. See memorandum on subordination strategy for more detailed information.

b Does not include plumbing code savings, which are already included in the water demand projections.

Table 4.10-1
Strategy Summary by County

Water User Group Name	County	Basin Name	Water Management Strategy Name	Source Name	Implementation Date	Strategy Supply Increase (Decrease) for 2010	Strategy Supply Increase (Decrease) for 2020	Strategy Supply Increase (Decrease) for 2030	Strategy Supply Increase (Decrease) for 2040	Strategy Supply Increase (Decrease) for 2050	Strategy Supply Increase (Decrease) for 2060	Capital Cost	Annual Cost 2010	Annual Cost 2020	Annual Cost 2030	Annual Cost 2040	Annual Cost 2050	Annual Cost 2060
City of Andrews	Andrews	Colorado	Voluntary Redistribution	Ogallala aquifer	2010	671	708	730	750	760	773	$0	$0	$0	$0	$0	$0	$0
City of Andrews	Andrews	Colorado	Desalination	Dockum aquifer	2020	0	1,121	1,121	1,121	1,121	1,121	$4,678,300	$0	$796,000	$796,000	$388,000	$388,000	$388,000
Irrigation	Andrews	Colorado	Conservation		2020	0	2,728	5,455	5,456	5,457	5,458	$4,041,459	$0	$146,804	$293,608	$293,608	$293,608	$293,608
Andrews County Total						*671*	*4,557*	*7,306*	*7,327*	*7,338*	*7,352*	*$8,719,759*	*$0*	*$942,804*	*$1,089,608*	*$681,608*	*$681,608*	*$681,608*
Irrigation	Borden	Brazos	Conservation		2020	0	94	189	189	189	189	$164,000	$0	$5,957	$11,915	$11,915	$11,915	$11,915
Irrigation	Borden	Colorado	Conservation		2020	0	136	271	271	271	271	$236,000	$0	$8,573	$17,145	$17,145	$17,145	$17,145
Borden County Total						*0*	*230*	*460*	*460*	*460*	*460*	*$400,000*	*$0*	*$14,530*	*$29,060*	*$29,060*	*$29,060*	*$29,060*
Coleman County WSC	Coleman	Colorado	Subordination	Lake Coleman	2010	19	19	19	18	18	18	$0	$0	$0	$0	$0	$0	$0
Brown County Other	Brown	Colorado	Voluntary Redistribution	Lake Brownwood	2010	300	300	300	300	300	300	$5,284,000	$758,000	$758,000	$297,000	$297,000	$297,000	$297,000
Irrigation	Brown	Colorado	Conservation		2020	0	93	185	185	185	185	$44,386	$0	$1,613	$3,225	$3,225	$3,225	$3,225
Brown County Total						*319*	*412*	*504*	*503*	*503*	*503*	*$5,328,386*	*$758,000*	*$759,613*	*$300,225*	*$300,225*	*$300,225*	*$300,225*
City of Bronte	Coke	Colorado	Subordination	Oak Creek Reservoir	2010	129	129	129	129	129	129	$0	$0	$0	$0	$0	$0	$0
City of Bronte	Coke	Colorado	Infrastructure Improvements	Oak Creek Reservoir	2010	0	0	0	0	0	0	$1,238,600	$21,600	$21,600	$0	$0	$0	$0
City of Bronte	Coke	Colorado	New Groundwater	Other aquifer	2010	100	100	100	100	100	100	$464,000	$57,000	$57,000	$17,000	$17,000	$17,000	$17,000
City of Bronte	Coke	Colorado	Conservation		2010	16	45	48	48	50	51	$0	$4,472	$8,743	$8,539	$8,340	$8,145	$8,023
City of Robert Lee	Coke	Colorado	Conservation		2010	16	40	44	45	46	48	$0	$4,770	$8,727	$8,524	$8,325	$8,130	$8,009
City of Robert Lee	Coke	Colorado	Infrastructure Improvements	Spence Reservoir	2010	0	0	0	0	0	0	$2,482,500	$259,000	$259,000	$43,000	$43,000	$43,000	$43,000
City of Robert Lee	Coke	Colorado	Subordination	Colorado River MWD System	2010	95	115	2	21	34	55	$0	$0	$0	$0	$0	$0	$0
City of Robert Lee	Coke	Colorado	Brush control		2010	0	0	0	0	0	0	$95,532	$19,000	$19,000	$19,000	$19,000	$19,000	$19,000
County-Other	Coke	Colorado	Subordination	Colorado River MWD System	2010	28	32	0	6	9	15	$0	$0	$0	$0	$0	$0	$0
Mining	Coke	Colorado	Subordination	Colorado River MWD System	2010	86	119	2	24	43	72	$0	$0	$0	$0	$0	$0	$0
Steam Electric Power	Coke	Colorado	Subordination	Oak Creek Reservoir	2010	310	247	289	339	401	477	$0	$0	$0	$0	$0	$0	$0
Coke County Total						*780*	*827*	*614*	*712*	*812*	*947*	*$4,280,632*	*$365,842*	*$374,070*	*$96,063*	*$95,665*	*$95,275*	*$95,032*
City of Coleman	Coleman	Colorado	Subordination	Lake Coleman	2010	6,886	6,778	6,679	6,581	6,478	6,373	$1,701,400	$148,336	$148,336	$0	$0	$0	$0
City of Coleman	Coleman	Colorado	Subordination	Hords Creek Reservoir	2010	1,390	1,360	1,330	1,300	1,270	1,240	$278,000	$24,237	$24,237	$0	$0	$0	$0
City of Coleman	Coleman	Colorado	Conservation		2010	50	109	141	163	181	187	$0	$21,311	$24,872	$23,960	$23,072	$22,202	$21,664
Coleman County WSC	Coleman	Colorado	Subordination	Lake Coleman	2010	126	114	109	103	101	99	$0	$0	$0	$0	$0	$0	$0
County-Other	Coleman	Colorado	Subordination	Lake Coleman	2010	20	19	19	18	18	18	$0	$0	$0	$0	$0	$0	$0
Irrigation	Coleman	Colorado	Subordination	Lake Coleman	2010	1,348	1,348	1,348	1,348	1,348	1,348	$0	$0	$0	$0	$0	$0	$0
Manufacturing	Coleman	Colorado	Subordination	Lake Coleman	2010	6	6	6	6	6	6	$0	$0	$0	$0	$0	$0	$0
Mining	Coleman	Colorado	Subordination	Lake Coleman	2010	17	18	18	18	18	18	$0	$0	$0	$0	$0	$0	$0
Coleman County Total						*9,843*	*9,752*	*9,650*	*9,537*	*9,420*	*9,289*	*$1,979,400*	*$193,884*	*$197,445*	*$23,960*	*$23,072*	*$22,202*	*$21,664*
City of Eden	Concho	Colorado	Bottled Water Program	Hickory aquifer	2010	0	0	0	0	0	0	$133,320	$26,874	$26,874	$8,760	$8,760	$8,760	$8,760
City of Eden	Concho	Colorado	Infrastructure Improvements	Hickory aquifer	2010	0	0	0	0	0	0	$1,367,372	$278,679	$278,679	$159,465	$159,465	$159,465	$159,465
Irrigation	Concho	Colorado	Conservation		2020	0	748	1,496	1,496	1,496	1,496	$1,591,088	$0	$57,796	$115,591	$115,591	$115,591	$115,591
Millersview-Doole WSC	Concho	Colorado	Subordination	Colorado River MWD System	2010	34	42	1	7	0	0	$0	$0	$0	$0	$0	$0	$0
Millersview-Doole WSC	Concho	Colorado	Voluntary Redistribution	Colorado River MWD System	2050	0	0	0	0	118	118	$0	$0	$0	$0	$0	$0	$0
Concho County Total						*34*	*790*	*1,497*	*1,503*	*1,614*	*1,614*	*$3,091,780*	*$305,553*	*$363,349*	*$283,816*	*$283,816*	*$283,816*	*$283,816*
Ector County UD	Ector	Colorado	Subordination	Colorado River MWD System	2010	400	613	11	151	272	478	$0	$0	$0	$0	$0	$0	$0
Irrigation	Ector	Colorado	Conservation		2020	0	243	485	485	485	485	$253,720	$0	$9,216	$18,433	$18,433	$18,433	$18,433
Irrigation	Ector	Rio Grande	Conservation		2020	0	2	5	5	5	5	$2,563	$0	$93	$186	$186	$186	$186
Manufacturing	Ector	Colorado	Subordination	Colorado River MWD System	2010	66	149	3	46	86	158	$0	$0	$0	$0	$0	$0	$0
City of Odessa	Ector	Colorado	Conservation		2010	540	1,168	1,488	1,657	1,854	2,074	$0	$400,979	$416,656	$418,272	$419,543	$420,351	$428,145
City of Odessa	Ector	Colorado	New Groundwater	Cenozoic Pecos Alluvium	2040	0	0	0	5,799	5,794	5,790	$0	$0	$0	$0	$0	$0	$0
City of Odessa	Ector	Colorado	Reuse		2020	0	4,293	4,273	4,262	4,258	4,256	$0	$0	$0	$0	$0	$0	$0
City of Odessa	Ector	Colorado	Subordination	Colorado River MWD System	2010	4,419	5,633	84	1,112	1,941	3,343	$0	$0	$0	$0	$0	$0	$0
City of Odessa	Ector	Colorado	Voluntary Redistribution	Cenozoic Pecos Alluvium	2020	0	4,708	4,708	4,708	4,708	4,708	$0	$0	$0	$0	$0	$0	$0
Steam Electric Power	Ector	Colorado	Alternative Cooling Technology		2020	0	2,750	4,293	6,174	8,467	11,262	$297,786,650	$0	$4,188,224	$6,821,106	$9,457,193	$14,052,855	$22,099,115
Ector County Total						*5,425*	*19,559*	*15,350*	*24,399*	*27,870*	*32,559*	*$298,042,933*	*$400,979*	*$4,614,189*	*$7,257,997*	*$9,895,355*	*$14,491,825*	*$22,545,879*

Note: Supplies from brush control and weather modification are not firm supplies. The total amount of supply and associated costs for these strategies are shown at the end of this table.

Table 4.10-1 Strategy Summary by County (Continued)

