



## ***Draft Population and Water Demand Projections for Municipal Water User Groups***

### ***How the Draft Population Projections were Developed***

The Texas Water Development Board (TWDB) utilized actual data from the 2000 and 2010 Censuses to estimate the future populations of counties to be used in the 2021 Brazos G Regional Water Plan (2021 Plan). Future population changes were estimated by adding projected births and migration into the area and subtracting deaths and migration out of the area. Migration, birth and death rates were estimated in each county for four racial or ethnic groups (Anglo, Hispanic, Black and Other), differentiated by gender and age. Each subdivision of race, gender and age is referred to as a “cohort.” Birth and death rates for each cohort were provided by the Texas Department of Health, while actual migration rates were estimated using the 2000 and 2010 Census data. The net of births minus deaths for each cohort is called the “natural increase/decrease.”

Three alternative assumptions were utilized for migration:

- 0.0 - This assumes no migration; all population changes are due to natural increase or decrease.
- 0.5 - This assumes migration by cohorts at half the rate that occurred between 2000 and 2010.
- 1.0 - This assumes migration by cohorts at the same rate that occurred between 2000 and 2010.

At the advice of the Texas State Demographic Center (TDC), the TWDB generally adopted the 0.5 migration assumption for each county in the State. In some counties, however, the TWDB adopted a migration scenario other than 0.5 in order to reflect local circumstances as accurately as possible.

Note that the county population projections remain unchanged from those used for the 2016 Plan.

The county population projections were apportioned between the various Water User Groups (WUGs) in each county according to the proportion of change in each county’s population between 2000 and 2010 that could be attributed to each municipal WUG. Municipal WUGs are defined for the 2021 planning cycle as cities, water supply corporations, special utility districts, and other public water suppliers supplying 100 acre-

feet or more in 2010. The remainder of each county population that does not fall into the category of a WUG is combined into a single WUG identified as “County Other”.

A more detailed description of the methodologies used by the TWDB is attached.

### ***Base Water Use Factors (GPCD)***

Base water use factors for use in the 2021 Plan remain unchanged from those used in the 2016 Plan. Water use data from 2011 generally were used to develop base water use factors, expressed in gallons per capita per day (GPCD) for each WUG. Data from 2011 are considered to represent dry-year demands, which form the basis for planning to meet water demands under drought conditions. In some instances years other than 2011 were used when those data were considered more representative of dry-year demands. Future GPCD values (2020 – 2070) were adjusted to account for the effects of the 1991 State Plumbing Fixtures Act.

### ***How to Revise the Population and Water Demand Projections***

The Brazos G Regional Water Planning Group intends to facilitate requests from local entities to revise population projections when those requests can be supported by local data that meet the criteria established by the TWDB. The planning group will review requested changes and submit requests with supporting data meeting the criteria to the TWDB.

### ***Criteria for Revisions to County Populations***

The individual county populations within the region have been summed to a “Regional Control Total.” It is the intent of the TWDB to maintain this regional control total. Any adjustments to a county-level population must involve a justifiable redistribution of projected county level populations within the region so that the regional total remains the same. To revise a county-level population projection, one or more of the following criteria must be present:

- a) The most recent county population estimate by the TDC is significantly different than a corresponding interpolation of the county’s population projections between the 2010 Census and 2020 projection.
- b) The most recent county population projection by the TDC (half-migration scenario) is significantly different than the draft county population projections proposed for the 2021 Plan.

The following data associated with the identified criteria must be supplied to the TWDB for justifying any revisions to the county-level population projections:

- Documentation of an action requesting the Census Bureau correct an undercount of population within a county.
- Revised county projections for migration and out-migration, indicating that the net migration rates of a county will differ significantly from the net migration rates previously used.

- Birth and/or survival rates for a county population between 2000 – 2010 by gender, race/ethnicity and singly-year age cohorts.
- Other data that may be important to justify any changes to the population projections.

### *Criteria for Revisions to Water User Group Populations*

The total county populations, as projected by the TWDB, will act as control totals for the populations within the counties. Any adjustments to a city, utility, or remaining County-Other population must involve a justifiable redistribution of projected populations within the county so that the county total remains the same. One or more of the following criteria must be verified for consideration of revising the sub-county population projections:

- a) The most recent census place population estimate by the TDC is significantly different than a corresponding interpolation of the water user group's population projection in the 2016 Plan, based on a comparison of the 2015 TDC census place estimate to the trend line between the 2010 and 2020 projections in the 2016 Plan.
- b) The population growth rate for a city, utility, or county-other over the most recent five years (2011-2015) is substantially different than the growth rate between 2000 and 2010.
- c) Identification of a recent expansion of a utility's Certificate of Convenience and Necessity (CCN) that was not known to the TWDB.
- b) Identification of growth limitations or build-out conditions for a water utility that would result in an expected population that is less than the draft projection.

