

Census-based Public Water System Population Estimates 2010, 2020

Amanda Covington

Planner

Projections & Socioeconomic Analysis

Water Supply Planning

Emma Jones

Data Analyst

Projections & Socioeconomic Analysis

Water Supply Planning

October 26th, 2023

Texas GIS Forum

Purpose, Agenda

Purpose: describe the process for developing Public Water System (PWS) population estimates using the most recent Census population and housing data and the current boundaries from the Texas Water Service Boundary Viewer. These estimates will be used to develop Water User Group (WUG) population estimates and water demand Gallons per Capita per Day (GPCD).

- Background
- GIS Analysis
- Best Fit Model
- Challenges, Limitations and Assumptions
- Population Projections

Background – terms

- GIS: Geographic Information System
- GPCD: Gallons Per Capita Per Day
- PPHH: Persons Per Household
- PSA: Projections and Socioeconomic Analysis Department
- PWS: Public Water System
- TDC: Texas Demographic Center
- WSP: Water Supply Planning Division
- WUG: Water User Group
- WUS: Water Use Survey

Background – TWDB Overview

Leadership,
information,
education, and
support

Planning,
financial
assistance, and
outreach

Conservation and
responsible
development of
water

TWDB provides leadership, information, education and support for planning, financial assistance, and outreach for the conservation and responsible development of water to ensure a secure water future for Texans.

Background –Water Supply Planning Overview

State Water Plan (SWP)

- 16 Regional Water Plans
- Bottom-up approach
- Address future water needs
- Based on historical water use
- 5-year planning cycle

Water Use Survey (WUS)

- Over 7,000 entities surveyed annually
- ~80% response rate
- Connections, net use, population
- Data is stored in a water use database with rigorous QA/QC measures
- Municipal: public water systems
- Industrial (manufacturing, mining, steam-electric power): using more than 10 million gallons of water

Source Data and Boundary Viewer



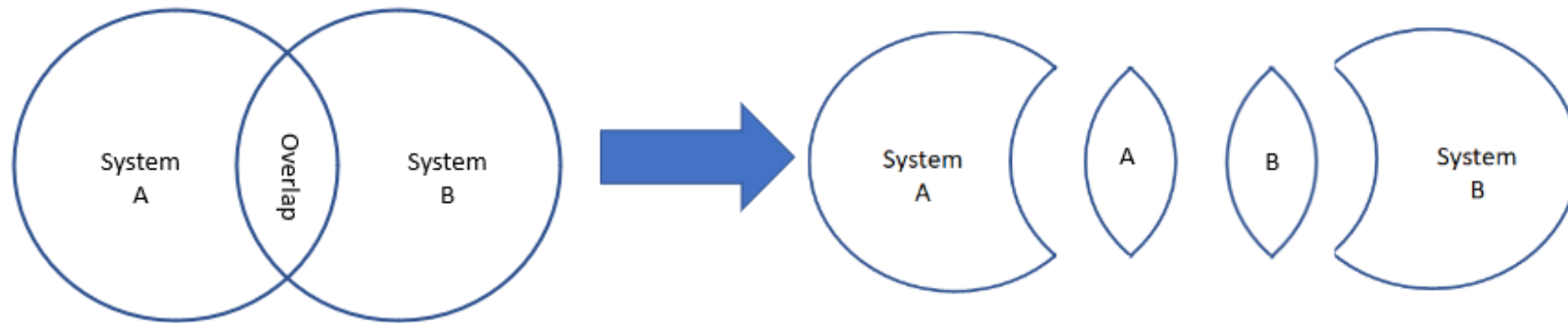
The screenshot shows the "Water Service Boundary Viewer" application. At the top, there is a search bar labeled "Find Address or PWS" and a "Menu" button. Below the search bar is a map of Texas with green shaded areas representing water service boundaries. The map includes state names like OKLAHOMA, ARKANSAS, LOUISIANA, and TEXAS, and city names like Oklahoma City, Memphis, Nashville, Knoxville, Green, Atlanta, Birmingham, ALABAMA, GEORGIA, COASTAL, FLORIDA, San Antonio, Houston, and New Orleans. A scale bar shows 400km and 300mi. Below the map is a table with columns for PWS ID, PWS Name, PWS Review Date, Area (sq mi), and County. The table shows 4552 service areas. Below the table is a "Service Area Selections" section.