Water User Group Name	County	Basin Name	Water Management Strategy Name	Source Name	Implementation Date	Strategy Supply Increase (Decrease) for 2010	Strategy Supply Increase (Decrease) for 2020	Strategy Supply Increase (Decrease) for 2030	Strategy Supply Increase (Decrease) for 2040	Strategy Supply Increase (Decrease) for 2050	Strategy Supply Increase (Decrease) for 2060	Capital Cost	Annual Cost 2010	Annual Cost 2020	Annual Cost 2030	Annual Cost 2040	Annual Cost 2050	Annual Cost 2060
Irrigation	Glasscock	Colorado	Conservation		2020	0	3,631	7,262	7,262	7,262	7,262	$9,566,394	$0	$347,494	$694,988	$694,988	$694,988	$694,988
City of Big Spring	Howard	Colorado	Conservation		2010	241	603	676	698	725	754	$0	$108,944	$112,960	$109,009	$104,321	$99,734	$96,894
City of Big Spring	Howard	Colorado	Reuse		2020	0	1,855	1,855	1,855	1,855	1,855	$0	$0	$0	$0	$0	$0	$0
City of Big Spring	Howard	Colorado	Subordination	Colorado River MWD System	2010	1,345	1,672	24	299	491	796	$0	$0	$0	$0	$0	$0	$0
City of Coahoma	Howard	Colorado	Subordination	Colorado River MWD System	2010	49	61	1	11	18	29	$0	$0	$0	$0	$0	$0	$0
Irrigation	Howard	Colorado	Conservation		2020	0	327	653	653	653	653	$543,311	$0	$19,736	$39,471	$39,471	$39,471	$39,471
Manufacturing	Howard	Colorado	Subordination	Colorado River MWD System	2010	267	349	5	71	124	220	$0	$0	$0	$0	$0	$0	$0
Mining	Howard	Colorado	Subordination	Colorado River MWD System	2010	400	523	9	101	171	285	$0	$0	$0	$0	$0	$0	$0
Howard County Total						*2,302*	*5,390*	*3,223*	*3,688*	*4,037*	*4,592*	*$543,311*	*$108,944*	*$132,696*	*$148,480*	*$143,792*	*$139,205*	*$136,365*
Irrigation	Irion	Colorado	Conservation		2020	0	37	73	73	73	73	$17,614	$0	$640	$1,280	$1,280	$1,280	$1,280
Irrigation	Irion	Colorado	Weather Modification		2010	0	0	0	0	0	0	$0	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000
Irion County Total						*0*	*37*	*73*	*73*	*73*	*73*	*$17,614*	*$90,000*	*$90,640*	*$91,280*	*$91,280*	*$91,280*	*$91,280*
City of Junction	Kimble	Colorado	Subordination	Llano River	2010	991	991	991	991	991	991	$200,000	$17,437	$17,437	$0	$0	$0	$0
County-Other	Kimble	Colorado	Subordination	Llano River	2010	9	9	9	9	9	9	$0	$0	$0	$0	$0	$0	$0
Irrigation	Kimble	Colorado	Conservation		2020	0	74	147	147	147	147	$118,702	$0	$4,312	$8,624	$8,624	$8,624	$8,624
Manufacturing	Kimble	Colorado	Subordination	Llano River	2010	1,000	1,000	1,000	1,000	1,000	1,000	$200,000	$17,437	$17,437	$0	$0	$0	$0
Kimble County Total						*2,000*	*2,074*	*2,147*	*2,147*	*2,147*	*2,147*	*$518,702*	*$34,874*	*$39,186*	*$8,624*	*$8,624*	*$8,624*	*$8,624*
City of Stanton	Martin	Colorado	Voluntary Redistribution	Colorado River MWD System	2010	392	422	429	430	415	393	$0	$0	$0	$0	$0	$0	$0
Irrigation	Martin	Colorado	Conservation		2020	0	1,751	3,502	3,502	3,502	3,502	$121,659	$0	$121,659	$243,318	$243,318	$243,318	$243,318
Martin County Total						*392*	*2,173*	*3,931*	*3,932*	*3,917*	*3,895*	*$121,659*	*$0*	*$121,659*	*$243,318*	*$243,318*	*$243,318*	*$243,318*
Irrigation	Mason	Colorado	Conservation		2020	0	746	1,491	1,491	1,491	1,491	$598,026	$0	$21,723	$43,446	$43,446	$43,446	$43,446
City of Brady	McCulloch	Colorado	Conservation		2010	77	192	214	222	230	239	$0	$23,486	$27,370	$26,348	$25,353	$24,380	$23,770
City of Brady	McCulloch	Colorado	Subordination	Brady Creek Reservoir	2010	2,170	2,170	2,170	2,170	2,170	2,170	$434,000	$37,838	$37,838	$0	$0	$0	$0
County Other	McCulloch	Colorado	Bottled Water Program	Hickory aquifer	2010	0	0	0	0	0	0	$0	$3,191	$3,191	$3,191	$3,191	$3,191	$3,191
Irrigation	McCulloch	Colorado	Conservation		2020	0	1,977	394	394	394	394	$139,633	$0	$5,072	$10,144	$10,144	$10,144	$10,144
Millersview-Doole WSC	McCulloch	Colorado	Subordination	Colorado River MWD System	2010	67	81	1	14	0	0	$0	$0	$0	$0	$0	$0	$0
Millersview-Doole WSC	McCulloch	Colorado	Voluntary Redistribution	Colorado River MWD System	2050	0	0	0	0	228	228	$0	$0	$0	$0	$0	$0	$0
Richland SUD	McCulloch	Colorado	Bottled Water Program	Hickory aquifer	2010	0	0	0	0	0	0	$2,000	$8,000	$8,000	$8,000	$8,000	$8,000	$8,000
Richland SUD	McCulloch	Colorado	Infrastructure Improvements	Hickory aquifer	2010	0	0	0	0	0	0	$1,291,720	$172,191	$172,191	$59,573	$59,573	$59,573	$59,573
McCulloch County Total						*2,314*	*4,420*	*2,779*	*2,800*	*3,022*	*3,031*	*$1,867,353*	*$244,706*	*$253,662*	*$107,256*	*$106,261*	*$105,288*	*$104,678*
City of Menard	Menard	Colorado	New Groundwater	Hickory aquifer	2010	140	139	140	140	141	141	$1,279,400	$172,500	$172,500	$61,000	$61,000	$61,000	$61,000
City of Menard	Menard	Colorado	Conservation		2010	10	24	28	30	32	33	$0	$7,332	$11,327	$11,009	$10,700	$10,397	$10,209
County-Other	Menard	Colorado	New Groundwater	Hickory aquifer	2010	20	21	20	20	19	19	$0	$0	$0	$0	$0	$0	$0
Irrigation	Menard	Colorado	Conservation		2020	0	23	46	46	46	46	$13,358	$0	$485	$970	$970	$970	$970
Menard County Total						*170*	*207*	*234*	*236*	*238*	*239*	*$1,292,758*	*$179,832*	*$184,312*	*$72,979*	*$72,670*	*$72,367*	*$72,179*
City of Midland	Midland	Colorado	Conservation		2020	930	2,320	2,903	3,110	3,310	3,521	$0	$420,493	$463,796	$461,155	$452,873	$440,673	$435,018
City of Midland	Midland	Colorado	Reuse		2010	0	5,389	5,389	5,389	5,389	5,389	$0	$0	$0	$0	$0	$0	$0
City of Midland	Midland	Colorado	Subordination	Colorado River MWD System	2010	4,488	6,055	0	0	0	0	$0	$0	$0	$0	$0	$0	$0
City of Midland	Midland	Colorado	Voluntary Redistribution	Colorado River MWD System	2030	0	0	10,000	9,800	9,600	9,400	$0	$0	$0	$4,660,000	$4,566,800	$4,473,600	$4,380,400
City of Midland	Midland	Colorado	Subordination	O.H. Ivie Reservoir	2010	17	(97)	(211)	(324)	(438)	(553)	$0	$0	$0	$0	$0	$0	$0
City of Midland	Midland	Colorado	Voluntary Redistribution	Ogallala aquifer	2010	1,237	1,237	1,237	0	0	0	$0	$0	$0	$0	$0	$0	$0
City of Midland	Midland	Colorado	Voluntary Redistribution	Ogallala aquifer	2010	3,485	3,485	3,485	0	0	0	$0	$0	$0	$0	$0	$0	$0
City of Midland	Midland	Colorado	New Groundwater	Cenozoic Pecos Alluvium	2030	0	0	13,600	13,600	13,600	13,600	$115,772,000	$0	$0	$13,080,000	$13,080,000	$2,986,000	$2,986,000
Irrigation	Midland	Colorado	Conservation		2020	0	1,800	3,600	3,600	3,600	3,600	$2,642,806	$0	$95,989	$191,977	$191,977	$191,977	$191,977
City of Odessa	Midland	Colorado	Subordination	Colorado River MWD System	2010	86	154	3	39	69	121	$0	$0	$0	$0	$0	$0	$0
City of Odessa	Midland	Colorado	Conservation		2010	11	32	48	58	66	75	$0	$0	$0	$0	$0	$0	$0
City of Odessa	Midland	Colorado	New Groundwater	Cenozoic Pecos Alluvium	2040	0	0	0	201	206	210	$0	$0	$0	$0	$0	$0	$0
City of Odessa	Midland	Colorado	Reuse		2020	0	117	137	148	152	154	$0	$0	$0	$0	$0	$0	$0
City of Odessa	Midland	Colorado	Voluntary Redistribution	Cenozoic Pecos Alluvium	2020	0	92	92	92	92	92	$0	$0	$0	$0	$0	$0	$0
Midland County Total						*10,254*	*20,584*	*40,283*	*35,713*	*35,646*	*35,609*	*$118,414,806*	*$420,493*	*$559,785*	*$18,393,132*	*$18,291,650*	*$8,092,250*	*$7,993,395*

Note: Supplies from brush control and weather modification are not firm supplies. The total amount of supply and associated costs for these strategies are shown at the end of this table.

Table 4.10-1 Strategy Summary by County (Continued)

Water User Group Name	County	Basin Name	Water Management Strategy Name	Source Name	Implementation Date	Strategy Supply Increase (Decrease) for 2010	Strategy Supply Increase (Decrease) for 2020	Strategy Supply Increase (Decrease) for 2030	Strategy Supply Increase (Decrease) for 2040	Strategy Supply Increase (Decrease) for 2050	Strategy Supply Increase (Decrease) for 2060	Capital Cost	Annual Cost 2010	Annual Cost 2020	Annual Cost 2030	Annual Cost 2040	Annual Cost 2050	Annual Cost 2060
Irrigation	Mitchell	Colorado	Conservation		2020	0	865	1,729	1,729	1,729	1,729	$2,135,784	$0	$77,581	$155,162	$155,162	$155,162	$155,162
Irrigation	Mitchell	Colorado	Weather Modification		2010	0	0	0	0	0	0	$0	$100,000	$100,000	$100,000	$100,000	$100,000	$100,000
Steam Electric Power	Mitchell	Colorado	Alternative Cooling Technology		2010	4,077	2,774	4,240	5,988	8,079	10,590	$297,786,650	$4,206,500	$4,224,776	$6,736,894	$9,172,282	$13,408,883	$20,780,468
Steam Electric Power	Mitchell	Colorado	Subordination	Colorado City/Champion Creek	2010	5,023	4,847	4,670	4,493	4,317	4,140	$1,004,600	$87,586	$87,586	$0	$0	$0	$0
Steam Electric Power	Mitchell	Colorado	Brush Control		2010	0	0	0	0	0	0	$906,932	$181,386	$181,386	$181,386	$181,386	$181,386	$181,386
Mitchell County Total						*9,100*	*8,486*	*10,639*	*12,210*	*14,125*	*16,459*	*$301,833,966*	*$4,575,472*	*$4,671,329*	*$7,173,442*	*$9,608,830*	*$13,845,431*	*$21,217,016*
Irrigation	Pecos	Rio Grande	Conservation		2020	0	6,300	12,600	12,600	12,600	12,600	$6,956,821	$0	$252,703	$505,405	$505,405	$505,405	$505,405
Irrigation	Reagan	Colorado	Conservation		2020	0	1,968	3,936	3,936	3,936	3,936	$190,926	$0	$190,926	$381,852	$381,852	$381,852	$381,852
Irrigation	Reeves	Rio Grande	Conservation		2020	0	5,824	11,648	11,648	11,648	11,648	$6,891,034	$0	$250,313	$500,626	$500,626	$500,626	$500,626
City of Ballinger	Runnels	Colorado	Conservation		2010	33	88	107	119	131	144	$0	$18,388	$24,012	$24,602	$25,222	$25,396	$25,803
City of Ballinger	Runnels	Colorado	Reuse		2040	0	0	0	220	220	220	$1,980,000	$0	$0	$0	$219,845	$219,845	$75,900
City of Ballinger	Runnels	Colorado	Subordination	Lake Ballinger	2010	917	930	920	910	900	890	$188,000	$16,391	$16,391	$0	$0	$0	$0
City of Ballinger	Runnels	Colorado	Voluntary Redistribution	Colorado River MWD System	2010	192	185	194	259	58	127	$0	$81,792	$78,810	$82,644	$110,334	$24,708	$54,102
Coleman County WSC	Runnels	Colorado	Subordination	Lake Coleman	2010	18	30	39	48	56	66	$0	$0	$0	$0	$0	$0	$0
County-Other	Runnels	Colorado	Subordination	Lake Ballinger	2010	23	0	0	0	0	0	$0	$0	$0	$0	$0	$0	$0
County-Other	Runnels	Colorado	Subordination	Lake Winters	2010	114	89	69	49	31	0	$0	$0	$0	$0	$0	$0	$0
County-Other	Runnels	Colorado	Voluntary Redistribution	Colorado River MWD System	2010	193	177	148	116	94	77	$0	$82,218	$75,402	$63,048	$49,416	$40,044	$32,802
Manufacturing	Runnels	Colorado	Subordination	Lake Winters	2010	54	60	65	70	74	79	$0	$0	$0	$0	$0	$0	$0
Manufacturing	Runnels	Colorado	Voluntary Redistribution	Colorado River MWD System	2010	9	10	11	12	13	15	$0	$3,834	$4,260	$4,686	$5,112	$5,538	$6,390
City of Miles	Runnels	Colorado	Subordination	OC Fisher Reservoir	2010	100	100	100	100	100	100	$0	$0	$0	$0	$0	$0	$0
Millersview-Doole WSC	Runnels	Colorado	Subordination	Colorado River MWD System	2010	25	31	0	6	0	0	$0	$0	$0	$0	$0	$0	$0
Millersview-Doole WSC	Runnels	Colorado	Voluntary Redistribution	Colorado River MWD System	2050	0	0	0	0	92	93	$0	$0	$0	$0	$0	$0	$0
City of Winters	Runnels	Colorado	Conservation		2010	21	55	63	67	71	76	$0	$12,392	$16,589	$16,353	$16,134	$15,829	$15,781
City of Winters	Runnels	Colorado	Reuse		2040	0	0	0	110	110	110	$1,660,000	$0	$0	$0	$198,000	$198,000	$53,020
City of Winters	Runnels	Colorado	Subordination	Lake Winters	2010	552	561	566	571	575	591	$144,000	$12,555	$12,555	$0	$0	$0	$0
Runnels County Total						*2,251*	*2,316*	*2,282*	*2,657*	*2,525*	*2,588*	*$3,972,000*	*$227,570*	*$228,019*	*$191,333*	*$624,063*	*$529,360*	*$263,798*
Irrigation	Schleicher	Colorado	Conservation		2020	0	89	178	178	178	178	$123,711	$0	$4,494	$8,987	$8,987	$8,987	$8,987
Irrigation	Schleicher	Rio Grande	Conservation		2020	0	18	36	36	36	36	$25,327	$0	$920	$1,840	$1,840	$1,840	$1,840
Schleicher County Total						*0*	*107*	*214*	*214*	*214*	*214*	*$149,038*	*$0*	*$5,414*	*$10,827*	*$10,827*	*$10,827*	*$10,827*
County-Other	Scurry	Colorado	Subordination	Colorado River MWD System	2010	54	66	1	12	20	33	$0	$0	$0	$0	$0	$0	$0
Irrigation	Scurry	Brazos	Conservation		2020	0	160	320	320	320	320	$303,477	$0	$11,024	$22,047	$22,047	$22,047	$22,047
Irrigation	Scurry	Colorado	Conservation		2020	0	411	823	823	823	823	$780,370	$0	$28,346	$56,693	$56,693	$56,693	$56,693
City of Snyder	Scurry	Colorado	Conservation		2010	70	154	191	205	220	234	$0	$46,943	$51,385	$50,089	$48,426	$46,643	$45,378
City of Snyder	Scurry	Colorado	Reuse		2020	0	726	726	726	726	726	$0	$0	$0	$0	$0	$0	$0
City of Snyder	Scurry	Colorado	Subordination	Colorado River MWD System	2010	511	641	9	117	194	315	$0	$0	$0	$0	$0	$0	$0
Scurry County Total						*635*	*2,158*	*2,070*	*2,203*	*2,303*	*2,451*	*$1,083,847*	*$46,943*	*$90,755*	*$128,829*	*$127,166*	*$125,383*	*$124,118*
Irrigation	Sterling	Colorado	Conservation		2020	0	45	89	90	91	92	$21,550	$0	$783	$1,566	$1,566	$1,566	$1,566
Irrigation	Sutton	Colorado	Conservation		2020	0	44	88	88	88	88	$50,783	$0	$1,845	$3,689	$3,689	$3,689	$3,689
Irrigation	Sutton	Rio Grande	Conservation		2020	0	98	196	196	196	196	$113,377	$0	$4,118	$11,926	$11,926	$11,926	$11,926
Sutton County Total						*0*	*142*	*284*	*284*	*284*	*284*	*$164,160*	*$0*	*$5,963*	*$15,615*	*$15,615*	*$15,615*	*$15,615*