The following data associated with the identified criteria must be supplied for justifying any revisions to population projections for a WUG:

- Population estimates for cities developed and published by the TDC or by a regional council of governments.
- The verified number of residential connections and permanent population served.
- Documentation from an official of a city or utility describing the conditions expected to limit population growth and estimating the maximum expected population.
- Other data that may be important to justify any changes to the population projections.

### *Criteria for Revisions to Base Water Demand Factors (GPCD)*

One or more of the following criteria must be verified for consideration of revising the base water demand factors:

- a) Evidence that per capita water use from a different year between 2012-2015 would be more appropriate because that year was more representative of dry-year conditions.

- b) Errors identified in the reporting of municipal water use for an entity in the base year, typically 2011.
- c) Evidence that the dry year water use was abnormal due to temporary infrastructure constraints.
- d) Trends indicating that per capita water use for a utility or rural area of a county have changed substantially since 2011 and evidence that these trends will continue in the future.
- e) Evidence that the number of installations of water-efficient fixtures and appliances between 2010 and 2015 is substantially different than the TWDB estimate of 2 percent of the 1995 housing population.<sup>1</sup>

The following data associated with the identified criteria must be supplied to the TWDB for justifying any revisions to base water demand factors:

- Annual municipal water production (total surface water diversions and/or groundwater pumpage and water purchased from other entities) for an entity, measured in acre-feet, between 2010 - 2014.
- The volume of water sales by an entity to other water users (city utilities, industries, water districts, water supply corporations, etc.) measured in acre-feet.
- Net annual municipal water use, defined as total water production less sales to other water users (city utilities, industries, water districts, water supply corporations, etc.) measured in acre-feet.
- Documentation of temporary infrastructure or other water supply constraints that were in place during 2011.
- Drought index or growing season rainfall data to document a year different than the designated dry year as a more appropriate base year for projections.
- Documentation of the number of water-efficient fixtures replaced between 1990 and 2015.

### *Procedure for Submitting Requests for Revisions*

The TWDB has provided several tools and data compilations to assist local entities in evaluating if a revision is warranted. These can be found here:

[http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/current\\_docs.asp](http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/current_docs.asp)

Initial requests to revise the county or WUG population projections will be accepted by the Brazos G Regional Water Planning Group until June 30, 2017. After June 30, 2017, staff from our technical consultant, HDR, Inc. and HDR's subconsultant, Susan Roth Consulting, LLC, will review all requests and work with requesting entities to formulate revision requests that meet the TWDB criteria. We anticipate that the final requests will be presented for approval at a November 2017 meeting of the Brazos G Regional Water

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<sup>1</sup> <http://www.twdb.texas.gov/waterplanning/data/projections/methodology/doc/2017methodology.pdf>

Planning Group. It is the intent of Brazos G to submit all supportable requests to the TWDB.

Please provide all requests for revision of draft population and water demand projections for the 2021 Plan to:

Susan Roth  
Susan Roth Consulting, LLC  
512.796.6692  
[susan@srothconsulting.com](mailto:susan@srothconsulting.com)

The following is the anticipated schedule for review and revision of the population projections.

*Schedule for Review and Revision of Municipal Projections*

June 30, 2017	Deadline to submit initial requests to revise the draft projections
July 1 – August 31, 2017	Consultant staff to coordinate with those requesting revisions
September 1 – October 31, 2017	Consultant staff to coordinate with TWDB staff regarding revision requests
November 2017	Brazos G RWPG meeting to accept revision requests and submit requests to the TWDB
January/February 2018	Final projections to be adopted by the TWDB

Source:

[http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/doc/current\\_docs/project\\_docs/Pop\\_muni\\_projection\\_method\\_summary.pdf](http://www.twdb.texas.gov/waterplanning/rwp/planningdocu/2021/doc/current_docs/project_docs/Pop_muni_projection_method_summary.pdf)

# Draft Population and Municipal Water Demand Projections Methodology for the 2021 Regional Water Plans

Previous regional and state water plans have been aligned with political boundaries, such as city limits, rather than water utility service areas. Recent TWDB rule changes now defines water user group (WUG) planning as being utility-based, and the emphasis of the development of draft projections for the 2021 regional water plans (RWPs) was on the transition of the 2017 State Water Plan (SWP) population projections and the associated water demand projections from political boundaries to utility service area boundaries.

## WUG Criteria

Municipal WUGs in the 2021 RWPs are defined as:

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

The list of WUGs for the 2021 RWPs was prepared based on the rules listed above and TWDB Water Use Survey data for the 2010-2014.

