7

Drought Response Information, Activities and Recommendations

This page intentionally left blank.

7 Drought Response Information, Activities and Recommendations

Droughts are of great importance to the planning and management of water resources in Texas. Although droughts can occur in all climatic zones, they have the greatest potential to become catastrophic in dry or arid regions such as West and Central Texas. It is not uncommon for mild droughts to occur over short periods of time in Texas; however, there is no certain way to predict how long or severe a drought will be while it is occurring. The only defense available in drought prone areas such as Brazos G is proper planning and preparation for worst case scenarios. This requires understanding of drought patterns and the historical droughts in the region.

Due to significant population growth throughout Texas, which is expected to continue in the Brazos G Area based on TWDB projections, the demand for water has increased. With growing demand and the threat of climate change contributing to water scarcity, planning is even more important to prevent shortages, deterioration of water quality and lifestyle/financial impacts on water suppliers and users. This chapter presents information on drought preparedness in the Brazos G Area, including regional droughts of record, current example drought contingency plans, emergency interconnects, and responses to local drought conditions, and methods to estimate available water supplies in the region.

7.1 Droughts of Record in the Brazos G Area

7.1.1 Background

One of the best tools in drought preparedness is a thorough understanding of the drought of record (DOR), or the worst drought to occur for a particular area during the available period of hydrologic data. However, there are many ways that the “worst drought” can be defined (degree of dryness, agricultural impacts, socioeconomic impacts, effects of precipitation etc.). Regional water planning focuses on hydrological drought, which is typically the type of drought associated with the largest shortfalls in surface and/or subsurface water supply. The frequency and severity of hydrological drought is often defined on a watershed or river basin scale, although it could be different from one area to the next, even within a planning region.

7.1.2 Current Drought of Record

In terms of severity and duration, the devastating drought of the 1950s is considered the drought of record for most of Texas, including most of the Brazos G Area. By 1956, 244 of the 254 counties were considered disaster areas. This drought lasted almost a decade in many places and not only affected Texas, but other states throughout the nation. The 1950’s drought has been used by water resource engineers and managers as a benchmark drought for water supply planning. Texas has experienced two recent droughts centered around 2008 and 2011. Incorporating these recent droughts into future water planning efforts would be prudent. These droughts have not yet been widely

considered to be new droughts of record for most of Texas, but have shown to be more severe in some parts of the Brazos G Area.

7.1.3 Drought Indicators

Water Availability Modeling

Engineers and planners often use surface water models to demonstrate the effects of historical droughts on water supply. Surface water effects are more readily observed than groundwater, and reservoir supplies that were not in place during historic droughts can be assessed using historic hydrology and these modeling tools. The primary tool used in regional planning in Texas to observe the performance of reservoirs under historic drought conditions is the TCEQ Water Availability Model (WAM). The WAM is the same tool used to determine the available flow and firm yields of surface water projects in the regional water plan.

The Brazos River Basin WAM (Brazos WAM) includes hydrologic information from 1940 through 1997 and supports the use of the 1950's drought as the drought of record for nearly all reservoirs in the Brazos G Area. However, it has not been updated to include information from more recent periods of drought after the turn of the century. A related tool called the Brazos Mini Water Availability Model (Mini-WAM), developed by HDR Inc , has been utilized by Brazos G to model reservoirs upstream of Possum Kingdom Reservoir and has been updated to include hydrology through June 2008. Applications of this tool support the more recent drought cycle that began in the late 1990's as potentially being more severe than the drought of the 1950's; however it also does not capture the entirety of the 2007-2009 drought or the drought that plagued parts of the region between 2011 and the Spring of 2015.

Drought Indices

Several Drought Indices have been developed to assess the effect of a drought through parameters such as severity, duration and spatial extent. The Palmer Drought Severity Index (PDSI) was one of the first comprehensive efforts using precipitation and temperature for estimating the moisture of a region. PDSI values greater than 0.49 correspond to wetter than normal conditions and values from -0.5 to 6 represent varying degrees of drought. Information is available for climate regions across the country through 2014, which makes the PDSI a helpful tool for understanding recent drought periods not included in the WAM.

Most of Brazos G lies in Texas Climate Division 3. A graph of yearly PDSI values for Texas Climate Division 3 shows that while the 1908 and the more recent drought in the early 21st century were severe, the drought of the 1950's was the most intense over a longer period of time, supporting the continued use of this drought as the drought of record for Brazos G (Figure 7-1). However, the eight most upstream counties in Brazos G, containing Lake Davis, Lake Stamford, Lake Fort Phantom Hill, Lake Kirby, Lake Abilene, and Lake Sweetwater, are located in Texas Climate Division 2. Figure 7-2 shows that while the drought of the 1950's has, to this point, lasted longer than the most recent drought, the PDSI in 2011 is more severe than the PDSI in 1956. The available information is not strong enough to change the drought of record, but it is worth noting the intensity of 2011.

Figure 7-1. Parmer Drought Severity Index: Division 3

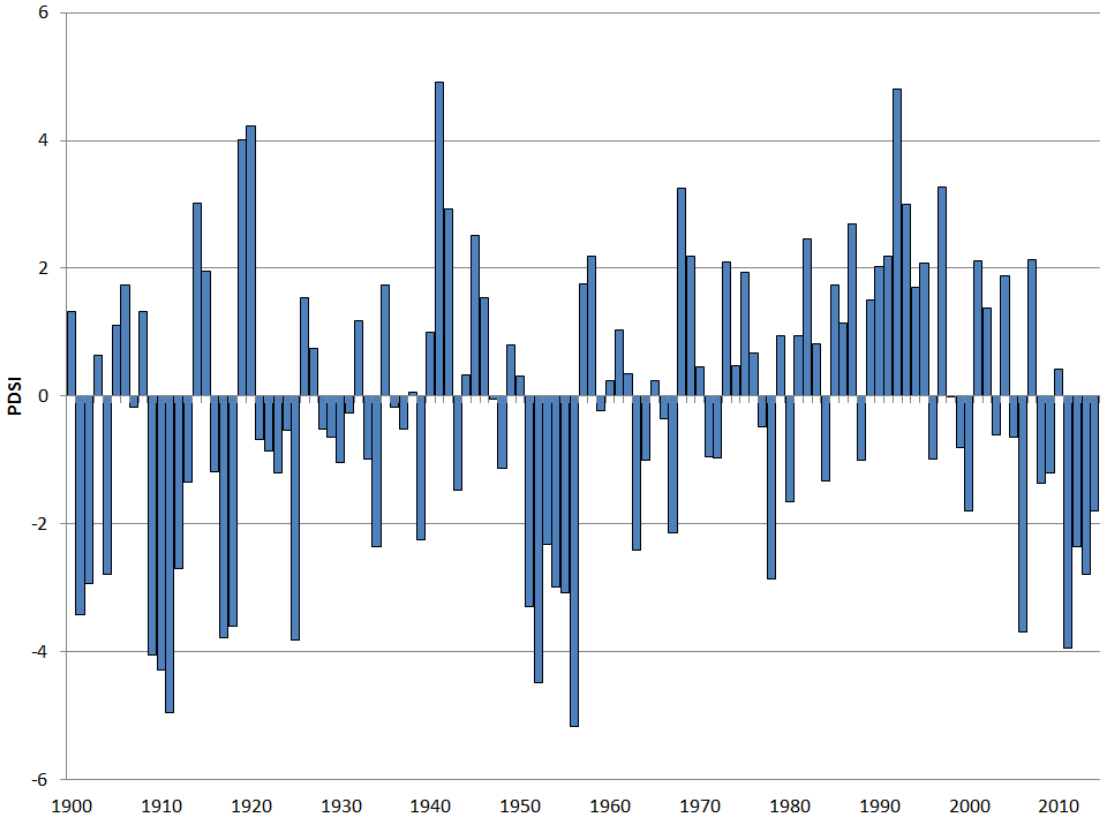
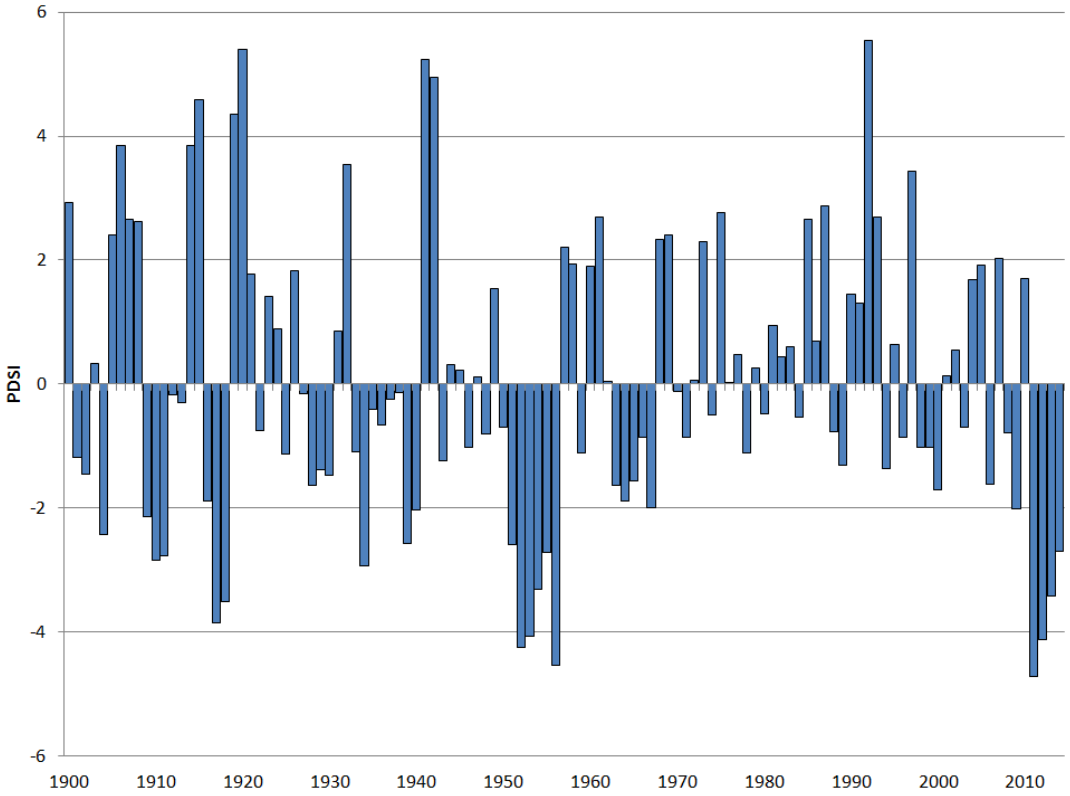