Note: Supplies from brush control and weather modification are not firm supplies. The total amount of supply and associated costs for these strategies are shown at the end of this table.

Table 4.10-1 Strategy Summary by County (Continued)

Water User Group Name	County	Basin Name	Water Management Strategy Name	Source Name	Implementation Date	Strategy Supply Increase (Decrease) for 2010	Strategy Supply Increase (Decrease) for 2020	Strategy Supply Increase (Decrease) for 2030	Strategy Supply Increase (Decrease) for 2040	Strategy Supply Increase (Decrease) for 2050	Strategy Supply Increase (Decrease) for 2060	Capital Cost	Annual Cost 2010	Annual Cost 2020	Annual Cost 2030	Annual Cost 2040	Annual Cost 2050	Annual Cost 2060
County-Other	Tom Green	Colorado	Subordination	Nasworthy/Twin Buttes	2010	250	250	250	250	250	250	$0	$0	$0	$0	$0	$0	$0
Irrigation	Tom Green	Colorado	Conservation		2020	0	5,774	11,548	11,548	11,548	11,548	$2,465,727	$0	$89,566	$179,132	$179,132	$179,132	$179,132
Irrigation	Tom Green	Colorado	Subordination	Nasworthy/Twin Buttes	2010	3,377	3,273	3,170	3,066	2,693	2,860	$0	$0	$0	$0	$0	$0	$0
Manufacturing	Tom Green	Colorado	Subordination	Nasworthy/Twin Buttes	2010	2,226	2,498	2,737	2,971	3,175	3,425	$0	$0	$0	$0	$0	$0	$0
Millersview-Doole WSC	Tom Green	Colorado	Subordination	Colorado River MWD System	2010	64	87	1	19	0	0	$0	$0	$0	$0	$0	$0	$0
Millersview-Doole WSC	Tom Green	Colorado	Voluntary Redistribution	Colorado River MWD System	2050	0	0	0	0	359	408	$0	$0	$0	$0	$0	$0	$0
City of San Angelo	Tom Green	Colorado	Desalination	Other aquifer	2020	0	5,600	5,600	5,600	5,600	5,600	$40,590,000	$0	$5,621,000	$5,621,000	$2,083,200	$2,083,200	$2,083,200
City of San Angelo	Tom Green	Colorado	New Groundwater	Hickory aquifer	2030	0	0	5,000	12,000	12,000	12,000	$91,582,000	$0	$0	$5,405,000	$12,972,000	$4,980,000	$4,980,000
City of San Angelo	Tom Green	Colorado	Conservation		2010	701	1,705	2,009	2,127	2,255	2,371	$0	$395,818	$415,843	$409,987	$398,440	$385,447	$375,342
City of San Angelo	Tom Green	Colorado	Infrastructure Improvements	Spence Reservoir	2010	2,274	2,261	2,247	2,233	2,220	2,206	$5,000,000	$555,500	$555,500	$119,600	$119,600	$119,600	$119,600
City of San Angelo	Tom Green	Colorado	Subordination	Nasworthy/Twin Buttes	2010	5,436	5,078	4,752	4,431	4,141	3,804	$0	$0	$0	$0	$0	$0	$0
City of San Angelo	Tom Green	Colorado	Subordination	OC Fisher Reservoir	2010	3,762	3,643	3,525	3,407	3,288	3,170	$0	$0	$0	$0	$0	$0	$0
City of San Angelo	Tom Green	Colorado	Subordination	OH Ivie Reservoir	2010	17	(97)	(211)	(324)	(438)	(553)	$0	$0	$0	$0	$0	$0	$0
City of San Angelo	Tom Green	Colorado	Brush Control		2010	8,362	8,362	8,362	8,362	8,362	8,362	$23,020,000	$4,604,000	$4,604,000	$4,604,000	$4,604,000	$4,604,000	$4,604,000
Steam Electric Power	Tom Green	Colorado	Alternative Cooling Technology		2040	0	0	0	48	243	481	$6,834,117	$0	$0	$0	$73,525	$403,312	$943,853
Steam Electric Power	Tom Green	Colorado	Subordination	Nasworthy/Twin Buttes	2010	1,021	1,021	1,021	1,021	1,021	1,021	$0	$0	$0	$0	$0	$0	$0
Tom Green County Total						*27,490*	*39,455*	*50,011*	*56,759*	*56,717*	*56,953*	*$169,491,844*	*$5,555,318*	*$11,285,909*	*$16,338,719*	*$20,429,897*	*$12,754,691*	*$13,285,127*
Irrigation	Upton	Colorado	Conservation		2020	0	911	1,822	1,822	1,822	1,822	$2,441,070	$0	$88,670	$177,341	$177,341	$177,341	$177,341
Irrigation	Upton	Rio Grande	Conservation		2020	0	9	18	18	18	18	$24,657	$0	$896	$1,791	$1,791	$1,791	$1,791
Upton County Total						*0*	*920*	*1,840*	*1,840*	*1,840*	*1,840*	*$2,465,727*	*$0*	*$89,566*	*$179,132*	*$179,132*	*$179,132*	*$179,132*
County Other	Ward	Rio Grande	Voluntary Redistribution	Cenozoic Pecos Alluvium aquifer	2020	0	400	400	400	400	400	$0	$0	$0	$0	$0	$0	$0
Irrigation	Ward	Rio Grande	Conservation		2020	0	785	1,570	1,570	1,570	1,570	$368,640	$0	$13,391	$26,781	$26,781	$26,781	$26,781
Irrigation	Ward	Rio Grande	Weather Modification		2010	0	0	0	0	0	0	$0	$90,000	$90,000	$90,000	$90,000	$90,000	$90,000
Steam Electric Power	Ward	Rio Grande	Alternative Cooling Technology		2050	0	0	0	0	679	1,973	$24,094,671	$0	$0	$0	$0	$1,126,950	$3,871,564
Ward County Total						*0*	*1,185*	*1,970*	*1,970*	*2,649*	*3,943*	*$24,463,311*	*$90,000*	*$103,391*	*$116,781*	*$116,781*	*$1,243,731*	*$3,988,345*
Irrigation	Winkler	Rio Grande	Conservation		2020	0	195	389	389	389	389	$164,628	$0	$5,980	$11,960	$11,960	$11,960	$11,960
			Conservation			2,716	44,441	80,204	80,795	81,419	82,057	$43,152,601	$1,465,328	$3,450,998	$5,308,966	$5,281,868	$5,248,446	$5,235,155
			Alternative Cooling Technology			4,077	5,524	8,533	12,210	17,468	24,306	$626,502,088	$4,206,500	$8,413,000	$13,558,000	$18,703,000	$28,992,000	$47,695,000
			Desalination			0	6,721	6,721	6,721	6,721	6,721	$45,268,300	$0	$6,417,000	$6,417,000	$2,471,200	$2,471,200	$2,471,200
			New Groundwater			260	260	18,860	31,860	31,860	31,860	$209,097,400	$229,500	$229,500	$18,563,000	$26,130,000	$8,044,000	$8,044,000
			Infrastructure Improvements			2,274	2,261	2,247	2,233	2,220	2,206	$11,380,192	$1,286,970	$1,286,970	$381,638	$381,638	$381,638	$381,638
			Reuse			0	12,380	12,380	12,710	12,710	12,710	$3,640,000	$0	$0	$0	$417,845	$417,845	$128,920
			Bottled Water Program			0	0	0	0	0	0	$135,320	$38,065	$38,065	$19,951	$19,951	$19,951	$19,951
			Brush Control			8,362	8,362	8,362	8,362	8,362	8,362	$24,022,464	$4,804,386	$4,804,386	$4,804,386	$4,804,386	$4,804,386	$4,804,386
			Subordination			49,812	52,817	35,735	36,825	37,174	39,106	$4,150,000	$361,817	$361,817	$0	$0	$0	$0
			Voluntary Redistribution			6,479	11,724	21,734	16,867	17,237	17,132	$5,284,000	$925,844	$916,472	$5,107,378	$5,028,662	$4,840,890	$4,770,694
			Weather Modification			0	0	0	0	0	0	$0	$280,000	$280,000	$280,000	$280,000	$280,000	$280,000
			Total for All Strategies			*73,980*	*144,490*	*194,776*	*208,583*	*215,171*	*224,460*	*$972,632,365*	*$13,598,410*	*$26,198,208*	*$54,440,319*	*$63,518,550*	*$55,500,356*	*$73,830,944*

Note: Supplies from brush control and weather modification are not firm supplies. The total amount of supply and associated costs for these strategies are shown at the end of this table.