| PWS ID | PWS Name | PWS Review Date | Area (sq mi) | County |
|-----------|---------------------------------------|-----------------|--------------|------------|
| TX1520067 | 114TH STREET MOBILE HOME PARK | 6/18/2020 | 0.015 | Lubbock |
| TX1700580 | 1485 LIMITED CRYSTAL SPRINGS WATER CO | 10/29/2020 | 0.033 | Montgomery |
| TX1012276 | 2920 WEST SUBDIVISION | 3/30/2020 | 0.612 | Harris |
| TX1500006 | 3 G WSC | 5/3/2020 | 0.433 | Llano |
| TX0910072 | 3-D MOBILE HOME AND RV PARK | 10/29/2020 | 0.023 | Grayson |
| TX0720059 | 3D BUNKHOUSE PWS | 10/29/2020 | 0.010 | Erath |
| TX0460152 | 4 D WATER | 3/1/2023 | 0.170 | Comal |



<https://www3.twdb.texas.gov/apps/waterserviceboundaries>

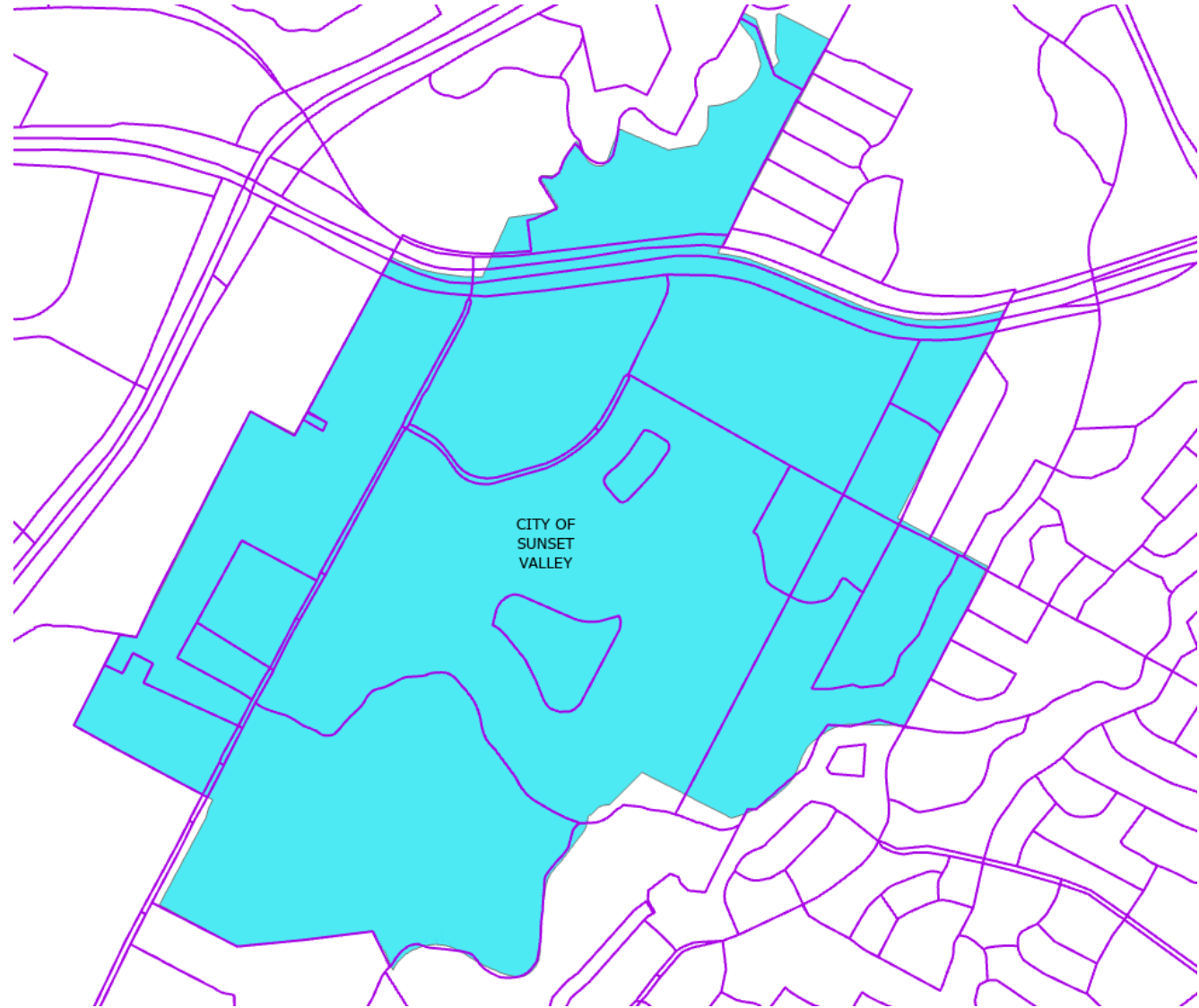
GIS Analysis – identify overlapping systems