Figure 7-2. Parmer Drought Severity Index: Division 2



7.1.4 Recent Droughts

During development of the 2011 Brazos G Regional Water Plan, Brazos G completed a study[1] of reservoir yields for 19 reservoirs located upstream of Possum Kingdom Reservoir in the upper Brazos Basin, due to concerns that the drought conditions being experienced since 1997 may have been more severe than the 1950's drought. The update to the Brazos Mini-WAM was competed as part of this effort, with the hydrologic record extended through June 2008.

The results of the study indicated that the period after 1997 through June 2008 was more severe than the 1950's drought for 11 of the 19 reservoirs, based on the year when minimum storage was computed by the model, typically either 2000 or 2004. As an indication of a new drought of record, the results demonstrate that some of the reservoirs in the upper Brazos Basin have experienced a drought worse than the 1950's drought during the 1997 – 2008 period. The fact that not all of the upper basin reservoirs studied indicated new drought of record demonstrates that "the severity of a drought has much to do with reservoir characteristics and how a reservoir relates to surrounding water rights in addition to hydrologic processes."[2]

In 2011, severely decreased precipitation resulted in substantial declines in streamflow throughout Texas. Record high temperatures also occurred June through August leading to an increase in evaporation rates. The evaporation was so great that by August 4, 2011, state climatologist John Nielson-Gammon declared 2011 to be the worst 1-year drought on record in Texas[3]. The 2011 water year statewide annual precipitation was 11.27 inches, more than 2 inches less than the previous record low of 13.91 inches in 1956.

The severe one-year drought experienced in 2011 can be considered to be part of an overall continuation of a drought cycle that began around 2008 (possibly since 1998), and in some parts of the state continued until the spring of 2015, when a large storm system caused flooding throughout much of the Brazos Basin and replenished much of the reservoir storage depleted during the drought. However, some reservoirs in the western part of the Brazos G Area have still not refilled, such as Hubbard Creek Reservoir and Lake Fort Phantom Hill. While the length of this recently concluded drought does not yet equal the drought of the 1950's, if weather patterns continue, the current drought cycle could very well be considered the drought of record throughout Texas. The current drought extending to present day and including 2011 has been identified as the new Drought of Record in the adjacent Colorado River Basin. The Lower Colorado River Authority (LCRA) recently reduced the estimated firm yield of the Highland Lakes system, and the Colorado River Municipal Water District (CRMWD) similarly has reduced the estimated yield of O.H. Ivie Reservoir.

---

[1] HDR, Inc., Study 1 – Updated Drought of Record and Water Quality Implications for Reservoirs Upstream of Possum Kingdom Reservoir, Brazos G Regional Water Planning Group, April 2009.

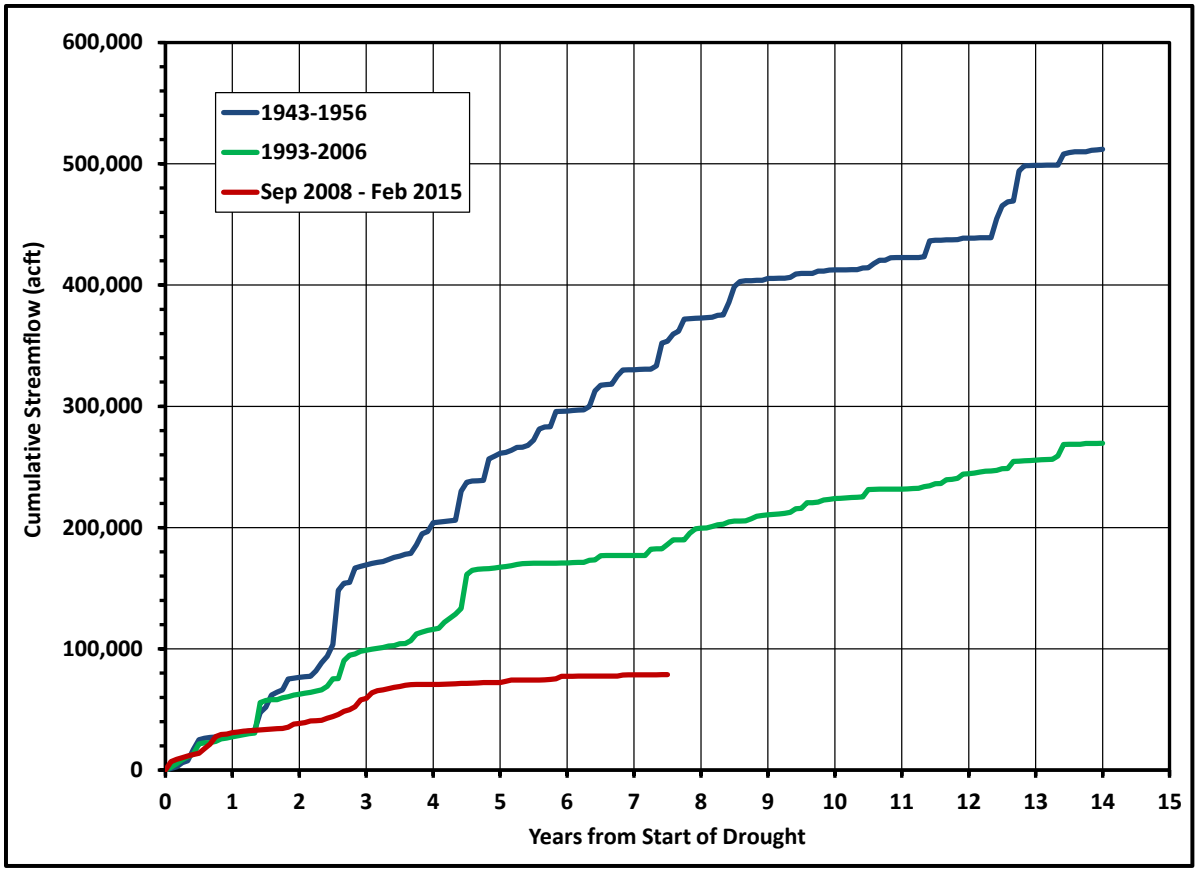
2 Ibid.