Table 4.10-2
Strategy Summary for Wholesale Water Providers

Wholesale Water Provider	Water Management Strategy Name	Source Name	Implementation Date	Strategy Supply Increase (Decrease) for 2010	Strategy Supply Increase (Decrease) for 2020	Strategy Supply Increase (Decrease) for 2030	Strategy Supply Increase (Decrease) for 2040	Strategy Supply Increase (Decrease) for 2050	Strategy Supply Increase (Decrease) for 2060	Capital Cost	Annual Cost 2010	Annual Cost 2020	Annual Cost 2030	Annual Cost 2040	Annual Cost 2050	Annual Cost 2060
CRMWD	Reuse		2020	0	12,380	12,380	12,380	12,380	12,380	$97,249,000	$0	$12,035,000	$12,035,000	$3,555,560	$3,555,560	$3,555,560
	Subordination	CRMWD System	2010	48,027	47,133	46,240	45,347	44,453	43,560	$9,605,400	$837,443	$837,443	$0	$0	$0	$0
	New Groundwater	Cenozoic Pecos Alluvium aquifer	2040	0	0	0	6,000	6,000	6,000	$39,934,000	$0	$0	$0	$4,987,000	$4,987,000	$1,505,000
	Desalination	Capitan Reef aquifer	2030	0	0	9,500	9,500	9,500	9,500	86,183,530	0	0	12,352,556	12,352,556	4,838,556	4,838,556
CRMWD Total				*48,027*	*59,513*	*68,120*	*73,227*	*72,333*	*71,440*	*$232,971,930*	*$837,443*	*$12,872,443*	*$24,387,556*	*$20,895,116*	*$13,381,116*	*$9,899,116*
San Angelo	Subordination	San Angelo system	2010	12,310	12,120	11,930	11,739	11,280	11,360	$1,582,400	$137,961	$137,961	$0	$0	$0	$0
	Rehabilitation of Spence pipeline	CRMWD System	2010	2,274	2,261	2,247	2,233	2,220	2,206	$0	$0	$0	$0	$0	$0	$0
	Desalination	Other aquifer	2020	0	5,600	5,600	5,600	5,600	5,600	$0	$0	$0	$0	$0	$0	$0
	New Groundwater	Hickory aquifer	2030	0	0	5,000	12,000	12,000	12,000	$0	$0	$0	$0	$0	$0	$0
San Angelo Total				*14,584*	*19,981*	*24,777*	*31,572*	*31,100*	*31,166*	*$1,582,400*	*$137,961*	*$137,961*	*$0*	*$0*	*$0*	*$0*
UCRA	Subordination	OC Fisher Reservoir	2010	3,862	3,743	3,625	3,507	3,388	3,270	$772,400	$67,341	$67,341	$0	$0	$0	$0
	Reuse			0	12,380	12,380	12,380	12,380	12,380	$97,249,000	$0	$12,035,000	$12,035,000	$3,555,560	$3,555,560	$3,555,560
	Subordination			64,199	62,996	61,795	60,593	59,121	58,190	$11,960,200	$1,042,745	$1,042,745	$0	$0	$0	$0
	Infrastructure Improvements			2,274	2,261	2,247	2,233	2,220	2,206	$0	$0	$0	$0	$0	$0	$0
	New Groundwater			0	0	5,000	18,000	18,000	18,000	$39,934,000	$0	$0	$0	$4,987,000	$4,987,000	$1,505,000
	Desalination			0	5,600	15,100	15,100	15,100	15,100	$86,183,530	$0	$0	$12,352,556	$12,352,556	$4,838,556	$4,838,556
	Total for All Strategies			*66,473*	*83,237*	*96,522*	*108,306*	*106,821*	*105,876*	*$235,326,730*	*$1,042,745*	*$13,077,745*	*$24,387,556*	*$20,895,116*	*$13,381,116*	*$9,899,116*

Notes: 1. Costs for San Angelo's strategies (Rehabilitation of Spence pipeline, Desalination, and New Groundwater) are shown on Table 4.10-1 for the city of San Angelo.
2. Subordination strategies are shown in Table 4.10-2 for the sponsoring wholesale provider.

Table 9.1-2
Results of Infrastructure Financing Surveys

Entity	Representing Water User Groups	Percentage						Cost								Comments
		Cash Reserves	Bonds	Bank Loans	Federal Programs	State Programs	Other	Cash Reserves	Bonds	Bank Loans	Federal Programs	State Programs	Other	Not Specified	Total	
City of Andrews	Andrews	50%			10%	40%		$2,339,150	$0	$0	$467,830	$1,871,320	$0	$0	$4,678,300	
	Andrews County Other (partial)															
City of Ballinger	Ballinger							$0	$0	$0	$0	$0	$0	$1,980,000	$1,980,000	Returned survey but did not specify programs
	Runnels County Other (partial)															
	Runnels County Manufacturing (partial)															
CRMWD	Big Spring	Yes	Yes		Yes	Yes		X	X	$0	X	X	$0	$232,971,930	$232,971,930	Indicated programs but did not identify specific percentages
	Howard County Manufacturing (partial)															
	Coahoma															
	Ector County UD															
	Odessa															
	Ector County Manufacturing (partial)															
	Snyder															
	Scurry County Other (partial)															
	Stanton															
City of Bronte	Bronte Village	10%			90%			$170,260	$0	$0	$1,532,340	$0	$0	$0	$1,702,600	
City of Eden	Eden	12%					88%	$179,918	$0	$0	$0	$0	$1,319,402	$0	$1,499,320	Other specified as State and Federal grants
	Concho County Other (partial)															
City of Menard	Menard	5%			90%		5%	$63,970	$0	$0	$1,151,460	$0	$63,970	$0	$1,279,400	ORCA water improvements
	Menard County Other (partial)															
City of Midland	Midland	5%	90%		5%			$5,788,600	$104,194,800	$0	$5,788,600	$0	$0	$0	$115,772,000	
	Midland County Other (partial)															
	Midland County Manufacturing (partial)															
Richland SUD	Richland SUD							$0	$0	$0	$0	$0	$0	$1,293,720	$1,293,720	Declined to fill out survey
City of Robert Lee	Robert Lee				80%	20%		$0	$0	$0	$1,986,000	$496,500	$0	$0	$2,482,500	TWDB loans and/or grants, Texas Community Development Grant Program
	Coke County Other (partial)															
City of San Angelo	San Angelo	10%	40%		50%			$0	$0	$0	$0	$0	$0	$0	$0	TWDB State Revolving Funds & TWDB Demonstration Grants
	Tom Green County Other (partial)															
	Tom Green County Manufacturing															
City of Winters	Winters							$0	$0	$0	$0	$0	$0	$1,660,000	$1,660,000	Survey not returned. Strategy implementation date after 2020.
	Runnels County Other (partial)															
	Runnels County Manufacturing (partial)															
Total								*$8,541,898*	*$104,194,800*	*$0*	*$10,926,230*	*$2,367,820*	*$1,383,372*	*$237,905,650*	*$365,319,770*	

Attachment 3
Revised Appendices

Appendix 4A
Comparison of Supply and Demand
(Values in Acre-Feet per Year)

County	Basin	WUG	Demand 2010	Demand 2020	Demand 2030	Demand 2040	Demand 2050	Demand 2060	Supply 2010	Supply 2020	Supply 2030	Supply 2040	Supply 2050	Supply 2060	Surplus (Need) 2010	Surplus (Need) 2020	Surplus (Need) 2030	Surplus (Need) 2040	Surplus (Need) 2050	Surplus (Need) 2060
ANDREWS	COLORADO	ANDREWS	3,087	3,263	3,371	3,467	3,515	3,585	2,416	2,555	2,641	2,717	2,755	2,812	(671)	(708)	(730)	(750)	(760)	(773)
		COUNTY-OTHER	531	551	559	566	570	580	531	551	559	566	570	580	0	0	0	0	0	0
		IRRIGATION	32,608	32,334	32,062	31,788	31,516	31,245	18,514	18,270	18,136	19,252	19,183	19,080	(14,094)	(14,064)	(13,926)	(12,536)	(12,333)	(12,165)
		LIVESTOCK	360	360	360	360	360	360	360	360	360	360	360	360	0	0	0	0	0	0
		MINING	1,845	1,893	1,911	1,929	1,946	1,969	1,845	1,893	1,911	1,929	1,946	1,969	0	0	0	0	0	0
	RIO GRANDE	COUNTY-OTHER	7	7	7	8	8	8	7	7	7	8	8	8	0	0	0	0	0	0
		LIVESTOCK	78	78	78	78	78	78	78	78	78	78	78	78	0	0	0	0	0	0
		MINING	63	64	65	65	66	67	120	120	120	120	120	120	57	56	55	55	54	53
BORDEN	BRAZOS	COUNTY-OTHER	14	14	14	12	11	10	14	14	14	12	11	10	0	0	0	0	0	0
		IRRIGATION	1,103	1,102	1,100	1,099	1,097	1,096	84	84	84	86	87	88	(1,019)	(1,018)	(1,016)	(1,013)	(1,010)	(1,008)
		LIVESTOCK	10	10	10	10	10	10	10	10	10	10	10	10	0	0	0	0	0	0
	COLORADO	COUNTY-OTHER	161	165	155	136	125	113	164	165	164	164	164	164	3	0	9	28	39	51
		IRRIGATION	1,587	1,585	1,582	1,581	1,578	1,577	759	759	759	759	759	759	(828)	(826)	(823)	(822)	(819)	(818)
		LIVESTOCK	271	271	271	271	271	271	271	271	271	271	271	271	0	0	0	0	0	0
		MINING	690	658	646	635	625	612	1,014	1,014	1,014	1,014	1,014	1,014	324	356	368	379	389	402
BROWN	BRAZOS	COUNTY-OTHER	12	12	12	12	12	12	12	12	12	12	12	12	0	0	0	0	0	0
		LIVESTOCK	32	32	32	32	32	32	32	32	32	32	32	32	0	0	0	0	0	0
		MINING	41	42	42	42	42	42	41	42	42	42	42	42	0	0	0	0	0	0
	COLORADO	BANGS	265	266	262	256	254	254	265	266	262	256	254	254	0	0	0	0	0	0
		BROOKESMITH SUD	1,374	1,391	1,384	1,357	1,348	1,348	1,413	1,412	1,413	1,413	1,413	1,414	39	21	29	56	65	66
		BROWNWOOD	3,896	3,927	3,889	3,816	3,792	3,792	3,896	3,927	3,889	3,816	3,792	3,792	0	0	0	0	0	0
		COLEMAN COUNTY WSC	19	19	19	18	18	18	19	19	19	18	18	18	0	0	0	0	0	0
		COUNTY-OTHER	342	342	336	327	324	324	238	238	232	223	220	220	(104)	(104)	(104)	(104)	(104)	(104)
		EARLY	799	812	810	801	797	797	1,228	1,228	1,228	1,228	1,228	1,228	429	416	418	427	431	431
		IRRIGATION	12,313	12,272	12,230	12,189	12,146	12,105	9,307	9,290	9,284	9,284	9,278	9,264	(3,006)	(2,982)	(2,946)	(2,905)	(2,868)	(2,841)
		LIVESTOCK	1,604	1,604	1,604	1,604	1,604	1,604	1,604	1,604	1,604	1,604	1,604	1,604	0	0	0	0	0	0
		MANUFACTURING	577	636	686	734	775	837	577	636	686	734	775	837	0	0	0	0	0	0
		MINING	2,446	2,462	2,468	2,474	2,480	2,488	2,446	2,462	2,468	2,474	2,480	2,488	0	0	0	0	0	0
		ZEPHYR WSC	399	404	399	391	387	387	616	616	616	616	616	616	217	212	217	225	229	229
COKE	COLORADO	BRONTE VILLAGE	245	258	254	250	249	249	116	129	125	121	120	120	(129)	(129)	(129)	(129)	(129)	(129)
		COUNTY-OTHER	175	162	159	154	152	152	147	130	159	148	143	137	(28)	(32)	0	(6)	(9)	(15)
		IRRIGATION	936	936	934	933	933	933	573	573	573	573	573	573	(363)	(363)	(361)	(360)	(360)	(360)
		LIVESTOCK	593	593	593	593	593	593	593	593	593	593	593	593	0	0	0	0	0	0
		MINING	488	528	550	572	593	614	402	409	548	548	550	542	(86)	(119)	(2)	(24)	(43)	(72)
		ROBERT LEE	351	346	342	338	336	336	263	238	347	324	309	288	(88)	(108)	5	(14)	(27)	(48)
		STEAM ELECTRIC POWER	310	247	289	339	401	477	0	0	0	0	0	0	(310)	(247)	(289)	(339)	(401)	(477)
COLEMAN	COLORADO	BROOKESMITH SUD	13	13	12	12	12	12	13	13	12	12	12	12	0	0	0	0	0	0
		COLEMAN	1,285	1,269	1,252	1,235	1,223	1,223	0	0	0	0	0	0	(1,285)	(1,269)	(1,252)	(1,235)	(1,223)	(1,223)
		COLEMAN COUNTY WSC	357	348	339	329	326	326	1,295	1,280	1,278	1,276	1,275	1,271	938	932	939	947	949	945
		COUNTY-OTHER	19	19	18	18	18	18	0	0	0	0	0	0	(19)	(19)	(18)	(18)	(18)	(18)
		IRRIGATION	1,379	1,379	1,379	1,379	1,379	1,379	31	31	31	31	31	31	(1,348)	(1,348)	(1,348)	(1,348)	(1,348)	(1,348)
		LIVESTOCK	1,259	1,259	1,259	1,259	1,259	1,259	1,259	1,259	1,259	1,259	1,259	1,259	0	0	0	0	0	0
		MANUFACTURING	6	6	6	6	6	6	0	0	0	0	0	0	(6)	(6)	(6)	(6)	(6)	(6)
		MINING	18	19	19	19	19	19	1	1	1	1	1	1	(17)	(18)	(18)	(18)	(18)	(18)
		SANTA ANNA	200	197	193	190	187	187	307	307	307	307	307	307	107	110	114	117	120	120
CONCHO	COLORADO	COUNTY-OTHER	188	193	191	189	188	188	219	221	221	221	221	221	31	28	30	32	33	33
		EDEN	559	572	569	562	559	559	574	572	572	572	572	572	15	0	3	10	13	13
		IRRIGATION	4,297	4,280	4,262	4,245	4,229	4,213	5,265	5,265	5,265	5,265	5,265	5,265	968	985	1,003	1,020	1,036	1,052
		LIVESTOCK	775	775	775	775	775	775	775	775	775	775	775	775	0	0	0	0	0	0
		MILLERSVIEW-DOOLE WSC	126	127	124	119	118	118	168	161	199	188	76	76	42	34	75	69	(42)	(42)
CRANE	RIO GRANDE	COUNTY-OTHER	316	387	425	452	484	518	316	387	425	452	484	518	0	0	0	0	0	0
		CRANE	940	1,002	1,028	1,045	1,072	1,105	940	1,002	1,028	1,045	1,072	1,105	0	0	0	0	0	0
		IRRIGATION	337	337	337	337	337	337	337	337	337	337	337	337	0	0	0	0	0	0
		LIVESTOCK	155	155	155	155	155	155	155	155	155	155	155	155	0	0	0	0	0	0
		MINING	2,221	2,216	2,214	2,212	2,210	2,208	2,221	2,216	2,214	2,212	2,210	2,208	0	0	0	0	0	0

