Methods & Data for Developing Projections for the 2021 Regional Water Plans and 2022 State Water Plan

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The following presentation is based upon professional research and analysis within the scope of the Texas Water Development Board’s statutory responsibilities and priorities but, unless specifically noted, does not necessarily reflect official Board positions or decisions.
Overview

• Planning in a nutshell
• Developing projections
  – Timeline
  – Population and municipal water demand projections
  – Non-municipal water demand projections
Basic Planning Parameters

• Meet **drought of record** water needs
• 50-year planning horizon (2020-2070)
• 5-year planning cycle
• 16 Regional plans make up the state water plan
2,868 Water User Groups (WUGs)

Municipal
- **1,618 Utilities**: Annual water use > 100 acre-feet
- **254 County-Others**: small water systems + rural population

Non-Municipal (996 WUGs):
- Irrigation
- Livestock
- Mining
- Manufacturing
- Steam Electric
Planning (in a nutshell)

1. Projected demand
2. Existing supply
3. Identify Needs
4. What do we do to meet needs?
5. How much will it cost($$)?
Overall Timeline & Process

2017

2018

2019

2020

2021

2022

Developing Draft Projection

Revision Process

Regional Water Plans

State Water Plan

Final Projections
Municipal Water Demand Projections calculation for 2020-2070:

- Projected Population
- Dry-year per-person water use (GPCD)
- Passive efficiency savings
1. Population Projections County

Based on recent projections from Texas Demographic Center

- 0.5 Scenario
- Projections extended to 2060 and 2070
- Hold declining counties’ projection constant
1. Population Projections
1,618 WUGs (Sub-County)

- **Share of population**: % of county’s total pop
- **Share of growth**: % of county’s growth
- **Constant population**: military, institutions, build-out

- Revision requests from the planning groups & local entities.
Population Projections for Texas

<table>
<thead>
<tr>
<th>Year</th>
<th>Population (Millions)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2020</td>
<td>29.7</td>
</tr>
<tr>
<td>2030</td>
<td>33.9</td>
</tr>
<tr>
<td>2040</td>
<td>38.0</td>
</tr>
<tr>
<td>2050</td>
<td>42.3</td>
</tr>
<tr>
<td>2060</td>
<td>46.7</td>
</tr>
<tr>
<td>2070</td>
<td>51.5</td>
</tr>
</tbody>
</table>
2. GPCD (Gallons Per Capita Daily)

\[ \text{GPCD} = \frac{\text{Water Use}}{\text{Population}} / 365 \]

- **Annual water use estimates**: Water Use Survey (WUS) – approx. 4,500 public water systems

- **Annual Population estimates**:
  - Utility reported population
  - GIS estimates using utility boundaries & Census blocks
  - Utility connection x household size
  - Reconcile against county totals from Texas Demographic Center
Municipal Water Demand Projections - Texas
Non-Municipal Water Demand
Illustrative Demand Trends

Baseline
(historical water use)

updated every 5 years
Irrigation

• Annual water use estimates (52%)
  • Evapotranspiration-based crop water need
  • Crop acreage from Farm Service Agency (FSA)

• **Baseline**: average of 2010-2014 water use

• **Trends**:
  I. 2020-2070 projections held constant
  II. Constrained groundwater option
  (i.e., demand > projected GW availability)
Groundwater Constrained Projections

Millions in acre-feet

Baseline Projections

Constrained Projections

Modeled Available Groundwater
Irrigation Water Demand Projections - Texas
Livestock

- Historical water use estimates (2%)
  - Livestock population from Texas Agricultural Statistics Service (TASS)
  - Per-head water use applied
- **Baseline**: average of 2010-2014 water use
- **Trends** flat in most cases
Livestock Water Demand Projections

- 2007 SWP
- 2012 SWP
- 2017 SWP
- Water Use Survey
- 2022_SWP
Mining

- Historical water use estimates (2%)
  - WUS reported water use
  - Oil & Gas estimates: Frac Focus data
- **Baseline**: average of 2010-2014 water use
- **Trend**: 2011/2012 UT Bureau of Economic Geology (BEG) projected oil & gas production, land/road development
Fracking Well Locations

2014 Frac Focus

Permian Basin

Eagle Ford
Manufacturing

• Historical water use estimates (8%)
  • WUS reported use by facility

• **Baseline**: highest single-year county use 2010-2014

• **Trend**:
  – 2020-2030 increase per industry sector employment projection
  – 2030-2070 held constant
Why Constant Demands After 2030?

Output ≠ Water Use

Figure 9. Texas Manufacturing Water Use vs. Dollar Output (2009 Chained Dollars Adjusted for Inflation)
Steam Electric

• Historical water use estimates (4%)
  – WUS reported water use estimates
• **Baseline**: highest single-year county water use (2010-2014) = *consumptive use*
  +/- near-term plant additions and retirements based on ERCOT, EIA
• **Trend**: 2020-2070 projections held constant
Why Constant Demands After 2020?

Long-term unknowns:

- Electricity demand
- Solar/Wind/Dry-Cooling
- Fuel type
- Cooling type
- Generation type
- Efficiency
- Environmental regulations
Questions?

• 2017 SWP Interactive: http://texasstatewaterplan.org


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