

***Appendix M***  
***Summary of Phase 1 Reports***



## **Appendix M Summaries of Phase 1 Reports**

In order to provide information for the development of the 2011 Plan, the Brazos G RWPG completed the following five studies during Phase 1.

***Study 1 – Updated Drought of Record and Water Quality Implications for Reservoirs Upstream of Possum Kingdom Reservoir***

***Study 2 – Groundwater Availability Model of the Edwards-Trinity (Plateau) and Dockum Aquifer in Western Nolan and Eastern Mitchell Counties, Texas***

***Study 3 – Regionalization Strategies to Assist Small Water Systems in Meeting New SDWA Requirements***

***Study 4 – Brazos G Activities in Support of Region C's Water Supply Study for Ellis, Johnson, Southern Dallas, and Southern Tarrant Counties (Four County Study)***

***Study 5 – Updated Water Management Strategies for Water User Groups in McLennan County***

The studies, completed in April 2009, are summarized below. The full reports from the studies can be downloaded from the Brazos G and TWDB websites at the following web addresses:

<http://www.brazosgwater.org/400.html>

[http://www.twdb.state.tx.us/wrpi/rwp/rwp\\_study.htm](http://www.twdb.state.tx.us/wrpi/rwp/rwp_study.htm)

### **Study 1 – Updated Drought of Record and Water Quality Implications for Reservoirs Upstream of Possum Kingdom Reservoir**

A subset of the Brazos Basin Water Availability Model (Brazos WAM) was developed that includes the Clear Fork watershed and the area contributing flows from the Brazos River Basin, downstream of the confluence of the Clear Fork with the main stem of the Brazos River, to just below Possum Kingdom Reservoir. This model is referred to as the “Brazos Mini-WAM.” Hydrologic data in the Brazos Mini-WAM were updated to reflect the ongoing drought through June, 2008; and reservoir yields for water supply reservoirs were computed to determine supply available to water user groups and wholesale water suppliers in the area.

Reservoir one-year safe yields were computed for 18 water supply reservoirs. For seven of the reservoirs, the critical drought period remains the drought of the 1950s, generally accepted as the “drought of record” in the Brazos River Basin and much of Texas. For the remaining reservoirs, the ongoing drought is more critical than the 1950s drought.

A separate analysis was completed for Millers Creek Reservoir because it is located outside of the area included in the Brazos Mini-WAM. Hydrology data were updated for the Millers Creek watershed, and an analysis outside the Brazos Mini-WAM was used to estimate the reservoir’s safe yield. The analysis indicates that the current drought is also more severe than the 1950s drought, and that the large rainfall event in 2007, which provided some temporary relief from the drought conditions, did not benefit Millers Creek Reservoir significantly.

As a reservoir’s level lowers during extended drought periods, concentrations of various water quality constituents increase as water is evaporated and not replenished with inflows. During extreme drought periods, under use levels approximating the yield of the reservoir, water quality can be expected to degrade considerably. A preliminary analysis of chloride and total dissolved solids concentrations in three reservoirs – Fort Phantom Hill Reservoir, Lake Graham and Lake Stamford – indicates that treatment costs will be much greater during critical drought periods under use levels that more closely approximate reservoir yields.

The updated Brazos Mini-WAM was used to develop estimates of water supply available in the Brazos Basin upstream of Possum Kingdom Reservoir during the development of the 2011 Plan. Notice is made in the 2011 Plan that degraded water quality at low reservoir levels during a drought may require additional treatment costs. Those additional treatment costs, however, were not considered during the development of the 2011 Plan.

## **Study 2 – Groundwater Availability Model of the Edwards-Trinity (Plateau) and Dockum Aquifer in Western Nolan and Eastern Mitchell Counties, Texas**

Concern has been expressed for the capability of the City of Sweetwater's Champion Wellfield to continue as a long-term water supply. To address those concerns, the Brazos G RWPG conducted a re-evaluation on the City of Sweetwater's Champion Wellfield. The study included the development of a local scale groundwater availability model, which was used to evaluate groundwater supplies in western Nolan and eastern Mitchell Counties, focusing on the Champion Wellfield. The major and minor aquifers in the area are the Edwards-Trinity (Plateau), called Edwards-Trinity in this report, and the Dockum. The wells in the Champion Wellfield are screened in the Dockum.

The assessment of the long-term groundwater supplies for Sweetwater from the Dockum considered the results of the groundwater modeling and the historical performance of Sweetwater's wells. Data from about two-thirds of the wells in the Champion Wellfield for which data are available show that the wells are being used at maximum rates and that these yields would become smaller if the declining trend in water levels continues. On the other hand, distributing the pumping to nearby areas would moderate future groundwater declines and the aquifer's saturated thickness would experience rather modest changes.

Based on these findings, the 2011 Plan includes a recommended water management strategy for the City of Sweetwater to continue to rely on a conjunctive management practice in which the City utilizes water from Oak Creek Reservoir when surface water is available and utilizes groundwater during droughts. This strategy includes an expansion of the Champion Wellfield to reduce the long-term withdrawals from the existing wells and lessen the magnitude of water level declines. The most favorable areas for expansion of the wellfield are to the south-southwest of the existing wellfield. This is attributed to spreading out the wells as much as possible and moving toward an area where the Dockum appears to be thicker and there appears to be more recharge from the overlying Edwards-Trinity.

The City of Sweetwater contributed partial funding for this study.