3 Winters, K.E., 2013, A historical perspective on precipitation, drought severity, and streamflow in Texas during 1951–56 and 2011: U.S. Geological Survey Scientific Investigations Report 2013–5113, p.1 http://pubs.usgs.gov/sir/2013/5113

The severity of the current drought is illustrated in Figure 7-3, which presents cumulative streamflows measured at USGS Streamgage 08084000 Clear Fork of the Brazos River near Nugent, TX. In the figure, cumulative streamflows since drought initiation are compared for three drought periods: 1950's, 1993 – 2006, and 2008 – February 15, 2015. When cumulative streamflows for the three drought periods are compared at a point in time seven years from initiation (essentially mid way through the 1950's drought), total streamflow for the current drought cycle is 22 percent and 42 percent of the total streamflow for the 1950's and 2006 droughts, respectively.

While the 2011 drought year and recent years appear to be very severe and can provide helpful information to water planners and managers throughout the state, the duration of the 1950's drought combined with the overall severity for more than a decade in the Brazos G Area suggests that it is still a valid choice as the DOR for regional planning purposes over the majority of the Brazos G Area. However, it appears from data such as presented in Figure 7-3 and the analyses performed previously that the upper Brazos Basin may be experiencing a new drought of record. This would have to be confirmed by more detailed analyses beyond the scope of this regional water plan. However, conditions in the middle and lower portions of the basin for these more recent droughts do not appear to be as severe as those experienced during the 1950's drought.

Figure 7-3. Comparison of Cumulative Streamflows for Three Drought Periods for the Clear Fork at Nugent, TX Streamgage (08084000)



7.2 Current Drought Preparations and Response

7.2.1 Current Drought Preparations and Responses

WUG Level Planning

WUGs in Brazos G can prepare for drought by participating in the regional planning process. The regional planning process attempts to meet projected water demands during a drought of severity equivalent to the drought of record. WUGs that provide accurate information to the planning group and Texas Water Development Board and consider recommendations accepted by the regional planning group should be able to supply water through drought periods. In addition, all wholesale water providers and most municipalities develop individual drought contingency plans or emergency action plans to be implemented at various stages of a drought.

Basin Responses

Throughout Texas, including the Brazos River Basin, water rights are issued under the prior appropriation system. During times of shortage, curtailment of water rights has become necessary in recent droughts. Dow Chemical made priority water rights calls in the Brazos River Basin in 2009, 2011, 2012, and 2013. When a priority call is made, upstream water rights that are junior in priority to the water right making the call are required to forgo diversions and impoundment of water and allow streamflows to pass downstream to honor the priority of downstream senior rights. The priority calls affected most water rights in the basin. Partly in response to the priority calls and in response to the ongoing drought, the Brazos Watermaster Program was established by petition and subsequent order issued by the TCEQ Commissioners on April 21, 2014. The program has jurisdiction over the Lower Brazos River Basin including and below Possum Kingdom Reservoir. The Brazos Watermaster will monitor water use and streamflow, and coordinate with water rights holders when flows need to be passed to honor senior water rights.

7.2.2 Overall Assessment of Local Drought Contingency Plans

Predicting the timing, severity and length of a drought is an inexact science; however, it is safe to assume that it is an inevitable component of the Texas climate. For this reason, it is critical to plan for these occurrences with policy outlining adjustments to the use, allocation and conservation of water in response to drought conditions. Drought and other circumstances that interrupt the reliable supply or water quality of a source often lead to water shortages. During a drought period, there generally is a greater demand on the already decreased supply as individuals attempt to maintain landscape vegetation through irrigation because less rainfall is available. This can further exacerbate a water supply shortage situation.

TCEQ requires all wholesale public water suppliers, retail public water suppliers serving 3,300 connections or more, and irrigation districts to submit drought contingency plans. In accordance with the requirements of Texas Administrative Code §288(b), DCPs must be updated every 5 years and adopted by retail public water providers. The TCEQ defines a DCP as “A strategy or combination of strategies for temporary supply and

demand management responses to temporary and potentially recurring water supply shortages and other water supply emergencies."[4] According to a TCEQ handbook[5] the underlying philosophy of drought contingency planning is that:

- While often unpreventable, short-term water shortages and other water supply emergencies can be anticipated,
- The potential risks and impacts of drought or other emergency conditions can be considered and evaluated in advance of an actual event; and, most importantly,
- Response measures and best management practices can be determined with implementation procedures defined, again in advance, to avoid, minimize, or mitigate the risks and impacts of drought-related shortages and other emergencies.

Model Drought Contingency plans are available on TCEQ's website, however, it is not possible to create a single DCP that will adequately address local concerns for all entities throughout the State of Texas. The conditions that define a water shortage can be very location specific because most communities in Brazos G rely primarily on local water supplies. For example, some communities rely on reservoirs that are regularly operated at full conditions; in this case a shortage could exist when the supplies are at 75 percent. Other reservoirs may rarely refill and be considered a concern at 25 percent capacity. Similarly, unique aquifer systems are considered at risk under location specific conditions. While the approach to planning may be different between entities all DCP's should include:

- Specific, quantified targets for water use reductions,
- Drought response stages,
- Triggers to begin and end each stage,
- Supply management measures,
- Demand management measures,
- Descriptions of drought indicators,
- Notification procedures,
- Enforcement procedures,
- Procedures for granting exceptions,
- Public input to the plan,
- Ongoing public education,
- Adoption of plan, and
- Coordination with regional water planning groups.

For water suppliers such as those in Brazos G, the primary goal of DCP development is to have a plan that can ensure an uninterrupted supply of water in an amount that can satisfy essential human needs. A secondary but also important goal is to minimize

[4] http://www.twdb.texas.gov/conservation/training/archives/more-than-a-drop-workshop/doc/5_%20TCEQ%20Rules.pdf

[5] https://www.tceq.texas.gov/assets/public/comm_exec/pubs/archive/rg424.pdf

negative impacts on quality of life, the economy and the local environment. In order to meet these goals, action needs to be taken in an expedient, pre-determined procedure, requiring that an approved DCP be in place before drought conditions occur.

In accordance with Texas Administrative code, most Region G entities have submitted DCPs to be implemented when local shortages occur. Brazos G was able to obtain DCPs for multiple WUGs and WWPs. These plans identify multiple triggers for initiation and termination of drought stages, responses to be implemented and reduction targets based on each stage. The plans also include information regarding public notification procedures and enforcement measures. Some WUGs or WWPs have included a method of granting a variance should the need arise.

7.2.3 Summary of Existing Triggers and Responses

Through timely implementation of drought response measures it is possible to meet the goals of the DCP by avoiding, minimizing or mitigating risks and impacts of water shortages and drought. In order to accomplish this, DCP's are built around a collection of drought responses and triggers based on various drought stages. Stages are generally similar for all DCP's but can vary from entity to entity. Stage one will normally represent mild water shortage conditions and the severity of the situation will increase through the stages until emergency water conditions are reached and, in some cases, a water allocation stage is determined.