Appendix 4A
Comparison of Supply and Demand
(Values in Acre-Feet per Year)

County	Basin	WUG	Demand 2010	Demand 2020	Demand 2030	Demand 2040	Demand 2050	Demand 2060	Supply 2010	Supply 2020	Supply 2030	Supply 2040	Supply 2050	Supply 2060	Surplus (Need) 2010	Surplus (Need) 2020	Surplus (Need) 2030	Surplus (Need) 2040	Surplus (Need) 2050	Surplus (Need) 2060
CROCKETT	COLORADO	LIVESTOCK	30	30	30	30	30	30	30	30	30	30	30	30	0	0	0	0	0	0
	RIO GRANDE	COUNTY-OTHER	43	41	40	38	37	36	43	41	40	38	37	36	0	0	0	0	0	0
		CROCKETT COUNTY WCID #1	1,664	1,790	1,825	1,832	1,872	1,913	2,503	2,503	2,503	2,503	2,503	2,503	839	713	678	671	631	590
		IRRIGATION	525	518	508	498	492	482	535	535	535	535	535	535	10	17	27	37	43	53
		LIVESTOCK	967	967	967	967	967	967	967	967	967	967	967	967	0	0	0	0	0	0
		MINING	402	421	431	441	450	459	402	421	431	441	450	459	0	0	0	0	0	0
		STEAM ELECTRIC POWER	973	776	907	1,067	1,262	1,500	1,500	1,500	1,500	1,500	1,500	1,500	527	724	593	433	238	0
ECTOR	COLORADO	COUNTY-OTHER	5,542	6,513	7,266	7,738	7,928	8,007	5,812	6,783	7,536	8,008	8,198	8,277	270	270	270	270	270	270
		ECTOR COUNTY UD	1,480	1,847	2,177	2,473	2,706	2,932	1,080	1,234	2,166	2,322	2,434	2,454	(400)	(613)	(11)	(151)	(272)	(478)
		IRRIGATION	5,477	5,412	5,348	5,281	5,219	5,152	5,477	5,412	5,348	5,281	5,219	5,152	0	0	0	0	0	0
		LIVESTOCK	198	198	198	198	198	198	198	198	198	198	198	198	0	0	0	0	0	0
		MANUFACTURING	2,743	2,946	3,107	3,248	3,357	3,471	2,677	2,797	3,104	3,202	3,271	3,313	(66)	(149)	(3)	(46)	(86)	(158)
		MINING	9,702	10,321	10,706	11,080	11,447	11,745	9,702	10,321	10,706	11,080	11,447	11,745	0	0	0	0	0	0
		ODESSA	21,508	22,084	22,626	23,335	24,355	25,559	17,089	11,778	17,890	17,583	17,779	17,584	(4,419)	(10,306)	(4,736)	(5,752)	(6,576)	(7,975)
		STEAM ELECTRIC POWER	6,375	9,125	10,668	12,549	14,842	17,637	6,375	6,375	6,375	6,375	6,375	6,375	0	(2,750)	(4,293)	(6,174)	(8,467)	(11,262)
	RIO GRANDE	COUNTY-OTHER	178	190	202	211	219	227	178	190	202	211	219	227	0	0	0	0	0	0
		IRRIGATION	56	54	54	54	52	52	56	54	54	54	52	52	0	0	0	0	0	0
		LIVESTOCK	95	95	95	95	95	95	95	95	95	95	95	95	0	0	0	0	0	0
		MANUFACTURING	16	17	18	19	19	20	16	17	18	19	19	20	0	0	0	0	0	0
		MINING	186	198	205	212	219	225	372	372	372	372	372	372	186	174	167	160	153	147
GLASSCOCK	COLORADO	COUNTY-OTHER	181	196	203	200	197	201	181	196	203	200	197	201	0	0	0	0	0	0
		IRRIGATION	52,272	51,854	51,438	51,021	50,603	50,190	24,488	24,473	24,466	24,469	24,472	24,468	(27,784)	(27,381)	(26,972)	(26,552)	(26,131)	(25,722)
		LIVESTOCK	232	232	232	232	232	232	232	232	232	232	232	232	0	0	0	0	0	0
		MINING	5	5	5	5	5	5	5	5	5	5	5	5	0	0	0	0	0	0
HOWARD	COLORADO	BIG SPRING	6,016	6,077	6,035	5,945	5,915	5,915	4,671	4,405	6,011	5,646	5,424	5,119	(1,345)	(1,672)	(24)	(299)	(491)	(796)
		COAHOMA	183	185	183	180	177	177	134	124	182	169	159	148	(49)	(61)	(1)	(11)	(18)	(29)
		COUNTY-OTHER	1,109	1,110	1,092	1,065	1,048	1,048	1,153	1,153	1,153	1,153	1,153	1,153	44	43	61	88	105	105
		IRRIGATION	4,799	4,744	4,690	4,635	4,581	4,527	4,862	4,862	4,862	4,862	4,862	4,862	63	118	172	227	281	335
		LIVESTOCK	366	366	366	366	366	366	366	366	366	366	366	366	0	0	0	0	0	0
		MANUFACTURING	1,648	1,753	1,832	1,910	1,976	2,099	1,471	1,452	1,843	1,839	1,852	1,879	(177)	(301)	11	(71)	(124)	(220)
		MINING	1,783	1,883	1,924	1,963	2,001	2,052	1,383	1,360	1,915	1,862	1,830	1,767	(400)	(523)	(9)	(101)	(171)	(285)
IRION	COLORADO	COUNTY-OTHER	109	109	103	94	87	83	109	109	103	94	87	83	0	0	0	0	0	0
		IRRIGATION	2,803	2,742	2,682	2,621	2,561	2,501	1,501	1,501	1,501	1,501	1,501	1,501	(1,302)	(1,241)	(1,181)	(1,120)	(1,060)	(1,000)
		LIVESTOCK	460	460	460	460	460	460	460	460	460	460	460	460	0	0	0	0	0	0
		MERTZON	129	130	124	114	107	102	139	139	139	139	139	139	10	9	15	25	32	37
		MINING	122	122	122	122	122	122	122	122	122	122	122	122	0	0	0	0	0	0
KIMBLE	COLORADO	COUNTY-OTHER	212	207	203	196	194	194	203	200	200	200	200	200	(9)	(7)	(3)	4	6	6
		IRRIGATION	985	948	913	877	841	807	1,771	1,771	1,771	1,771	1,771	1,771	786	823	858	894	930	964
		JUNCTION	936	935	926	917	910	910	0	0	0	0	0	0	(936)	(935)	(926)	(917)	(910)	(910)
		LIVESTOCK	668	668	668	668	668	668	668	668	668	668	668	668	0	0	0	0	0	0
		MANUFACTURING	702	767	823	880	932	1,002	3	3	3	3	3	3	(699)	(764)	(820)	(877)	(929)	(999)
		MINING	71	67	65	63	61	60	104	104	104	104	104	104	33	37	39	41	43	44
LOVING	RIO GRANDE	COUNTY-OTHER	11	11	10	10	10	10	11	11	10	10	10	10	0	0	0	0	0	0
		IRRIGATION	581	580	576	575	573	572	583	583	583	583	583	583	2	3	7	8	10	11
		LIVESTOCK	70	70	70	70	70	70	70	70	70	70	70	70	0	0	0	0	0	0
		MINING	2	2	2	2	2	2	3	3	3	3	3	3	1	1	1	1	1	1
MARTIN	COLORADO	COUNTY-OTHER	377	403	411	412	399	378	377	403	411	412	399	378	0	0	0	0	0	0
		IRRIGATION	14,324	14,073	13,822	13,571	13,321	13,075	13,536	13,509	13,500	13,571	13,321	13,075	(788)	(564)	(322)	0	0	0
		LIVESTOCK	273	273	273	273	273	273	273	273	273	273	273	273	0	0	0	0	0	0
		MANUFACTURING	39	41	42	43	44	47	39	41	42	43	44	47	0	0	0	0	0	0
		MINING	674	645	634	624	615	603	705	705	705	705	705	705	31	60	71	81	90	102
		STANTON	411	440	447	448	433	411	19	18	18	18	18	18	(392)	(422)	(429)	(430)	(415)	(393)

Appendix 4A
Comparison of Supply and Demand
(Values in Acre-Feet per Year)