- Collect boundaries from TWSBV administrator
- Split boundaries in GIS
- Calculate the split area
- Identify overlapped areas
- Assign split IDs (used later in the population apportionment)

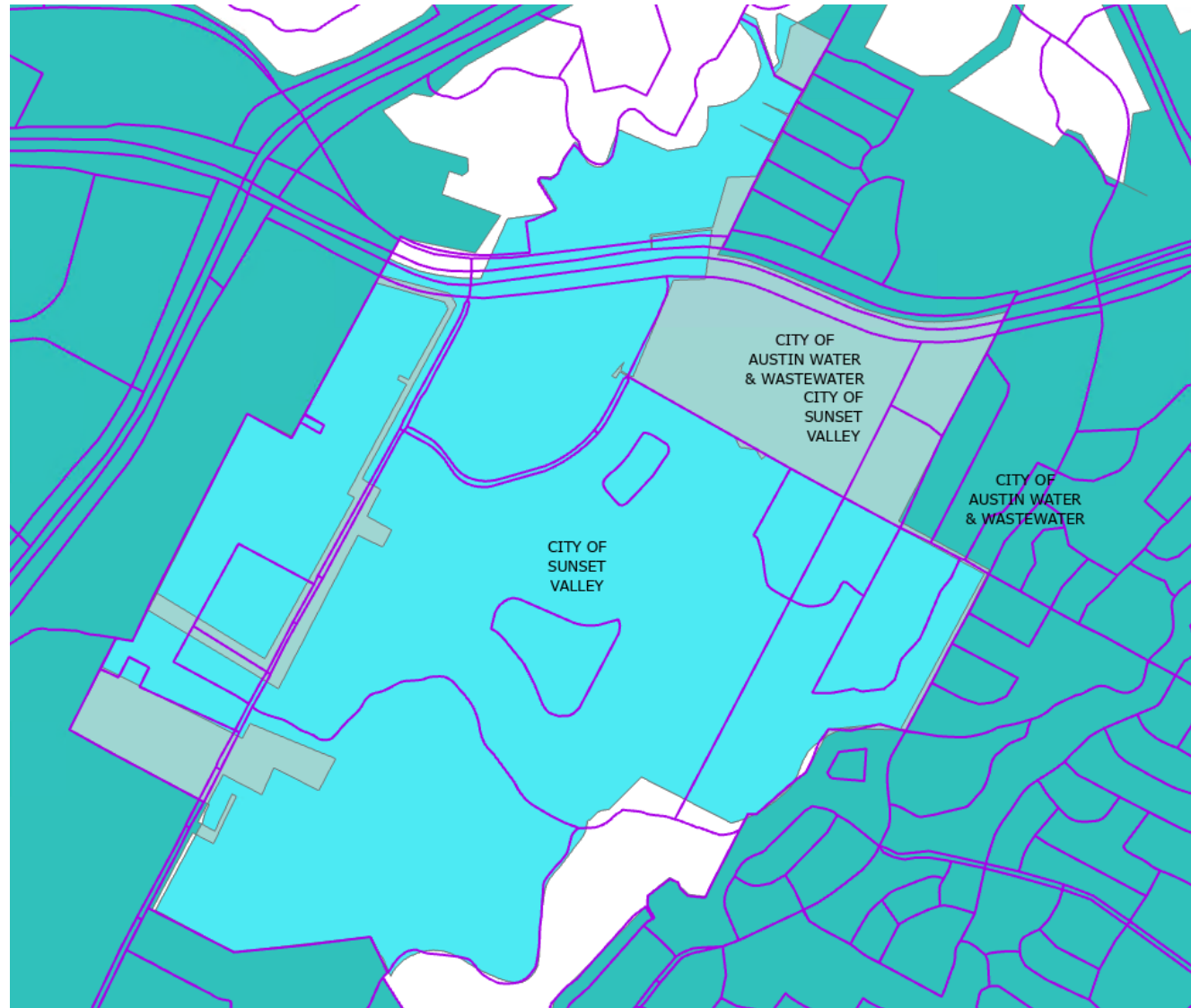
Overlapping Systems