Brazos G compiled stage, trigger and response information for 25 DCP's in the region including those from WWPs, WUGs and County-Other suppliers. Compliance in the majority of the DCPs in the region is voluntary under Stage I and mandatory under Stage II and III. Most Entities included a Stage IV and a few plans specify a Stage V and/or Stage VI scenario. Target reductions, triggers and responses are included for most stages. Triggers, stages and responses for entities in Brazos G can be found in Table 7-1.

Table 7-1. Common Drought Response Measures

Entity Name	DCP Date	Stage Number	Triggers										Responses											Water Supplies	
			Contamination	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Supply Based	Time	Wholesale Provider	Other	Assessment and Identification	Water Rate Change or Surcharge	Irrigation Schedule	Mandatory Reduction	Notification of Public Agencies or Specific Users	Prohibited Use	Public Notification	Discontinue Water Diversions	Suspend Service	Water Allocation	Others	SW	GW
City of Thrall	2003	1								√					√	√			√				√		
		2		√		√									√			√	√				√		
		3		√		√									√			√	√				√		√
		4		√		√									√			√	√				√		
		Emergency	√		√							√					√	√	√				√		
Central Texas WSC	2009	1						√									√		√					√	
		2						√								√	√								
		3						√						√		√	√								
		Emergency						√									√			√			√		
Upper Leon River MWD	2009	1		√				√			√	√					√							√	
		2		√				√			√	√					√								
		Emergency	√		√			√			√	√					√					√			
City of Harker Heights	2012	1		√											√			√	√					√	
		2		√											√			√	√				√		
		3	√	√	√				√			√			√			√	√		√	√	√		
City of Sweetwater	2011	1		√			√	√											√				√	√	√
		2		√			√	√							√			√	√						
		3		√			√	√							√		√	√	√						
		4		√			√	√						√	√		√	√	√			√			
		Emergency		√	√			√				√	√	√			√		√				√		
City of Comanche	2011	1		√				√				√			√	√	√		√				√	√	
		2		√				√				√			√	√	√		√				√		
		3		√				√				√			√	√	√	√	√				√		
		Emergency	√	√	√			√				√		√	√		√		√			√	√		
City of Robinson	2002	1		√			√			√						√	√	√	√				√	√	√
		2		√			√			√					√		√	√	√				√		
		3		√			√			√					√		√	√	√				√		
		4		√	√		√			√					√		√	√	√				√		
		Emergency	√		√												√	√	√				√		
City of Mexia	2002	1		√		√		√							√				√				√	√	√
		2		√		√		√							√			√	√				√		
		3		√		√		√						√				√	√			√	√		
City of Lampasas	2001	1		√	√						√	√			√	√	√		√				√	√	
		2		√	√						√	√			√	√		√	√				√		
		3	√	√	√						√	√			√	√	√	√	√			√	√		
		Emergency	√	√	√						√	√	√				√		√				√		
Bethesda WSC	2009	1		√							√	√			√		√	√					√	√	√
		2		√			√		√		√	√			√		√	√	√				√		
		3	√	√	√		√		√		√	√			√		√	√	√				√		
City of Hearne	2001	1					√									√	√		√				√		√
		2					√								√	√	√		√				√		
		3					√								√	√	√		√				√		
		4					√								√	√	√		√				√		
		Emergency	√		√												√		√						
City of Georgetown	2009	1								√													√		
		2		√		√		√	√			√			√			√					√	√	√
		3		√		√		√	√			√			√			√					√		
		Emergency		√					√			√						√					√		

This page intentionally left blank.

Table 7-1. Common Drought Response Measures (Continued)

Entity Name	DCP Date	Stage Number	Triggers										Responses										Water Supplies	
			Contamination	Demand/Capacity Based	Failure	Groundwater Level	Production Rate	Reservoir Level	Supply Based	Time	Wholesale Provider	Other	Assessment and Identification	Water Rate Change or Surcharge	Irrigation Schedule	Mandatory Reduction	Notification of Public Agencies or Specific Users	Prohibited Use	Public Notification	Discontinue Water Diversions	Suspend Service	Water Allocation	Others	SW	GW
Tri-County SUD	2002	1		√																			√		
		2		√											√								√		
		3		√											√			√					√		√
		4		√											√			√					√		
		Emergency	√		√													√							
City of Taylor	2002	1		√											√			√					√		
		2		√											√			√					√		
		3		√											√			√					√	√	
		4		√											√			√					√		
		Emergency	√	√	√							√		√				√				√	√		
City of Copperas Cove	2002	1		√											√		√	√	√				√		
		2		√					√						√		√	√	√				√		
		3		√											√		√	√	√				√	√	
		4		√	√										√		√	√	√				√		
		Emergency	√		√										√		√	√	√				√		
		Water Allocation	√		√							√		√	√		√	√	√			√	√		
City of Anson	2009	1		√				√								√			√				√		
		2		√				√								√		√	√				√	√	
		3		√				√								√		√	√			√	√		
		Emergency	√		√								√				√						√		
Manville WSC	2009	1		√			√																√		
		2		√			√		√						√								√		
		3		√	√		√		√			√			√			√						√	√
		Emergency	√		√								√				√					√	√		
Stephens Regional SUD	2014	1							√										√				√		
		2							√						√				√				√	√	
		3							√									√	√				√		
		Emergency	√		√				√				√	√			√		√			√	√		
City of Rule	2013	1									√				√								√		
		2									√				√			√					√	√	
		3									√				√			√					√		√
		Emergency	√		√									√				√				√	√		
Block House MUD	2013	1										√							√				√		
		2		√								√			√			√					√	√	
		3		√								√			√			√					√		
		Emergency		√								√			√			√				√	√		
City of Stamford	2012	1						√	√														√		
		2		√			√	√	√					√	√			√					√	√	
		3		√			√	√	√					√	√			√					√		
		4		√	√		√	√	√			√		√				√				√	√		
City of Killeen	2012	1								√													√		
		2								√					√			√					√	√	
		3										√			√			√					√		
		Emergency										√			√			√					√		
City of Gatesville	2000	1					√	√											√				√		
		2					√	√							√				√				√	√	
		3			√		√	√										√					√		
North Central Texas Municipal Water Authority	2000	1						√	√										√				√		
		2						√	√								√		√				√	√	
		3						√	√								√		√			√	√		
		Emergency	√		√								√				√						√		

This page intentionally left blank.

7.3 Existing and Potential Emergency Interconnects

A goal of the regional planning process is to ensure a connected supply that meets or exceeds drought of record demands for the next 50 years. However, it is also important for regions to plan for emergency supplies in the event of a prolonged drought or an interruption/impairment of supply from an existing source. An interconnection between two collaborating municipal water user groups (WUGs) can serve as an alternative means of providing emergency drinking water in lieu of trucking in supply or other expensive options. In Compliance with Texas Administrative Code (TAC), Chapter 357 Regional Water Planning Guidelines, available information on existing major water infrastructure facilities that may be used for interconnections in event of an emergency shortage of water was collected.

For the Brazos G Regional Water Planning Area, all municipal water user groups and wholesale water providers were sent a survey in 2013 regarding their water supply and use. As part of the survey, individual municipalities and wholesale water providers were asked to confirm or update information regarding the existence of emergency interconnects integrated with their system and the provider of the potential emergency supply. Of the 237 WUGs in Region G, 56 responded to the survey and only ten reported having emergency interconnects.

The TCEQ Texas Drinking Water Watch database (TCEQ database) was used as a secondary source of emergency interconnection information. While more WUGs had reported information to TCEQ than had completed the Brazos G survey, some interconnects reported on the survey were not found in the TCEQ database. However, 22 additional interconnects were noted from the TCEQ database bringing the total to 32 reported emergency interconnects. While this should not be considered a comprehensive list, it is the extent of information available at this time.