County	Basin	WUG	Demand 2010	Demand 2020	Demand 2030	Demand 2040	Demand 2050	Demand 2060	Supply 2010	Supply 2020	Supply 2030	Supply 2040	Supply 2050	Supply 2060	Surplus (Need) 2010	Surplus (Need) 2020	Surplus (Need) 2030	Surplus (Need) 2040	Surplus (Need) 2050	Surplus (Need) 2060
MASON	COLORADO	COUNTY-OTHER	190	187	183	178	176	177	190	190	190	190	190	190	0	3	7	12	14	13
		IRRIGATION	10,079	9,936	9,792	9,648	9,505	9,363	16,099	16,099	16,099	16,099	16,099	16,099	6,020	6,163	6,307	6,451	6,594	6,736
		LIVESTOCK	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	1,036	0	0	0	0	0	0
		MASON	742	739	733	727	722	723	766	765	766	766	766	766	24	26	33	39	44	43
		MINING	6	6	6	6	6	6	6	6	6	6	6	6	0	0	0	0	0	0
MCCULLOCH	COLORADO	BRADY	1,879	1,893	1,874	1,854	1,842	1,842	1,009	1,009	1,009	1,009	1,009	1,009	(870)	(884)	(865)	(845)	(833)	(833)
		COUNTY-OTHER	12	12	12	12	12	12	12	12	12	12	12	12	0	0	0	0	0	0
		IRRIGATION	2,824	2,789	2,754	2,718	2,683	2,649	6,103	6,103	6,103	6,103	6,103	6,103	3,279	3,314	3,349	3,385	3,420	3,454
		LIVESTOCK	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	1,027	0	0	0	0	0	0
		MANUFACTURING	844	929	1,004	1,075	1,137	1,233	844	929	1,004	1,075	1,137	1,233	0	0	0	0	0	0
		MILLERSVIEW-DOOLE WSC	248	245	239	230	228	228	309	312	386	364	148	148	61	67	147	134	(80)	(80)
		MINING	154	159	162	165	168	171	154	159	162	165	168	171	0	0	0	0	0	0
		RICHLAND SUD	113	113	111	109	108	108	186	186	186	186	186	186	73	73	75	77	78	78
MENARD	COLORADO	COUNTY-OTHER	104	102	99	97	96	96	84	81	80	80	80	80	(20)	(21)	(19)	(17)	(16)	(16)
		IRRIGATION	6,061	6,041	6,022	6,003	5,981	5,962	3,620	3,620	3,620	3,620	3,620	3,620	(2,441)	(2,421)	(2,402)	(2,383)	(2,361)	(2,342)
		LIVESTOCK	642	642	642	642	642	642	642	642	642	642	642	642	0	0	0	0	0	0
		MENARD	354	353	347	341	339	339	304	304	304	304	304	304	(50)	(49)	(43)	(37)	(35)	(35)
MIDLAND	COLORADO	COUNTY-OTHER	3,210	3,543	3,773	3,920	4,019	4,143	3,210	3,543	3,773	3,920	4,019	4,143	0	0	0	0	0	0
		IRRIGATION	41,493	41,170	40,848	40,526	40,203	39,884	25,260	24,811	24,500	24,272	24,091	23,891	(16,233)	(16,359)	(16,348)	(16,254)	(16,112)	(15,993)
		LIVESTOCK	904	904	904	904	904	904	904	904	904	904	904	904	0	0	0	0	0	0
		MANUFACTURING	164	182	198	213	226	245	164	182	198	213	226	245	0	0	0	0	0	0
		MIDLAND	28,939	30,056	30,804	31,246	31,631	32,112	23,061	22,871	10,473	10,246	10,021	9,795	(5,878)	(7,185)	(20,331)	(21,000)	(21,610)	(22,317)
		MINING	677	778	846	915	986	1,046	677	778	846	915	986	1,046	0	0	0	0	0	0
		ODESSA	419	603	724	810	867	925	333	322	573	611	633	636	(86)	(281)	(151)	(199)	(234)	(289)
MITCHELL	COLORADO	COLORADO CITY	997	980	949	914	879	826	997	999	1,001	1,004	1,008	1,013	0	19	52	90	129	187
		COUNTY-OTHER	621	609	593	570	549	516	621	609	593	570	549	516	0	0	0	0	0	0
		IRRIGATION	5,534	5,507	5,479	5,452	5,425	5,398	5,564	5,564	5,564	5,564	5,564	5,564	30	57	85	112	139	166
		LIVESTOCK	449	449	449	449	449	449	449	449	449	449	449	449	0	0	0	0	0	0
		LORAINE	85	82	79	75	71	67	110	110	110	110	110	110	25	28	31	35	39	43
		MINING	115	110	108	107	106	104	141	141	141	141	141	141	26	31	33	34	35	37
		STEAM ELECTRIC POWER	9,100	7,621	8,910	10,481	12,396	14,730	0	0	0	0	0	0	(9,100)	(7,621)	(8,910)	(10,481)	(12,396)	(14,730)
PECOS	RIO GRANDE	COUNTY-OTHER	702	722	731	730	726	712	702	722	731	730	726	712	0	0	0	0	0	0
		FORT STOCKTON	3,267	3,397	3,461	3,481	3,479	3,411	5,913	5,913	5,913	5,913	5,913	5,913	2,646	2,516	2,452	2,432	2,434	2,502
		IRAAN	452	469	478	480	479	470	567	567	567	567	567	567	115	98	89	87	88	97
		IRRIGATION	79,681	78,436	77,191	75,945	74,700	73,475	82,583	82,583	82,583	82,583	82,583	82,583	2,902	4,147	5,392	6,638	7,883	9,108
		LIVESTOCK	1,239	1,239	1,239	1,239	1,239	1,239	1,240	1,240	1,240	1,240	1,240	1,240	1	1	1	1	1	1
		MANUFACTURING	2	2	2	2	2	2	3	3	3	3	3	3	1	1	1	1	1	1
		MINING	159	158	158	158	158	158	286	286	286	286	286	286	127	128	128	128	128	128
		PECOS COUNTY WCID #1	395	403	401	399	395	387	478	478	478	478	478	478	83	75	77	79	83	91
REAGAN	COLORADO	BIG LAKE	910	988	1,026	1,010	970	923	910	988	1,026	1,010	970	923	0	0	0	0	0	0
		COUNTY-OTHER	125	135	141	138	133	126	125	135	141	138	133	126	0	0	0	0	0	0
		IRRIGATION	36,597	35,990	35,385	34,779	34,174	33,579	25,600	25,383	25,269	25,220	25,198	25,186	(10,997)	(10,607)	(10,116)	(9,559)	(8,976)	(8,393)
		LIVESTOCK	253	253	253	253	253	253	253	253	253	253	253	253	0	0	0	0	0	0
		MINING	2,036	2,165	2,235	2,303	2,370	2,436	2,036	2,165	2,235	2,303	2,370	2,436	0	0	0	0	0	0
	RIO GRANDE	LIVESTOCK	19	19	19	19	19	19	26	26	26	26	26	26	7	7	7	7	7	7
REEVES	RIO GRANDE	BALMORHEA	110	126	138	148	157	166	122	132	139	148	157	166	12	6	1	0	0	0
		COUNTY-OTHER	219	192	171	152	136	124	219	200	186	170	154	142	0	8	15	18	18	18
		IRRIGATION	103,069	102,196	101,323	100,448	99,575	98,710	66,972	66,951	66,936	66,923	66,911	66,863	(36,097)	(35,245)	(34,387)	(33,525)	(32,664)	(31,847)
		LIVESTOCK	2,283	2,283	2,283	2,283	2,283	2,283	2,283	2,283	2,283	2,283	2,283	2,283	0	0	0	0	0	0
		MADERA VALLEY WSC	695	700	702	703	705	711	695	700	702	703	705	711	0	0	0	0	0	0
		MANUFACTURING	720	741	756	770	781	825	720	741	756	770	781	825	0	0	0	0	0	0
		MINING	182	177	175	173	172	170	182	177	175	173	172	170	0	0	0	0	0	0
		PECOS	2,810	3,064	3,261	3,413	3,573	3,712	2,810	3,064	3,261	3,413	3,573	3,712	0	0	0	0	0	0

Appendix 4A
Comparison of Supply and Demand
(Values in Acre-Feet per Year)

County	Basin	WUG	Demand 2010	Demand 2020	Demand 2030	Demand 2040	Demand 2050	Demand 2060	Supply 2010	Supply 2020	Supply 2030	Supply 2040	Supply 2050	Supply 2060	Surplus (Need) 2010	Surplus (Need) 2020	Surplus (Need) 2030	Surplus (Need) 2040	Surplus (Need) 2050	Surplus (Need) 2060
RUNNELS	COLORADO	BALLINGER	917	998	1,057	1,121	1,178	1,237	0	0	0	0	0	0	(917)	(998)	(1,057)	(1,121)	(1,178)	(1,237)
		COLEMAN COUNTY WSC	18	30	39	48	56	66	18	30	39	48	56	66	0	0	0	0	0	0
		COUNTY-OTHER	360	295	246	193	156	129	30	29	29	28	31	52	(330)	(266)	(217)	(165)	(125)	(77)
		IRRIGATION	4,331	4,317	4,298	4,279	4,260	4,241	2,973	2,973	2,973	2,973	2,973	2,973	(1,358)	(1,344)	(1,325)	(1,306)	(1,287)	(1,268)
		LIVESTOCK	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	1,530	0	0	0	0	0	0
		MANUFACTURING	63	70	76	82	87	94	0	0	0	0	0	0	(63)	(70)	(76)	(82)	(87)	(94)
		MILES	150	163	173	183	193	203	134	134	134	134	134	134	(16)	(29)	(39)	(49)	(59)	(69)
		MILLERSVIEW-DOOLE WSC	94	93	93	91	92	93	125	118	149	141	56	56	31	25	56	50	(36)	(37)
		MINING	44	45	45	45	45	45	44	45	45	45	45	45	0	0	0	0	0	0
		WINTERS	552	561	566	571	575	591	0	0	0	0	0	0	(552)	(561)	(566)	(571)	(575)	(591)
SCHLEICHER	COLORADO	COUNTY-OTHER	117	108	102	98	95	93	117	108	102	98	95	93	0	0	0	0	0	0
		ELDORADO	581	644	671	675	691	711	710	710	710	710	710	711	129	66	39	35	19	0
		IRRIGATION	1,750	1,716	1,680	1,645	1,609	1,575	2,286	2,286	2,286	2,286	2,286	2,286	536	570	606	641	677	711
		LIVESTOCK	583	583	583	583	583	583	583	583	583	583	583	583	0	0	0	0	0	0
		MINING	125	134	139	144	149	154	150	150	150	150	150	154	25	16	11	6	1	0
	RIO GRANDE	COUNTY-OTHER	25	23	22	21	20	20	25	23	22	21	20	20	0	0	0	0	0	0
		IRRIGATION	358	351	344	337	330	322	846	846	846	846	846	846	488	495	502	509	516	524
		LIVESTOCK	204	204	204	204	204	204	204	204	204	204	204	204	0	0	0	0	0	0
SCURRY	BRAZOS	COUNTY-OTHER	316	318	317	313	312	312	316	318	317	313	312	312	0	0	0	0	0	0
		IRRIGATION	788	762	736	710	684	659	788	762	736	710	684	659	0	0	0	0	0	0
		LIVESTOCK	233	233	233	233	233	233	233	233	233	233	233	233	0	0	0	0	0	0
		MINING	2,244	2,403	2,465	2,525	2,583	2,667	2,921	2,921	2,921	2,921	2,921	2,921	677	518	456	396	338	254
	COLORADO	COUNTY-OTHER	558	562	560	553	552	552	504	496	559	541	532	519	(54)	(66)	(1)	(12)	(20)	(33)
		IRRIGATION	2,027	1,961	1,894	1,827	1,760	1,696	2,741	2,741	2,741	2,741	2,741	2,741	714	780	847	914	981	1,045
		LIVESTOCK	396	396	396	396	396	396	396	396	396	396	396	396	0	0	0	0	0	0
		MINING	863	924	948	971	994	1,026	959	959	959	971	994	1,026	96	35	11	0	0	0
		SNYDER	2,792	2,834	2,844	2,829	2,832	2,832	2,281	2,193	2,835	2,712	2,638	2,517	(511)	(641)	(9)	(117)	(194)	(315)
STERLING	COLORADO	COUNTY-OTHER	52	56	57	56	54	55	52	56	57	56	54	55	0	0	0	0	0	0
		IRRIGATION	648	621	595	569	543	518	745	745	745	745	745	745	97	124	150	176	202	227
		LIVESTOCK	503	503	503	503	503	503	503	503	503	503	503	503	0	0	0	0	0	0
		MINING	590	600	605	610	615	620	590	600	605	610	615	620	0	0	0	0	0	0
		STERLING CITY	297	321	330	330	319	324	297	321	330	330	319	324	0	0	0	0	0	0
SUTTON	COLORADO	COUNTY-OTHER	54	56	56	55	54	54	54	56	56	55	54	54	0	0	0	0	0	0
		IRRIGATION	561	551	540	530	518	507	562	562	562	562	562	562	1	11	22	32	44	55
		LIVESTOCK	358	358	358	358	358	358	358	358	358	358	358	358	0	0	0	0	0	0
		MINING	35	35	36	36	37	37	35	35	36	36	37	37	0	0	0	0	0	0
	RIO GRANDE	COUNTY-OTHER	223	232	231	226	225	223	223	232	231	226	225	223	0	0	0	0	0	0
		IRRIGATION	1,250	1,226	1,202	1,178	1,155	1,132	1,250	1,232	1,232	1,232	1,232	1,232	0	6	30	54	77	100
		LIVESTOCK	438	438	438	438	438	438	438	438	438	438	438	438	0	0	0	0	0	0
		MINING	45	47	47	48	48	49	45	47	47	48	48	49	0	0	0	0	0	0
		SONORA	1,195	1,252	1,252	1,236	1,235	1,222	1,919	1,919	1,919	1,919	1,919	1,919	724	667	667	683	684	697
TOM GREEN	COLORADO	CONCHO RURAL WSC	695	873	990	1,048	1,091	1,103	1,103	1,103	1,103	1,103	1,103	1,103	408	230	113	55	12	0
		COUNTY-OTHER	1,761	1,703	1,633	1,553	1,476	1,408	1,720	1,720	1,720	1,720	1,720	1,720	(41)	17	87	167	244	312
		IRRIGATION	104,621	104,362	104,107	103,852	103,593	103,338	57,531	57,531	57,531	57,531	57,531	57,531	(47,090)	(46,831)	(46,576)	(46,321)	(46,062)	(45,807)
		LIVESTOCK	1,978	1,978	1,978	1,978	1,978	1,978	1,978	1,978	1,978	1,978	1,978	1,978	0	0	0	0	0	0
		MANUFACTURING	2,226	2,498	2,737	2,971	3,175	3,425	0	0	0	0	0	0	(2,226)	(2,498)	(2,737)	(2,971)	(3,175)	(3,425)
		MILLERSVIEW-DOOLE WSC	238	263	291	319	359	408	418	420	534	544	244	244	180	157	243	225	(115)	(164)
		MINING	73	80	85	90	95	99	150	150	150	150	150	150	77	70	65	60	55	51
		SAN ANGELO	20,800	21,418	21,734	21,744	21,907	21,969	11,616	11,393	11,170	10,946	10,723	10,500	(9,184)	(10,025)	(10,564)	(10,798)	(11,184)	(11,469)
		STEAM ELECTRIC POWER	543	777	909	1,069	1,264	1,502	0	0	0	0	0	0	(543)	(777)	(909)	(1,069)	(1,264)	(1,502)