 Sunset Valley



Overlapping Systems

-  Sunset Valley
-  Austin
-  Overlap



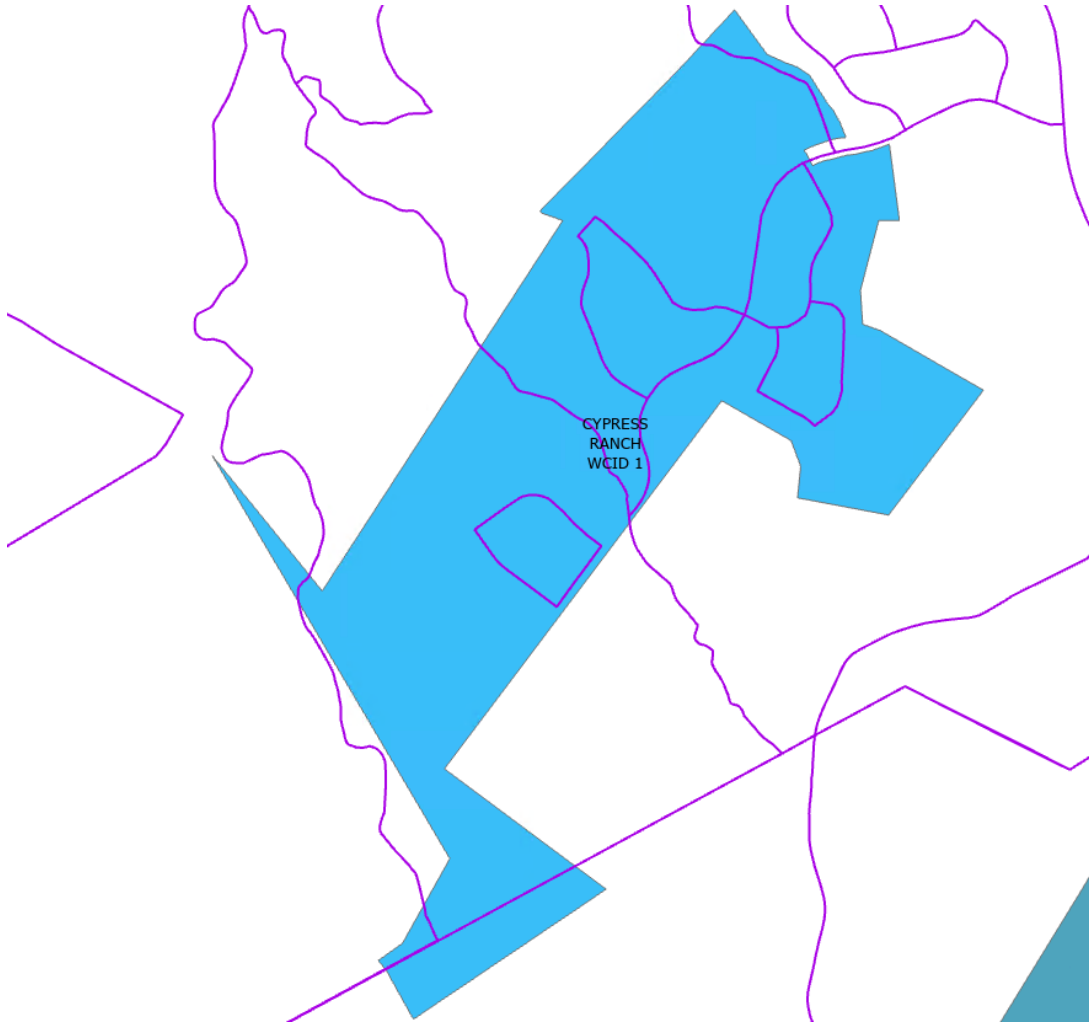
GIS Analysis – calculate block density

1. Calculate square mile area
2. Divide population and housing by square miles