Some circumstances that would require the use of an emergency interconnect system to be operated could affect an entire body of water or aquifer, such as drought or contamination. It is important to know the source of the emergency interconnect provider's supply for this reason. The source to each provider was determined using the TCEQ Water Watch database and surface water (SW) or groundwater (GW) designation is noted. Information on existing and potential interconnect supply capacity or location was not available from either source. In accordance with Texas Water Code §16.053(r) the information gathered is considered confidential and was submitted to the executive administrator but not included in the regional plan.

7.4 Emergency Response to Local Drought Conditions or Loss of Municipal Supply

The regional and state water plans aim to prepare entities for severe drought scenarios based on the drought of record as described in section 7.1. However, entities may find themselves in a local drought or facing a loss of municipal supply. While rare, it is important to have a back up plan in case of infrastructure failure or water supply contamination. This is especially important for smaller entities that rely on a sole source of supply. While many entities and wholesale water providers have DCP's as described

in section 7.2, it is less common for small municipalities or those included in County-Other to have these emergency plans. An analysis of a broad range of emergency response options was performed for small WUGs with 2010 Census populations less than 7,500 and a sole supply source as well as for all County-Other WUGs in the region.

A WUG relying on groundwater is considered sole source if its entire supply comes from the same aquifer regardless of varying groundwater districts or combination of contractual and local development supplies. A WUG relying on surface water is considered sole source if their yield comes from one river intake or one reservoir, regardless of the number of contracts in place. A WUG with a BRA contract was not considered sole-source due to system operations. WUGs with both groundwater and surface water supplies were not included, with the exception of county-other entities.

A broad range of emergency situations could result in a loss of reliable municipal supply and it is not possible to plan one solution to meet any possible emergency. Accordingly, a range of possible responses were selected for each entity based on source type and location. A WUG utilizing groundwater was analyzed for potential additional fresh water and brackish water wells, based on the existence of appropriate aquifers in the area. MAG availability was not considered since the wells are assumed temporary over the course of an emergency. Surface water WUGs were analyzed for curtailment of junior water rights and for releases from upstream reservoirs. Additional yield availability was not analyzed for reservoir releases; in the case of a temporary, localized emergency, special arrangements can be made.

A nearby entity that could provide supply in the case of an isolated incident was identified for each WUG and existing interconnects were noted if information was available. In addition, trucking in water was considered as a supply option under severe circumstances. Any infrastructure required for implementation of the options is also reported. A total of 84 entities were analyzed including 38 county-other WUGs. The results of this analysis are summarized in Table 7-2, with the detailed results presented in Table 7-3.

Table 7-2. Summary of Emergency Supply Options

Entity		Potential Emergency Water Supply Sources					
Primary Source	Total WUGs	Release From Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Well	Truck in Water	Supply from Nearby Entity
Groundwater	57	0	0	57	17	57	57
Surface Water	9	5	9	0	0	9	9
Blend	18	11	18	18	9	18	18
Total:	84	16	27	75	26	84	84

Table 7-3. Potential Emergency Supply Options for Small Water User Groups

Entity					Potential Emergency Water Supply Sources						Implementation Requirements		
Water User Group	County	2020 Population	2020 Demand (acft)	Source	Release From Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Well	Truck in Water	Supply from Nearby Entity	Known Existing Interconnect	Potential Entity Providing Supply	Type of Infrastructure Required
BELL COUNTY-OTHER	BELL	5,166	870	BLEND		X	X	X	X	X		KILLEEN	Well, Pipeline, Transportation
CHILDRESS CREEK WSC	BOSQUE	2,656	410	TRINITY			X		X	X		CLIFTON	Well, Pipeline, Transportation
VALLEY MILLS	BOSQUE	1,349	264	TRINITY			X		X	X		CLIFTON	Well, Pipeline, Transportation
WALNUT SPRINGS	BOSQUE	922	97	TRINITY			X		X	X		CLIFTON	Well, Pipeline, Transportation
BOSQUE COUNTY-OTHER	BOSQUE	9,167	1,271	GW			X		X	X		CLIFTON	Well, Pipeline, Transportation
BRAZOS COUNTY-OTHER	BRAZOS	6,168	904	GW			X	X	X	X		COLLEGE STATION	Well, Pipeline, Transportation
CALDWELL	BURLESON	4,896	1,027	CARRIZO			X		X	X		ROCKDALE	Well, Pipeline, Transportation
DEANVILLE WSC	BURLESON	3,598	465	CARRIZO			X		X	X		CALDWELL	Well, Pipeline, Transportation
SNOOK	BURLESON	552	184	SPARTA			X	X	X	X		CALDWELL	Well, Pipeline, Transportation
SOMERVILLE	BURLESON	1,485	266	SPARTA			X	X	X	X		CALDWELL	Well, Pipeline, Transportation
BURLESON COUNTY-OTHER	BURLESON	5,341	615	GW			X	X	X	X		CALDWELL	Well, Pipeline, Transportation

Table 7-3. Potential Emergency Supply Options for Small Water User Groups

Entity					Potential Emergency Water Supply Sources						Implementation Requirements		
Water User Group	County	2020 Population	2020 Demand (acft)	Source	Release From Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Well	Truck in Water	Supply from Nearby Entity	Known Existing Interconnect	Potential Entity Providing Supply	Type of Infrastructure Required
BELL COUNTY-OTHER	BELL	5,166	870	BLEND		X	X	X	X	X		KILLEEN	Well, Pipeline, Transportation
CHILDRESS CREEK WSC	BOSQUE	2,656	410	TRINITY			X		X	X		CLIFTON	Well, Pipeline, Transportation
VALLEY MILLS	BOSQUE	1,349	264	TRINITY			X		X	X		CLIFTON	Well, Pipeline, Transportation
WALNUT SPRINGS	BOSQUE	922	97	TRINITY			X		X	X		CLIFTON	Well, Pipeline, Transportation
BOSQUE COUNTY-OTHER	BOSQUE	9,167	1,271	GW			X		X	X		CLIFTON	Well, Pipeline, Transportation
BRAZOS COUNTY-OTHER	BRAZOS	6,168	904	GW			X	X	X	X		COLLEGE STATION	Well, Pipeline, Transportation
CALDWELL	BURLESON	4,896	1,027	CARRIZO			X		X	X		ROCKDALE	Well, Pipeline, Transportation
DEANVILLE WSC	BURLESON	3,598	465	CARRIZO			X		X	X		CALDWELL	Well, Pipeline, Transportation
SNOOK	BURLESON	552	184	SPARTA			X	X	X	X		CALDWELL	Well, Pipeline, Transportation
SOMERVILLE	BURLESON	1,485	266	SPARTA			X	X	X	X		CALDWELL	Well, Pipeline, Transportation
BURLESON COUNTY-OTHER	BURLESON	5,341	615	GW			X	X	X	X		CALDWELL	Well, Pipeline, Transportation

Table 7-3. Potential Emergency Supply Options for Small Water User Groups

Entity					Potential Emergency Water Supply Sources						Implementation Requirements		
Water User Group	County	2020 Population	2020 Demand (acft)	Source	Release From Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Well	Truck in Water	Supply from Nearby Entity	Known Existing Interconnect	Potential Entity Providing Supply	Type of Infrastructure Required
CROSS PLAINS	CALLAHAN	1,051	179	TRINITY			X		X	X		CLYDE	Well, Pipeline, Transportation
CALLAHAN COUNTY-OTHER	CALLAHAN	7,728	613	BLEND	X	X	X		X	X		CLYDE	Well, Pipeline, Transportation
COMANCHE COUNTY-OTHER	COMANCHE	7,672	805	BLEND	X	X	X		X	X		COMANCHE	Well, Pipeline, Transportation
CORYELL COUNTY-OTHER	CORYELL	4,807	564	BLEND	X	X	X	X	X	X		COPPERAS COVE	Well, Pipeline, Transportation
RISING STAR	EASTLAND	867	100	TRINITY			X		X	X		EASTLAND	Well, Pipeline, Transportation
EASTLAND COUNTY-OTHER	EASTLAND	6,450	583	BLEND	X	X	X		X	X		EASTLAND	Well, Pipeline, Transportation
MOUNTAIN PEAK SUD	JOHNSON	7,272	2,284	TRINITY			X		X	X		BURLESON	Well, Pipeline, Transportation
ERATH COUNTY-OTHER	ERATH	19,031	2,665	BLEND		X	X		X	X		STEPHENVILLE	Well, Pipeline, Transportation
WEST BRAZOS WSC	FALLS	2,781	399	TRINITY			X		X	X	WACO	MARLIN	Well, Pipeline, Transportation
FALLS COUNTY-OTHER	FALLS	4,153	526	BLEND		X	X	X	X	X		MARLIN	Well, Pipeline, Transportation
FISHER COUNTY-OTHER	FISHER	989	115	SEYMOUR			X	X	X	X		ROTAN	Well, Pipeline, Transportation