Appendix 4A
Comparison of Supply and Demand
(Values in Acre-Feet per Year)

County	Basin	WUG	Demand 2010	Demand 2020	Demand 2030	Demand 2040	Demand 2050	Demand 2060	Supply 2010	Supply 2020	Supply 2030	Supply 2040	Supply 2050	Supply 2060	Surplus (Need) 2010	Surplus (Need) 2020	Surplus (Need) 2030	Surplus (Need) 2040	Surplus (Need) 2050	Surplus (Need) 2060
UPTON	COLORADO	COUNTY-OTHER	52	54	53	53	54	55	52	54	53	53	54	55	0	0	0	0	0	0
		IRRIGATION	16,592	16,355	16,123	15,887	15,651	15,421	5,920	5,904	5,900	5,895	5,889	5,882	(10,672)	(10,451)	(10,223)	(9,992)	(9,762)	(9,539)
		LIVESTOCK	78	78	78	78	78	78	78	78	78	78	78	78	0	0	0	0	0	0
		MINING	2,011	2,025	2,030	2,035	2,040	2,046	2,011	2,025	2,030	2,035	2,040	2,046	0	0	0	0	0	0
	RIO GRANDE	COUNTY-OTHER	100	102	102	101	102	104	100	102	102	101	102	104	0	0	0	0	0	0
		IRRIGATION	167	166	162	160	158	155	199	199	199	199	199	199	32	33	37	39	41	44
		LIVESTOCK	134	134	134	134	134	134	134	134	134	134	134	134	0	0	0	0	0	0
		MCCAMEY	559	606	621	629	648	668	1,071	1,070	1,070	1,071	1,070	1,069	512	464	449	442	422	401
		MINING	651	655	657	659	660	662	651	655	657	659	660	662	0	0	0	0	0	0
		RANKIN	231	245	248	250	255	261	327	326	326	326	326	325	96	81	78	76	71	64
WARD	RIO GRANDE	COUNTY-OTHER	925	929	925	910	905	905	925	529	525	510	505	505	0	(400)	(400)	(400)	(400)	(400)
		IRRIGATION	13,793	13,624	13,454	13,284	13,115	12,947	8,266	8,651	7,733	6,745	6,210	6,059	(5,527)	(4,973)	(5,721)	(6,539)	(6,905)	(6,888)
		LIVESTOCK	126	126	126	126	126	126	126	126	126	126	126	126	0	0	0	0	0	0
		MANUFACTURING	7	7	7	7	7	7	7	7	7	7	7	7	0	0	0	0	0	0
		MINING	153	155	156	157	158	159	153	155	156	157	158	159	0	0	0	0	0	0
		MONAHANS	2,559	2,592	2,597	2,572	2,564	2,564	2,559	2,592	2,597	2,572	2,564	2,564	0	0	0	0	0	0
		STEAM ELECTRIC POWER	4,914	4,223	4,937	5,807	6,868	8,162	4,914	4,223	4,937	5,807	6,189	6,189	0	0	0	0	(679)	(1,973)
WINKLER	COLORADO	LIVESTOCK	2	2	2	2	2	2	2	2	2	2	2	2	0	0	0	0	0	0
	RIO GRANDE	COUNTY-OTHER	119	121	120	119	116	112	121	121	121	121	121	121	2	0	1	2	5	9
		IRRIGATION	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	10,000	0	0	0	0	0	0
		KERMIT	1,927	1,988	1,983	1,966	1,922	1,860	3,943	3,943	3,943	3,943	3,943	3,943	2,016	1,955	1,960	1,977	2,021	2,083
		LIVESTOCK	149	149	149	149	149	149	167	167	167	167	167	167	18	18	18	18	18	18
		MINING	928	895	883	872	861	847	1,878	1,878	1,878	1,878	1,878	1,878	950	983	995	1,006	1,017	1,031
		WINK	331	341	341	338	331	320	657	657	657	657	657	657	326	316	316	319	326	337
Grand Total			*807,453*	*810,576*	*813,895*	*816,478*	*820,191*	*825,581*	*613,969*	*609,471*	*609,481*	*610,484*	*609,696*	*608,859*	*(193,484)*	*(201,105)*	*(204,414)*	*(205,994)*	*(210,495)*	*(216,722)*

Region F Water Plan
Strategy Evaluation Matrix

Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on:				Interbasin Transfer	Third Party Social & Economic Impacts	Implementation Issues	Comments
							Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters				
Andrews	Andrews	Colorado	Dockum Desalination	950	High	$838	Low	Positive	None identified	Low	n/a	None identified		
County Other	Brown	Colorado	Voluntary redistribution	300	High	$2,527	Low	Positive	None	Low	n/a	Positive impact of increased reliable supply on north shore of Lake Brownwood	Other studies may provide better, less expensive alternatives to get Lake Brownwood water to customers	Treated water to northern Brown County from Brookesmith SUD or Zephr WSC
Bronte	Coke	Colorado	5 new water wells	100	Medium to Low	$570	Low	Positive	None identified	Low	n/a		Quantity available from aquifer uncertain	
Bronte	Coke	Colorado	Voluntary Redistribution - San Angelo Regional Desalination System	280	High	$1,920	Low	Positive	None identified	Low	n/a	None identified	Need excess capacity in San Angelo project, operational issues, cost	Transmission only. See San Angelo desalination for treatment.
Bronte	Coke	Colorado	Regional System from Lake Brownwood to Runnels and Coke Counties	280	High	$1,796	Low	Positive	None identified	Low	n/a	None identified	Sponsorship, cost, operational issues	
Bronte	Coke	Colorado	Reuse	110	High	$1,800	Medium	Positive	None identified	Medium	n/a	None identified	Public perception, disposal, TCEQ rules	
Bronte	Coke	Colorado	Rehabilitation of Oak Creek pipeline	129	Medium	$855	Low	Positive	None identified	Low	n/a	None identified	Funding	
Bronte	Coke	Colorado	Water Conservation	51	Medium	$280	Low	Positive	None identified	Low	n/a	None identified	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Robert Lee	Coke	Colorado	Infrastructure Improvements	200	High	$1,297	Low	3	3	TBD	n/a	Improved quality and reliability for the city	Financing	0.5 mgd treatment expansion and new storage tank
Robert Lee	Coke	Colorado	Voluntary Redistribution - San Angelo Regional Desalination System	448	High	$1,920	Low	Positive	None identified	Low	n/a	None identified	Need excess capacity in San Angelo project, operational issues, cost	Transmission only. See San Angelo desalination for treatment.
Robert Lee	Coke	Colorado	Regional System from Lake Brownwood to Runnels and Coke Counties	448	High	$1,796	Low	Positive	None identified	Low	n/a	None identified	Sponsorship, cost, operational issues	
Robert Lee	Coke	Colorado	Reuse	110	High	$1,800	Medium	Positive	None identified	Medium	n/a	None identified	Public perception, disposal, TCEQ rules	
Robert Lee	Coke	Colorado	Desalination of Spence Reservoir Water	500	High	$1,364	Medium	Positive	None identified	Medium	n/a	Increased reliability and better water for city	Financing, disposal of brine reject	Strategy assumes that reject can be discharged. Costs may be significantly higher if other methods used.
Robert Lee	Coke	Colorado	Floating pump in Mountain Creek Resevoir	50	Low	TBD	Low	Positive	None identified	Low	n/a	None identified	Financing	Allows city to take more water when reservoir is low
Robert Lee	Coke	Colorado	Water Conservation	51	Medium	$298	Low	Positive	None identified	Low	n/a	None identified	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Eden	Concho	Colorado	CAX treatment	392	High	$352	Low to Medium	Positive	None identified	Medium	n/a	High cost takes away resources	Disposal of waste products	
Eden	Concho	Colorado	RO treatment	392	High	$423	Low to Medium	Positive	None identified	Medium	n/a	High cost takes away resources	Disposal of waste products	
Eden	Concho	Colorado	Bottled water program	1.3	High	$19,000	Low	Positive	None identified	Low	n/a	Users need to travel to obtain water	Regulatory acceptance	Lowest overall cost
CRMWD	Ector/Midland	Colorado	Odessa/Midland Reuse	9799	High	$1,019	Low	Low	None	Low to Medium	n/a	None identified	Public perception, disposal, TCEQ rules	
CRMWD	Howard	Colorado	Big Spring Reuse	1855	High	$627	Low	Low	None	Low to Medium	n/a	None identified	Public perception, disposal, TCEQ rules	
Manufacturing	Kimble	Colorado	Edwards-Trinity aquifer	1000	Medium	$670	Medium	None	None identified	None	n/a	None identified	Locating areas with sufficient production and acceptable water quality	Manufacturing demands appear to include recirculated water
Richland SUD	McCulloch	Colorado	Specialty Media Treatment System	113	High	$619	Low	Positive	None identified	Low	n/a	Security and worker safety, loss of revenue due to increased costs	Depends on ability to locate injection well. Will require long-term contract and minimum guaranteed payment.	
Richland SUD	McCulloch	Colorado	Bottled water program	0.5	High	$22,400	Low	Positive	None identified	Low	n/a	Users need to travel to obtain water	Regulatory acceptance	Lowest overall cost
Richland SUD	McCulloch	Colorado	Replacement well	113.0	High	$1,524	Low	Positive	None identified	Low	n/a	None identified	Assumes that an area with low radionuclide concentration can be identified	
Menard	Menard	Colorado	Aquifer Storage and Recovery	240	High	$913	Low	Positive	None identified	Low	n/a	None identified	Suitability of Hickory not established, financing	
Menard	Menard	Colorado	Water Conservation	33	Medium	$733	Low	Positive	None identified	Low	n/a	None identified	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Menard	Menard	Colorado	New Hickory well	160	Medium to High	$1,078	Low	Positive	None identified	Low	n/a	None identified	Water quality unknown.	May be higher impacts if advanced treatment needed.
Menard	Menard	Colorado	San Saba Off-Channel Reservoir	500	High	$3,438	Medium	Positive	None identified	Low	n/a	Property owners at reservoir site	Specific site not selected. Priority date of water significantly affects feasibility.	Assuming that diversion is under existing Menard or LCRA water right.
Midland	Midland	Colorado	T-Bar Well Field	13,400	High	$962	Low	Low	Low	Low	Not required for groundwater		Pipeline route and well field layout not determined	Additional studies underway. Not available for this plan.