Pop Density = Population/Area

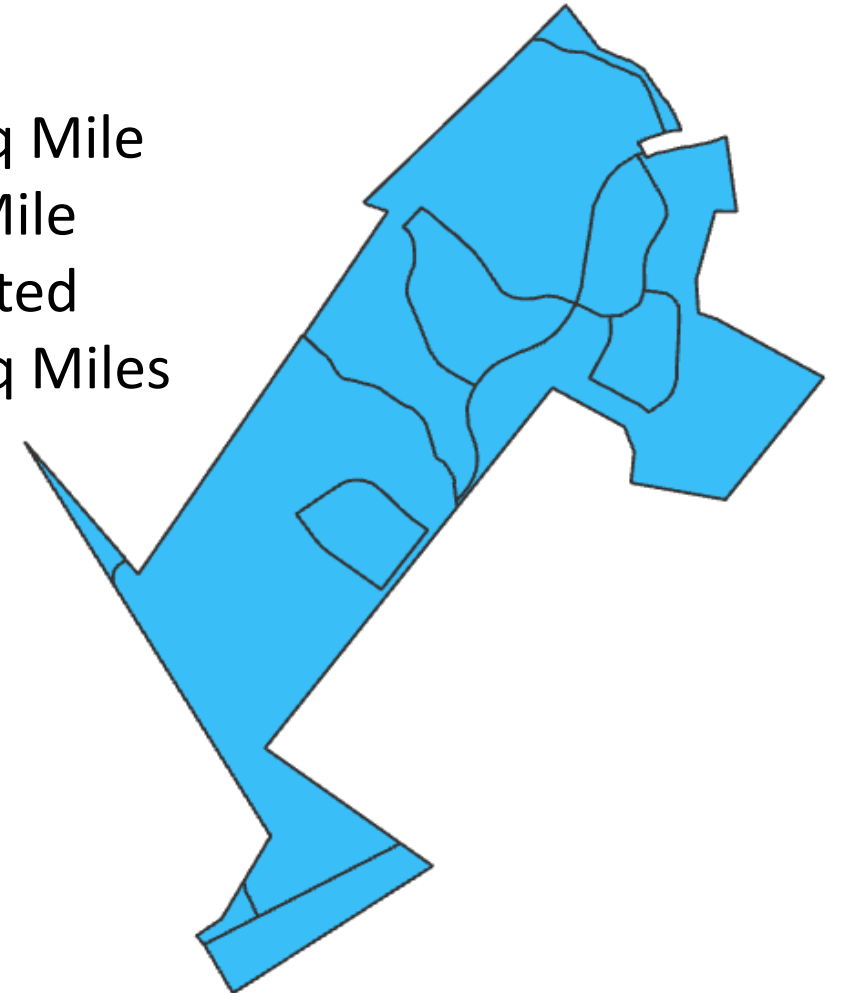
House Density = Houses/Area

GIS Analysis – union PWS to Block



Noteworthy Attributes

- PWS ID
- PWS Split ID
- Population/Sq Mile
- Housing/Sq Mile
- NEW: Calculated Union Area Sq Miles