Table 7-3. Potential Emergency Supply Options for Small Water User Groups

Entity					Potential Emergency Water Supply Sources						Implementation Requirements		
Water User Group	County	2020 Population	2020 Demand (acft)	Source	Release From Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Well	Truck in Water	Supply from Nearby Entity	Known Existing Interconnect	Potential Entity Providing Supply	Type of Infrastructure Required
NAVASOTA	GRIMES	7,291	1,428	GULF COAST			X		X	X		COLLEGE STATION	Well, Pipeline, Transportation
GRIMES COUNTY-OTHER	GRIMES	12,659	1,789	GW			X	X	X	X		NAVASOTA	Well, Pipeline, Transportation
HICO	HAMILTON	1,385	180	TRINITY			X		X	X		HAMILTON	Well, Pipeline, Transportation
HAMILTON COUNTY-OTHER	HAMILTON	3,387	423	TRINITY			X		X	X		HAMILTON	Well, Pipeline, Transportation
HASKELL COUNTY-OTHER	HASKELL	1,911	255	BLEND		X	X	X	X	X		HASKELL	Well, Pipeline, Transportation
ITASCA	HILL	1,773	156	TRINITY			X	X	X	X		HILLSBORO	Well, Pipeline, Transportation
WHITE BLUFF COMMUNITY WS	HILL	2,022	434	TRINITY			X		X	X		HILLSBORO	Well, Pipeline, Transportation
WOODROW-OSCEOLA WSC	HILL	4,205	384	TRINITY			X		X	X		HILLSBORO	Well, Pipeline, Transportation
HILL COUNTY-OTHER	HILL	8,692	968	BLEND	X	X	X	X	X	X		HILLSBORO	Well, Pipeline, Transportation
TOLAR	HOOD	858	120	TRINITY			X		X	X		GRANBURY	Well, Pipeline, Transportation
HOOD COUNTY-OTHER	HOOD	26,999	2,823	BLEND	X	X	X		X	X		GRANBURY	Well, Pipeline, Transportation

Table 7-3. Potential Emergency Supply Options for Small Water User Groups

Entity					Potential Emergency Water Supply Sources						Implementation Requirements		
Water User Group	County	2020 Population	2020 Demand (acft)	Source	Release From Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Well	Truck in Water	Supply from Nearby Entity	Known Existing Interconnect	Potential Entity Providing Supply	Type of Infrastructure Required
GODLEY	JOHNSON	1,133	115	TRINITY			X		X	X		BURLESON	Well, Pipeline, Transportation
GRANDVIEW	JOHNSON	1,754	182	WOODBINE			X		X	X		BURLESON	Well, Pipeline, Transportation
RIO VISTA	JOHNSON	1,080	150	TRINITY			X		X	X		BURLESON	Well, Pipeline, Transportation
JOHNSON COUNTY-OTHER	JOHNSON	15,131	1,613	BLEND	X	X	X		X	X		BURLESON	Well, Pipeline, Transportation
JONES COUNTY-OTHER	JONES	2,220	279	BLEND	X	X	X	X	X	X		ABILENE	Well, Pipeline, Transportation
JAYTON	KENT	528	92	SEYMOUR			X	X	X	X		ASPERMONT	Well, Pipeline, Transportation
KENT COUNTY-OTHER	KENT	270	33	SEYMOUR			X	X	X	X		JAYTON	Well, Pipeline, Transportation
KNOX COUNTY-OTHER	KNOX	1,333	138	BLEND		X	X	X	X	X		MUNDAY	Well, Pipeline, Transportation
LAMPASAS COUNTY-OTHER	LAMPASAS	2,364	317	GW			X	X	X	X		LAMPASAS	Well, Pipeline, Transportation
GIDDINGS	LEE	5,621	1,120	CARRIZO			X	X	X	X		THRALL	Well, Pipeline, Transportation
LEXINGTON	LEE	1,355	242	CARRIZO			X		X	X		GIDDINGS	Well, Pipeline, Transportation

Table 7-3. Potential Emergency Supply Options for Small Water User Groups

Entity					Potential Emergency Water Supply Sources						Implementation Requirements		
Water User Group	County	2020 Population	2020 Demand (acft)	Source	Release From Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Well	Truck in Water	Supply from Nearby Entity	Known Existing Interconnect	Potential Entity Providing Supply	Type of Infrastructure Required
LEE COUNTY-OTHER	LEE	1,870	195	GW			X	X	X	X		GIDDINGS	Well, Pipeline, Transportation
GROESBECK	LIMESTONE	4,377	688	SW	X	X			X	X		MEXIA	Pipeline, Transportation
THORNTON	LIMESTONE	529	70	CARRIZO			X		X	X		MEXIA	Well, Pipeline, Transportation
LIMESTONE COUNTY-OTHER	LIMESTONE	9,384	892	BLEND	X	X	X	X	X	X		MEXIA	Well, Pipeline, Transportation
CHALK BLUFF WSC	MCLENNAN	2,646	269	TRINITY			X		X	X		WACO	Well, Pipeline, Transportation
CROSS COUNTRY WSC	MCLENNAN	3,175	533	TRINITY			X		X	X		WACO	Well, Pipeline, Transportation
GHOLSON	MCLENNAN	1,174	155	TRINITY			X		X	X		WACO	Well, Pipeline, Transportation
MART	MCLENNAN	2,375	353	TRINITY			X		X	X		WACO	Well, Pipeline, Transportation
NORTH BOSQUE WSC	MCLENNAN	2,436	619	TRINITY			X		X	X		WACO	Well, Pipeline, Transportation
WESTERN HILLS WS	MCLENNAN	3,142	212	TRINITY			X		X	X		WACO	Well, Pipeline, Transportation
MCLENNAN COUNTY-OTHER	MCLENNAN	27,613	3,533	BLEND	X	X	X		X	X		WACO	Well, Pipeline, Transportation

Table 7-3. Potential Emergency Supply Options for Small Water User Groups

Entity					Potential Emergency Water Supply Sources						Implementation Requirements		
Water User Group	County	2020 Population	2020 Demand (acft)	Source	Release From Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Well	Truck in Water	Supply from Nearby Entity	Known Existing Interconnect	Potential Entity Providing Supply	Type of Infrastructure Required
MILANO WSC	MILAM	3,805	432	CARRIZO			X		X	X		CAMERON	Well, Pipeline, Transportation
ROCKDALE	MILAM	5,929	1,159	CARRIZO			X		X	X		CAMERON	Well, Pipeline, Transportation
MILAM COUNTY-OTHER	MILAM	2,438	300	SW		X		X	X	X		CAMERON	Pipeline, Transportation
ROSCOE	NOLAN	1,402	200	DOCKUM			X		X	X		SWEETWATER	Well, Pipeline, Transportation
NOLAN COUNTY-OTHER	NOLAN	1,948	228	BLEND		X	X		X	X		SWEETWATER	Well, Pipeline, Transportation
STRAWN	PALO PINTO	710	137	SW	X	X			X	X		MINERAL WELLS	Pipeline, Transportation
PALO PINTO COUNTY-OTHER	PALO PINTO	11,432	1,063	SW	X	X			X	X		MINERAL WELLS	Pipeline, Transportation
BREMOND	ROBERTSON	1,027	189	CARRIZO			X		X	X		HEARNE	Well, Pipeline, Transportation
CALVERT	ROBERTSON	1,192	190	CARRIZO			X		X	X		HEARNE	Well, Pipeline, Transportation
FRANKLIN	ROBERTSON	1,728	256	CARRIZO			X		X	X		HEARNE	Well, Pipeline, Transportation
HEARNE	ROBERTSON	4,459	757	CARRIZO			X		X	X		HEARNE	Well, Pipeline, Transportation
ROBERTSON COUNTY WSC	ROBERTSON	3,049	246	CARRIZO			X		X	X		HEARNE	Well, Pipeline, Transportation