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Entity	County Used	Basin Used	Strategy	Quantity (Ac-Ft/Yr)	Reliability	Cost ($/Ac-Ft)	Impacts of Strategy on:				Interbasin Transfer	Third Party Social & Economic Impacts	Implementation Issues	Comments
							Environmental Factors	Agricultural Resources/ Rural Areas	Other Natural Resources	Key Water Quality Parameters				
Midland	Midland	Colorado	Water Conservation	3,521	Medium	$452	Low	Positive	None identified	Low	n/a	None identified	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
BCWID	Multiple	Colorado	Lake Brownwood to Runnels & Coke Counties	2800	High	$1,796	Low	Low	None	Low	n/a	None identified	Sponsorship, cost, operational issues.	
CRMWD	Multiple	Colorado	Winkler Well Field	6000	High	$831	Low	Low	Low	Low	Not required for groundwater		Pipeline route and well field layout not determined	
CRMWD	Multiple	Colorado	Water from SW Pecos County	15000	Medium	$1,248	Low to Medium	May impact Belding Farms	None identified	Low	Not required for groundwater	May impact other groundwater users in Pecos County	Needs additional studies regarding supplies and impacts	
CRMWD	Multiple	Colorado	Water from Roberts County	25000	High	$2,046	Low	Low	Low	Low	Not required for groundwater	Other users of Roberts County water	Would be more cost-effective with other participants	
Multiple	Multiple	Multiple	Subordination of senior water rights	58,884	Medium	TDB	Medium	Positive	None identified	Low	n/a	None identified	Needs further analysis before implementation	Done in conjunction with Region K
Ballinger	Runnels	Colorado	Regional System from Lake Brownwood to Runnels and Coke Counties	1,329	High	$1,919	Low	Positive	None identified	Low	n/a	None identified	Sponsorship, cost, operational issues	
Ballinger	Runnels	Colorado	Voluntary redistribution - Hords Creek Resevoir	220	Low	$1,982	Low	Positive	None identified	Low	n/a	None identified	Subordination to downstream water rights	May require modifications to contracts with Corps of Engineers
Ballinger	Runnels	Colorado	Volunary Redistribution - purchase water from CRMWD	394	High	$426	Low	Positive	None identified	Low	n/a	Water obtained through existing contract with Millersview-Doole	Must have agreement with CRMWD, Millersview-Doole WSC and WCTMWD	Uses existing WCTMWD and Ballinger pipelines
Ballinger	Runnels	Colorado	Voluntary Redistribution - San Angelo Regional Desalination System	1,329	Medium to High	$1,751	Low	Positive	None identified	Low	n/a	None identified	Need excess capacity in San Angelo project, operational issues, cost	Transmission only. See San Angelo desalination for treatment.
Ballinger	Runnels	Colorado	Reuse	220	High	$999	Medium	Positive	None identified	Medium	n/a	None identified	Public perception, disposal, TCEQ rules	
Ballinger	Runnels	Colorado	Water Conservation	144	Medium	$557	Low	Positive	None identified	Low	n/a	None identified	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
Winters	Runnels	Colorado	Regional System from Lake Brownwood to Runnels and Coke Counties	729	High	$1,919	Low	Positive	None identified	Low	n/a	None identified	Sponsorship, cost, operational issues	
Winters	Runnels	Colorado	Voluntary Redistribution - San Angelo Regional Desalination System	729	High	$1,751	Low	Positive	None identified	Low	n/a	None identified	Need excess capacity in San Angelo project, operational issues, cost, participation by other cities	Transmission only. See San Angelo desalination for treatment.
Winters	Runnels	Colorado	Reuse	110	High	$1,800	Medium	Positive	None identified	Medium	n/a	None identified	Public perception, disposal, TCEQ rules	
Winters	Runnels	Colorado	Water Conservation	76	Medium	$590	Low	Positive	None identified	Low	n/a	None identified	Site specific data needed. May require financial and technical assistance.	Conservation based on generic assessment. Site-specific data not available.
CRMWD	Scurry	Colorado	Snyder Reuse	726	High	$1,176	Low	Low	None	Low to Medium	n/a	None identified	Public perception, disposal, TCEQ rules	
CRMWD	Multiple	Colorado	Capitan Reef Desalination	9,500	Medium	$1,300	Low	Low	None	Low	n/a	None identified	Reliability of large-scale development not established.	
San Angelo	Tom Green	Colorado	Water Conservation	4,350	Medium	$565	Low	Low	None identified	Low	n/a	None identified	City developing a water conservation program	Actual conservation savings may be greater.
San Angelo	Tom Green	Colorado	Edwards-Trinity aquifer	12,000	Medium	$468	Medium	Potential impact to local users	None identified	Low	n/a	Potential impact to local users	Locating areas with sufficient production. Groundwater conservation district rules that discourage large-scale development	
San Angelo	Tom Green	Colorado	Water from SW Pecos County	12,000	Medium	$1,867	Low to Medium	May impact Belding Farms	None identified	Low	Not required for groundwater	May impact other groundwater users in Pecos County	Needs additional studies regarding supplies and impacts	
San Angelo	Tom Green	Colorado	McCulloch Well Field	12,000	High	$1,081	Low	Potential impact to other Hickory users	None identified	Low	n/a	Potential impact to other Hickory users	Pipeline route and well field layout currently being studied	Water may not meet standards for Radium & require advanced treatment, which may increase costs
San Angelo	Tom Green	Colorado	Regional Desalination Facility	11200	High	$890	Low	Low	None identified	Low	n/a		Lack of data on target aquifer	
San Angelo	Tom Green	Colorado	Rehabilitation of Spence Pipeline	2,300	High	$241	Low	Low	None identified	Low	n/a			
Steam Electric	Not determined	Not determined	CCGT and ACC Generation	24,306	Medium to High	$26,000	Low	None	None identified	Low	n/a		Implementation based on economic decisions by power industry	Technology requires very little water

Region F Water Plan
Environmental Quantification Matrix

Entity	County	Basin	Strategy	Environmental Factors									Comments
				Acres Impacted	Envir Water Needs	Habitat	Threat and Endanger Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Other	Overall Environmental Impacts	
Andrews	Andrews	Colorado	Dockum Desalination	15	Low	Low	6	Low	None	Low		Low	Disposal through existing deep well injection
County Other	Brown	Colorado	Voluntary redistribution	53	Low	Low	10	Low	None	Low		Low	Not a significant draw on reservoir
Bronte	Coke	Colorado	5 new water wells	5	Low	Low	8	Low	None	Low		Low	Producing aquifer not well known.
Bronte	Coke	Colorado	Voluntary Redistribution - San Angelo Regional Desalination System	184	Low	Low	8	Low	None	Low		Low	Impacts for transmission system only. See San Angelo desal for treatment.
Bronte	Coke	Colorado	Regional System from Lake Brownwood to Runnels and Coke Counties	202	Low	Low	8	Low	None	Low		Low	
Bronte	Coke	Colorado	Reuse	10	Medium	Medium	8	Low	None	Medium		Medium	Assuming that waste stream from treatment process would be discharged or use land application.
Bronte	Coke	Colorado	Rehabilitation of Oak Creek pipeline	32	Low	Low	8	Low	None	Low		Low	
Bronte	Coke	Colorado	Water Conservation	0	Low	Low	8	Low	None	Low		Low	
Robert Lee	Coke	Colorado	Infrastructure Improvements	4	Low	Low	8	Low	None	Low		Low	0.5 mgd treatment plant and new storage tank
Robert Lee	Coke	Colorado	Voluntary Redistribution - San Angelo Regional Desalination System	184	Low	Low	8	Low	None	Low		Low	Impacts for transmission system only. See San Angelo desal for treatment.
Robert Lee	Coke	Colorado	Regional System from Lake Brownwood to Runnels and Coke Counties	202	Low	Low	8	Low	None	Low		Low	
Robert Lee	Coke	Colorado	Reuse	10	Medium	Medium	8	Low	None	Medium		Medium	Assuming that waste stream from treatment process would be discharged or use land application.
Robert Lee	Coke	Colorado	Desalination of Spence Reservoir Water	5	Medium	Medium	8	Low	None	Medium		Medium	
Robert Lee	Coke	Colorado	Floating pump in Mountain Creek Resevoir	1	Low	Low	8	Low	None	Low		Low	Allows city to take more water when reservoir is low
Robert Lee	Coke	Colorado	Water Conservation	0	Low	Low	8	Low	None	Low		Low	
Eden	Concho	Colorado	CAX treatment	<1	Low to Medium	Low to Medium	8	Low	None	Medium		Low to Medium	Long-term impacts of land application of naturally occuring radionuclides unknown
Eden	Concho	Colorado	RO treatment	<1	Low to Medium	Low to Medium	8	Low	None	Medium		Low to Medium	Long-term impacts of land application of naturally occuring radionuclides unknown
Eden	Concho	Colorado	Bottled water program	<1	Low	Low	8	Low	None	Low		Low	Small amount of water treated
CRMWD	Ector/Midlar	Colorado	Odessa/Midland Reuse	152	Low	Medium	6	Low	None	Low		Low	Impacts due to decreased flow in Monahans Draw.
CRMWD	Howard	Colorado	Big Spring Reuse	6	Low	Low	6	Low	None	Medium		Low	No impact below Beals Creek diversion
Manufacturing	Kimble	Colorado	Edwards-Trinity aquifer	<1	Medium	Medium	9	Low	None	Medium		Medium	Potential impact on surface water flows
Richland SUD	McCulloch	Colorado	Specialty Media Treatment System	<1	Low	Low	9	Low	None	Low		Low	Spent media disposed using deep-well injection.
Richland SUD	McCulloch	Colorado	Bottled water program	<1	Low	Low	9	Low	None	Low		Low	Small amount of water treated
Richland SUD	McCulloch	Colorado	Replacement well	1	Low	Low	9	Low	None	Low		Low	Replaces existing well
Menard	Menard	Colorado	Aquifer Storage and Recovery	2	Low to Medium	Low	12	Low	None	Low		Low	In conjunction with Hickory well
Menard	Menard	Colorado	Water Conservation	0	Low	Low	12	Low	None	Low		Low	
Menard	Menard	Colorado	New Hickory well	2	Low	Low	12	Low	None	Low		Low	Impacts may be higher if advanced treatment required because of brine disposal
Menard	Menard	Colorado	San Saba Off-Channel Reservoir	80	Medium	Medium	12	Low to Mediu	None	Low		Medium	Specific site not selected
Midland	Midland	Colorado	T-Bar Well Field	212	Low	Low	7	Low	None	Low		Low	Estimated impacts. Precise route unknown pending routing study.
Midland	Midland	Colorado	Water Conservation	0	Low	Low	6	Low	None	Low		Low	
BCWID	Multiple	Colorado	Lake Brownwood to Runnels & Coke Counties	202	Low	Low	10	Low	None	None		Low	
CRMWD	Multiple	Colorado	Winkler Well Field	112	Low	Low	7	Low	None	Low		Low	Estimated impacts. Precise route unknown pending routing study.
CRMWD	Multiple	Colorado	Water from SW Pecos County	265	Low to Medium	Low	23	Low	None	Low to Medium		Low to Medium	
CRMWD	Multiple	Colorado	Water from Roberts County	1125	Low to Medium	Low		Low	None	Low		Low	Possible impact on Canadian River flows

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Environmental Quantification Matrix

Entity	County	Basin	Strategy	Environmental Factors									Comments
				Acres Impacted	Envir Water Needs	Habitat	Threat and Endanger Species	Cultural Resources	Bays & Estuaries	Envir Water Quality	Other	Overall Environmental Impacts	
Multiple	Multiple	Multiple	Subordination of senior water rights	0	Medium	Low	varies	Low	Medium to	Medium to Low		Medium	
Ballinger	Runnels	Colorado	Regional System from Lake Brownwood to Runnels and Coke Counties	202	Low	Low	10	Low	None	Low		Low	
Ballinger	Runnels	Colorado	Voluntary redistribution - Hords Creek Resevoir	51	Low	Low	10	Low	None	Low		Low	
Ballinger	Runnels	Colorado	Volunary Redistribution - purchase water from CRMWD	0	Low	Low	10	Low	None	Low		Low	Pipeline already in place
Ballinger	Runnels	Colorado	Voluntary Redistribution - San Angelo Regional Desalination System	184	Low	Low	10	Low	None	Low		Low	Impacts for transmission system only. See San Angelo desal for treatment.
Ballinger	Runnels	Colorado	Reuse	10	Medium	Medium	10	Low	None	Medium		Medium	Assuming that waste stream from treatment process would be discharged or use land application.
Ballinger	Runnels	Colorado	Water Conservation	0	Low	Low	10	Low	None	Low		Low	
Winters	Runnels	Colorado	Regional System from Lake Brownwood to Runnels and Coke Counties	202	Low	Low	10	Low	None	Low		Low	
Winters	Runnels	Colorado	Voluntary Redistribution - San Angelo Regional Desalination System	184	Low	Low	10	Low	None	Low		Low	Impacts for transmission system only. See San Angelo desal for treatment.
Winters	Runnels	Colorado	Reuse	10	Medium	Medium	10	Low	None	Medium		Medium	Assuming that waste stream from treatment process would be discharged or use land application.
Winters	Runnels	Colorado	Water Conservation	0	Low	Low	10	Low	None	Low		Low	
CRMWD	Scurry	Colorado	Snyder Reuse	9	Low	Low	6	Low	None	Medium		Low	No impact below Colorado City
CRMWD	Multiple	Colorado	Capitan Reef Desalination	164	Low	Low	7	Low	None	Low		Low	Estimated impacts. Precise route unknown pending routing study.
San Angelo	Tom Green	Colorado	Water Conservation	0	Low	Low	10	Low	None	Low		Low	Conserved water expected to remain in reservoirs for later use, use by others, or lost due to evaporation. Not expected to have a significant positive impact on environmental flows.
San Angelo	Tom Green	Colorado	Edwards-Trinity aquifer	83	Medium to high	Medium	10	Low	None	Medium to Low		Medium	
San Angelo	Tom Green	Colorado	Water from SW Pecos County	448	Low to Medium	Low	23	Low	None	Low to Medium		Low to Medium	
San Angelo	Tom Green	Colorado	McCulloch Well Field	476	Low	Low	12	Low	None	Low		Low	Estimated impacts. Precise route unknown pending routing study.
San Angelo	Tom Green	Colorado	Regional Desalination Facility	100	Low	Low	10	Low	None	Low		Low	Using deep well injection for brine disposal
San Angelo	Tom Green	Colorado	Rehabilitation of Spence Pipeline	0	Low	Low	10	Low	None	Low		Low	Existing pipeline
Steam Electric	Not determi	Not determ	CCGT and ACC Generation	0	Low	Low	unknown	Low	None	Low		Low	Location of new generation not determined