### **Study 3 – Regionalization Strategies to Assist Small Water Systems in Meeting New SDWA Requirements**

The Brazos G RWPG performed a preliminary investigation of the feasibility for small public water systems (PWSs) to cooperate on a regional basis to help meet ever increasing Safe Drinking Water Act (SDWA) regulations. This study identifies and recommends two candidate groups of small PWSs in the Brazos G Area that may be amenable to using the regionalization of resources to optimize system operation, reduce costs, and maintain compliance with the SDWA.

Small systems with potential SDWA compliance issues were initially identified using compliance records and analytical lab results obtained from the Texas Commission on Environmental Quality (TCEQ). Data analysis in a geographic information system (GIS) indicated five potential regional groups, geographically spread across the Brazos G Area. The groupings were based on the high density of PWSs with multiple compliance risks for human or environmental health. Small systems located within the five regional groups were surveyed (64% response rate) to record the most important compliance-related issues faced by the system and to gauge interest in being evaluated as part of a regionalization strategy.

Two recommended groups were selected based on criteria that evaluated the severity of the issues as it relates to SDWA compliance, the extent to which the issues were shared among neighboring systems, and the engineering, political, and economic feasibility of regionalizing resources in the area. One group of PWSs, located in an area encompassing parts of Falls, Hill, Limestone, and McLennan Counties, is looking for strategies to lower arsenic concentrations. Blending to lower arsenic concentrations was deemed to be the most appropriate strategy, assuming a reliable purchase water source can be identified. The other group, located north of Abilene in Knox and Haskell Counties, is looking for strategies to lower nitrate concentrations. Treatment to lower nitrate concentration is probably the most feasible solution.

While no recommended water management strategies arose from this study, future steps in the regionalization process will require an entity to assume a leadership role (a “convener”) to oversee and assist these identified systems in the regionalization process. Results of detailed cost and engineering analyses can be used to recommend a regionalization strategy in a Brazos G plan, and allow participating PWSs to qualify for low-interest loans and grants to implement these strategies.

#### **Study 4 – Brazos G Activities in Support of Region C's Water Supply Study for Ellis, Johnson, Southern Dallas, and Southern Tarrant Counties (Four County Study)**

Recent population estimates show that some North Texas counties are growing faster than projected in the 2006 Brazos G and Region C Plans. The Region C RWPG and the Brazos G RWPG completed a study (Four County Study) that considers population and water demand growth for Ellis, Johnson, Southern Dallas, and Southern Tarrant Counties. The majority of the project area is within in Region C, therefore, Region C prepared and submitted the report to guide the development of the 2011 Region C and Brazos G Plans. Brazos G specifically assisted with Johnson County entities located in the Brazos G Area. The purpose of this study was to review recent growth in the study area, make adjustments to population and demand projections to account for growth, and update the current and future water plans of the water user groups and wholesale water providers in the study area. This study included conducting meetings and compiling survey data provided by water suppliers regarding their current and future water plans, determining revisions to population and demand projections, and developing a water supply plan for the study area. This report describes the assistance provided by Brazos G to the study effort and summarizes the information resulting from the study that is pertinent to the Brazos G Area. The full Four County Study report was published by Region C.

The recommended changes from the 2006 Brazos G Plan for Johnson County include:

- Higher projections of population and water demand for water user groups in the study area, including higher projections provided by the City of Mansfield for their Johnson County growth as reallocated from previous Tarrant and Ellis County estimates,
- New water management strategies for Alvarado, Grand Prairie, and Johnson County Special Utility District (JCSUD),
- Consideration for Arlington to become a wholesale water provider, and
- Cost estimate updates for all water management strategies in the study area.

The results of the study were utilized to develop revised population and water demand projections for the 2011 Brazos G Plan. The strategies recommended by the study also form the basis for the recommended water management strategies for water user groups and wholesale water providers in Johnson County in the 2011 Brazos G Plan.

### **Study 5 – Updated Water Management Strategies for Water User Groups in McLennan County**

This study was conducted to identify potential water management strategies for water user groups (WUGs) in McLennan County. The primary focus of the study was to identify strategies other than the City of Waco and the Trinity Aquifer. The study included compiling information including: water demands, primary and secondary water supplies, Trinity Aquifer wells and pumpage from the Trinity Aquifer, and contacting representatives of each WUG regarding their plans for future water supplies.

Of the 20 WUGs contacted, 18 have all or part of their primary water supply coming from the Trinity Aquifer and two have all of their supply coming from the City of Waco. Five of the WUGs have a supplemental supply from Waco; and, seven have a supplemental supply from a surface water source other than Waco. Other water supplies being used by one or more utilities include: the Brazos River, Bluebonnet Water Supply Corporation (WSC) which gets its water from Lake Belton, and Tri-County Special Utility District (SUD).

Based on interviews with representatives of WUGs, most WUGs have relatively short-term plans to continue with their past practices. In general, these practices are to install new Trinity Aquifer wells as needed. Several WUGs have immediate plans to construct new wells, and to rely on or expand interconnects with other neighboring water utilities for emergencies. Three of the 17 WUGs who rely on Trinity Aquifer wells expressed an opinion that they may need to connect to Waco or rely increasingly on Waco for their water supply. Several expressed an interest in either remaining independent of Waco or becoming independent of Waco.

Potential new water supply strategies for McLennan County that do not include the Trinity Aquifer or Waco include: Lake Belton via Bluebonnet WSC, the Brazos River, the Brazos River Alluvium, and reuse of wastewater effluent. Waco's development of wastewater reuse supplies for non-potable uses will free up and extend existing potable supplies. The FFLM WSC and Tri-County SUD may also be able to meet some of the future demands for utilities that are located near their distribution systems.

This study was used to guide the selection of recommended water management strategies for WUGs and wholesale water providers in McLennan County.

The City of Waco contributed partial funding for this study.