Table 7-3. Potential Emergency Supply Options for Small Water User Groups

Entity					Potential Emergency Water Supply Sources						Implementation Requirements		
Water User Group	County	2020 Population	2020 Demand (acft)	Source	Release From Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Well	Truck in Water	Supply from Nearby Entity	Known Existing Interconnect	Potential Entity Providing Supply	Type of Infrastructure Required
ROBERTSON COUNTY-OTHER	ROBERTSON	3,890	439	CARRIZO			X	X	X	X		HEARNE	Well, Pipeline, Transportation
SHACKELFORD COUNTY-OTHER	SHACKELFORD	1,242	125	SW	X	X			X	X		ALBANY	Pipeline, Transportation
GLEN ROSE	SOMERVELL	2,730	583	TRINITY			X		X	X		TOLAR	Well, Pipeline, Transportation
SOMERVELL COUNTY-OTHER	SOMERVELL	6,752	822	SW	X	X			X	X		GLEN ROSE	Pipeline, Transportation
STEPHENS COUNTY-OTHER	STEPHENS	1,447	156	GW			X		X	X		BRECKENRIDGE	Well, Pipeline, Transportation
STONEWALL COUNTY-OTHER	STONEWALL	575	68	SEYMOUR			X	X	X	X		ASPERMONT	Well, Pipeline, Transportation
TAYLOR COUNTY-OTHER	TAYLOR	5,714	660	SW		X			X	X		ABILENE	Pipeline, Transportation
THROCKMORTON	THROCKMORTON	831	182	SW		X			X	X	FORT BELKNAP WSC	GRAHAM	Pipeline, Transportation
THROCKMORTON COUNTY-OTHER	THROCKMORTON	496	48	SW		X			X	X		THROCKMORTON	Pipeline, Transportation
G & W WSC	GRIMES	7,638	851	GULF COAST			X		X	X		NAVASOTA	Well, Pipeline, Transportation
WASHINGTON COUNTY-OTHER	WASHINGTON	18,844	2,424	GULF COAST			X	X	X	X		BRENHAM	Well, Pipeline, Transportation

Table 7-3. Potential Emergency Supply Options for Small Water User Groups

Entity					Potential Emergency Water Supply Sources						Implementation Requirements		
Water User Group	County	2020 Population	2020 Demand (acft)	Source	Release From Upstream Reservoir	Curtailment of Junior Water Rights	Local Groundwater Well	Brackish Groundwater Well	Truck in Water	Supply from Nearby Entity	Known Existing Interconnect	Potential Entity Providing Supply	Type of Infrastructure Required
BARTLETT	WILLIAMSON	1,855	356	TRINITY			X	X	X	X		ROUND ROCK	Well, Pipeline, Transportation
FLORENCE	WILLIAMSON	1,238	119	TRINITY			X		X	X		ROUND ROCK	Well, Pipeline, Transportation
GRANGER	WILLIAMSON	1,568	212	TRINITY			X	X	X	X		ROUND ROCK	Well, Pipeline, Transportation
THRALL	WILLIAMSON	1,000	89	GW			X		X	X		ROUND ROCK	Well, Pipeline, Transportation
WILLIAMSON COUNTY-OTHER	WILLIAMSON	71,170	11,047	BLEND	X	X	X	X	X	X		ROUND ROCK	Well, Pipeline, Transportation
YOUNG COUNTY-OTHER	YOUNG	1,757	214	BLEND		X	X		X	X		GRAHAM	Well, Pipeline, Transportation

7.5 Region Specific Drought Response Recommendations and Model Drought Contingency Plans

Brazos G acknowledges that DCPs are a useful drought management tool for entities with both surface and groundwater sources and recommends that all entitles consider adopting a DCP in preparation for drought conditions. The region also recommends that in accordance with TCEQ guidelines, entities update their DCPs every five years as triggers can change as wholesale and retail water providers reassess their contracts and supplies. Brazos G obtained 24 drought contingency plans from across the region. Fourteen of these participating water providers and WUGs rely solely on surface water, four entities rely solely on groundwater and six of them utilize both sources to meet needs.

7.5.1 Drought Response Recommendations for Surface Water

Surface water accounts for approximately 75% of projected 2070 municipal supplies in Brazos G. Surface water supply is sold by more than 25 wholesale water providers and comes from over 50 lakes and numerous river intakes. With such a variety of supply sources it is difficult to create a set of triggers and responses that fit the needs of each WUG in the regional planning area. Brazos G recognizes that supplies are understood best by the operators and suggests that WUGs without DCPs look to the DCPs of their water providers as examples, if available.

For entities without DCPs which supply themselves with local surface water, Brazos G suggests reviewing the drought responses and recommendations used by similar entities in the region. An example of triggers and responses from the DCP for the City of Abilene is presented below (Table 7-4). Abilene was selected as a representative example because they provide water to several entities throughout the Brazos G Area and rely on various types of surface water triggers that can be applied throughout the region. The DCP includes four water stages ranging from “Water Alert” to “Water Crisis”. The triggers depend on parameters such as treatment plant use, storage levels, reservoir elevations, and system failures. The responses include categories ranging from home irrigation limits to commercial and industrial use reductions.

Table 7-4. Abilene Surface Water Drought Contingency Response

Drought Stage	Trigger	Actions
Stage I – Water Alert	• Combined treatment plant use > 49.5 MGD for 2 Days, or • Storage levels do not refill above 50% overnight, or • Ft. Phantom Reservoir at or below EL. 1625.9 if Hubbard Creek Reservoir is at 60% capacity or less, or • Ft. Phantom Reservoir at or below EL. 1624.9 if Hubbard Creek Reservoir is at greater than 60% capacity.	• Announcement and Implementation by the City • Irrigation limited to designated day of the week during restricted hours unless hand held hose or less than 5 gallons of faucet water is used • Vehicle washing is only permissible by using a five gallon container and/or a hand held hose equipped with a quick shutoff nozzle. • Water may be added to swimming pools or fountains to sustain appropriate maintenance levels only on designated irrigation day • Use of water from fire hydrants shall be limited to firefighting activities or other activities necessary to maintain public health, safety and welfare • Water wasting is prohibited • Commercial and industrial users shall reduce water use by 15%
Stage II – Water Warning	• Combined treatment plant use > 49.5 MGD for 2 Days, or • Storage levels do not refill above 50% overnight, or • Ft. Phantom Reservoir at or below EL. 1618.9, or • Major line breaks or pump system failure causes loss of capacity to provide service.	• Announcement and Implementation by the City • Irrigation limited to designated day once every two weeks during restricted hours unless hand held hose or less than 5 gallons of faucet water is used • Vehicle washing is only permissible by using a five gallon container and/or a hand held hose equipped with a quick shutoff nozzle. • Water may be added to swimming pools or fountains to sustain appropriate maintenance levels only on designated irrigation day • Use of water from fire hydrants shall be limited to firefighting activities or other activities necessary to maintain public health, safety and welfare • Water Wasting is prohibited • Commercial and industrial users shall reduce water use by 15%, golf courses by 30%
Stage III – Water Emergency	• Combined treatment plant use > 30 MGD for 3 days, and Ft. Phantom Reservoir at or below EL. 1614.9, or • Major line breaks or pump system failure causes loss of capacity to provide service.	• Announcement and Implementation by the City • Irrigation limited to hand held hose or less than 5 gallons of faucet water is used, no lawn use • Only permissible to wash vehicles on the premises of a commercial car wash station • Water may be added to swimming pools or fountains to sustain appropriate maintenance levels only on designated irrigation day • Use of water from fire hydrants shall be limited to firefighting activities or other activities necessary to maintain public health, safety and welfare • Water Wasting is prohibited • Commercial and industrial users shall reduce water use by 15%, golf courses by 50%