## Population and Municipal Water Demand Projections

TWDB staff prepared draft population and municipal water demand projections for 2020-2070 for all municipal WUGs using projection trends based on the population projections in the 2017 SWP as reassembled by utility service areas. In addition, the municipal water demand projections generally utilize the base gallons per capita daily (GPCD) and water efficiency volumes from the 2017 SWP. However, a new set of 2010 population estimates for each municipal WUG were developed to reflect a utility based boundary (not political boundary) as a baseline population to be projected for the 2021 RWP.

### 1.1 2010 and 2011 Population Estimates for Municipal WUGs for the 2021 RWP

Multiple sources of data were used as proxies for estimating 2010 baseline population (permanent residential population) including:

- TWDB Water Use Survey population and connection data reported by Public Water Systems (PWSs);
- GIS analyses using year 2010 Census block data within known utility boundaries;
- TCEQ population and connection data for PWS; and

- 2010 Census Household Size

However, unlike the U.S. Census estimates for cities, there is no one data source that can be solely relied upon for estimating the 2010 permanent population served by water utilities because each data source has its limitations: 1) population reported in the residential Water Use Survey often includes transient population including tourists, seasonal workers or students, 2) available service area boundaries sometimes do not coincide with the actual service area, and 3) connections reported in the Water Use Survey may include commercial, institutional or multi-family housing connections. TWDB staff assembled the available data from different sources in a single spreadsheet/GIS framework as proxy to population and determined the initial 2010 baseline population estimates for the 2021 WUGs. Once the initial 2010 values were determined, they were adjusted to be reconciled with the corresponding total county population from the 2017 SWP.

Year 2011 population estimates were required to determine baseline GPCD calculations for new WUGs, and were obtained using the growth rate of population shown in the TWDB Water Use Survey based on the change in the number of connections reported from 2010 to 2011. The resulting percentage change was applied to the initial 2010 population estimate, obtained above, to determine an estimate of the 2011 WUG population.

## 1.2 Region and County-Level Draft Population Projections

Because there will not be new decennial census data available for use in the 2021 RWPs, the 2017 SWP region and county-level population projections were carried over and used as draft projections for the 2021 RWPs. As noted above, these county-level values were maintained for the upcoming plan, and the initial estimates of the WUG-level populations using the boundaries of the new utility-based planning unit were reconciled so that the original county totals from the 2017 SWP were maintained.

## 1.3 WUG-Level Draft Population Projections

The regional and state water plans require population projections for individual municipal Water Use Groups.

Below are the steps taken to develop WUG-level population projections:

- 1) Establish the bridge table between municipal WUG lists in the 2017 SWP and the 2021 RWP.
- 2) Estimate 2010 population served by a WUG based on the utility service boundary to be used as a baseline population for the 2021 RWP.
- 3) Use the projected trend of the corresponding WUG in the 2017 SWP and apply it to the utility-based WUG's 2010 baseline population to project the population for 2020-2070 to be used in the draft projections for the 2021 RWP. If multiple WUGs in the 2017 SWP became a utility-based WUG in the 2021 RWP, then the projected trend of the primary WUG (largest water user by volume among those WUGs) was used. For a new utility-based WUG that was included in County-Other in the 2017 SWP, draft population projections were developed by allocating growth from the county projections using the share of population and applying the WUG's 2010 share of the county population to the projected county population for 2020-2070.
- 4) Retain any build-out information from the 2017 SWP.
- 5) Apply the geographic splits based on the utilities' service area boundaries. The sum of all WUG populations within a county was then reconciled to the total county projections.

#### 1.4 WUG-Level Demand Projections

Draft municipal water demand projections utilize the population projections and a per-person water use (GPCD) volume for each WUG. The GPCD minus the incremental water efficiency savings for each decade is multiplied by the projected draft population to develop the draft municipal projections.

Below are the steps taken to develop WUG-level demand projections in acre-feet/year:

- 1) Use the GPCD and water efficiency savings of the corresponding WUGs in the 2017 SWP to calculate draft water demand projections based on the draft utility-based WUG population projections for 2020-2070. If multiple WUGs in the 2017 SWP became a utility-based WUG in 2021 RWP, then a GPCD of the primary WUG (largest water user by volume among those WUGs) was used. For new WUGs that were part of County-Other WUG in the 2017 plan, the baseline GPCD was calculated based on the 2011 net water use (or 2014) reported in the Water Use Survey. The county average of water efficiency savings were used for these new WUGs.

**Demand Projection =**

$$\text{Population} \times ((\text{base GPCD} - \text{Water Efficiency Savings}) \times 365 \text{ days}) / (325,851 \text{ gal/ac-ft})$$

- 2) TWDB staff applied a minimum of 60 GPCD for all WUGs which was also used as a lower bound for GPCD in the 2017 SWP.
- 3) For all county-other WUGs, the same GPCDs and water efficiency savings in the 2017 SWP were carried over and used to calculate draft demand projections.