Table 7-4. Abilene Surface Water Drought Contingency Response

Drought Stage	Trigger	Actions
Stage IV – Water Crisis	• Loss of capability to provide water service, or • Contamination of supply source, or • Other unforeseen conditions.	• All outdoor irrigation of vegetation including lawns, using potable water is prohibited • Only washing of mobile equipment in the critical interest of the public health or safety is allowed • Filling of swimming pools or fountains is prohibited • Use of water from fire hydrants shall be limited to fire fighting and related activities • Water for domestic use only may be purchased from the bulk loading station • Commercial and industrial users of water shall continue to maintain at least a 15% use reduction

7.5.2 Drought Response Recommendations for Groundwater

Groundwater accounts for approximately 25% of projected 2070 municipal supplies. Entities in Brazos G utilize both brackish and non-brackish wells from over 15 aquifers or formations. With such a variety of supply sources it is difficult to create a set of triggers and responses that fit the needs of each WUG in the regional planning area. Brazos G recognizes that supplies are understood best by the operators and suggests that WUGs without DCPs look to the DCP's of their water providers and groundwater conservation districts as examples, if available.

For entities without DCPs supplying themselves with local groundwater, Brazos G suggests reviewing the drought responses and recommendations used by similar entities in the region. An example of triggers and responses from the DCP for the City of Thrall is presented below (Table 7-5). Thrall was selected as a representative example because they are a small WUG utilizing local groundwater like many of the groundwater reliant WUGS who have not yet developed a DCP. The DCP includes four water stages ranging from "Mild" to "Water Emergency". The triggers depend on parameters such as season, ground storage levels, contamination, and system failures. The responses include categories ranging from residential irrigation limits to commercial and industrial use reductions.

Table 7-5. Thrall Groundwater Drought Contingency Response

Drought Stage	Trigger	Actions
Stage I – MILD	Yearly: May 1st – September 30th.	• City reduces water main flushing • Voluntary limit on irrigation to 2 days a week at designated times • City of Thrall should adhere to Stage 2 restrictions below • Customers are requested to minimize or discontinue non-essential water use

Table 7-5. Thrall Groundwater Drought Contingency Response

Drought Stage	Trigger	Actions
Stage II – MODERATE	Ground Storage does not gain over 20ft.	• Mandatory limit on irrigation to 2 days a week at designated times or by hand held hose or 5 gallon bucket • Vehicle washing allowed only with hand held bucket or hose • Filling of pools or Jacuzzis limited to watering days/times • Non-circulating ponds or fountains are prohibited unless supporting aquatic life. • Use of water from fire hydrants shall be limited to firefighting activities or other activities necessary to maintain public health, safety and welfare. • All restaurants are prohibited from serving water unless requested • Non essential uses are prohibited
Stage III – SEVERE	Ground Storage does not gain over 15 ft.	• All actions listed in Stage II • Irrigation limited to hand held hose or less than 5 gallons of faucet water is used during designated watering days and times. • The use of water for construction from designated hydrants under special permit is discontinued.
Stage IV – CRITICAL	Ground Storage does not gain over 10 ft	• All actions listed in Stages II and III • Only washing of mobile equipment in the critical interest of the public health or safety is allowed. Commercial car washes can be used during designated hours. • Filling of swimming pools or fountains is prohibited • No applications for new, additional or expanded water service infrastructure shall be approved
Stage V – EMERGENCY	• Infrastructure breaks • Contamination • System outage	• All actions described in previous stages • Irrigation of landscaped areas is absolutely prohibited • Use of water to wash any vehicle is absolutely prohibited

7.5.3 Model Drought Contingency Plans

TCEQ has prepared model drought contingency plans for wholesale and retail water suppliers to provide guidance and suggestions to entities with regard to the preparation of drought contingency plans. Not all items in the model will apply to every system's situation, but the overall model can be used as a starting point for most entities. Brazos G suggests that the TCEQ Model DCPs should be used in conjunction with drought contingency measures such as those listed above for Abilene and Thrall for entities wishing to develop a new DCP. The TCEQ model drought contingency plans can be found in on TCEQ's website at the following link:

https://www.tceq.texas.gov/permitting/water_rights/contingency.html

7.6 Drought Management WMS

The regional water plan is developed to meet projected water demands during a drought of severity equivalent to the drought of record. Brazos G sees the purpose of the planning as ensuring that sufficient supplies are available to meet future water demands. For this reason, drought management recommendations have not been made by Brazos G as a water management strategy for specific WUG needs. Reducing water demands during a drought as a defined water management strategy does not ensure that sufficient supplies will be available to meet the projected water demands; but simply eliminates the demands. While Brazos G encourages entities in the region to promote demand management during a drought, it should not be identified as a "new source" of supply. Recommending demand reductions as a water management strategy is antithetical to the concept of planning to meet projected water demands. It does not make more efficient use of existing supplies as does conservation, but instead effectively turns the tap off when the water is needed most. It is planning to not meet future water demands.

While Drought Management WMS are not supported by the RGWPG, DCPs are encouraged for all entities and the region supports the implementation of the drought responses outlined in these DCPs when corresponding triggers occur. While the relief provided from these DCP responses can prolong supply and reduce impacts to communities, they are not considered to be reliable for all entities under all potential droughts.

7.7 Other Drought Recommendations

7.7.1 Model Updates

It is of upmost importance that regional water planning groups have the most up to date information available to make decisions. The Brazos G WAM is used to determine both the drought of record and the firm yield of reservoirs, but has not been updated in almost 20 years. The Brazos G Regional Water Planning Group recommends that the Texas legislature approve a budget for TCEQ to pursue updated WAMs before the next regional planning cycle. This will be especially important if the duration of the recent drought continues or the severity increases.

7.7.2 Monitoring and Assessment

Brazos G recommends that all entities monitor the drought situation around the state and locally in order to prepare for and facilitate decisions. Several state and local agencies are monitoring and reporting on conditions with up to date information. A few informative sources are listed below.

- Brazos River Authority Drought Information: http://www.brazos.org/DroughtStatus.asp
- Parmer Drought Severity Index: http://www.ncdc.noaa.gov/temp-and-precip/drought/historical-palmers/
- TWDB Drought Information: http://waterdatafortexas.org/drought/

- TCEQ Drought Information: https://www.tceq.texas.gov/response/drought

In addition, Brazos G supports the efforts of the Texas Drought Preparedness Council administered by the Texas Department of Public Safety, and recommends that entities review information developed by the council. The Drought Preparedness Council was established by the legislature in 1999 and is composed of 15 representatives from several state agencies. The council is responsible for assessment and public reporting of drought monitoring and water supply conditions, advising the governor on drought conditions, and ensuring effective coordination among agencies. The council currently is promoting outreach to inform entities of the assistance they can provide and looking for input as to how they can be more useful. Brazos G suggests that entities take advantage of the resources available to them through the Drought Preparedness Council such as the Drought Annex (2014), which describes the activities that help minimize potential impacts of drought and outlines an effective mechanism for proactive monitoring and assessment. More information on the Drought Preparedness Council can be found here:

http://www.txdps.state.tx.us/dem/CouncilsCommittees/droughtCouncil/stateDroughtPrepCouncil.htm

This page intentionally left blank.