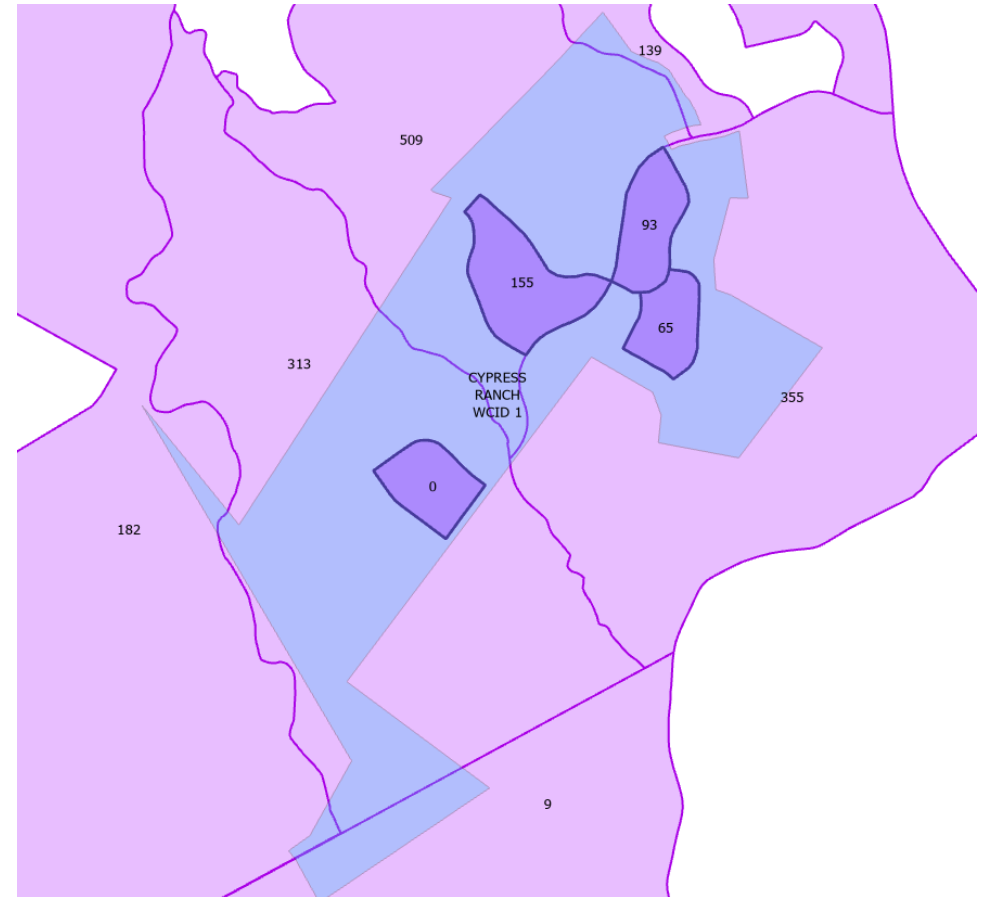
GIS Analysis – calculate min/max pop

Max Pop – the total population of all Census Blocks which intersect the system boundary

1,820

Min Pop – the total population of all Census Blocks completely within the system boundary

313



Adjust Overlap Population

- Applied overlap factor to distribute population in the overlap area to each PWS

| PWS | Overlap ID | Overlap Population | Factor | Split Population PWS |
|----------------------|------------|--------------------|--------|----------------------|
| WALSTON SPRINGS WSC | 1 | 10 | 0.5 | 5 |
| PLEASANT SPRINGS WSC | 1 | 10 | 0.5 | 5 |
| CITY OF LUFKIN | 2 | 525 | 0 | 0 |
| HUDSON WSC | 2 | 525 | 1 | 525 |
| MOUNTAIN PEAK SUD | 3 | 3 | .33 | 1 |
| SARDIS LONE ELM WSC | 3 | 3 | .33 | 1 |
| CITY OF MIDLOTHIAN | 3 | 3 | .33 | 1 |

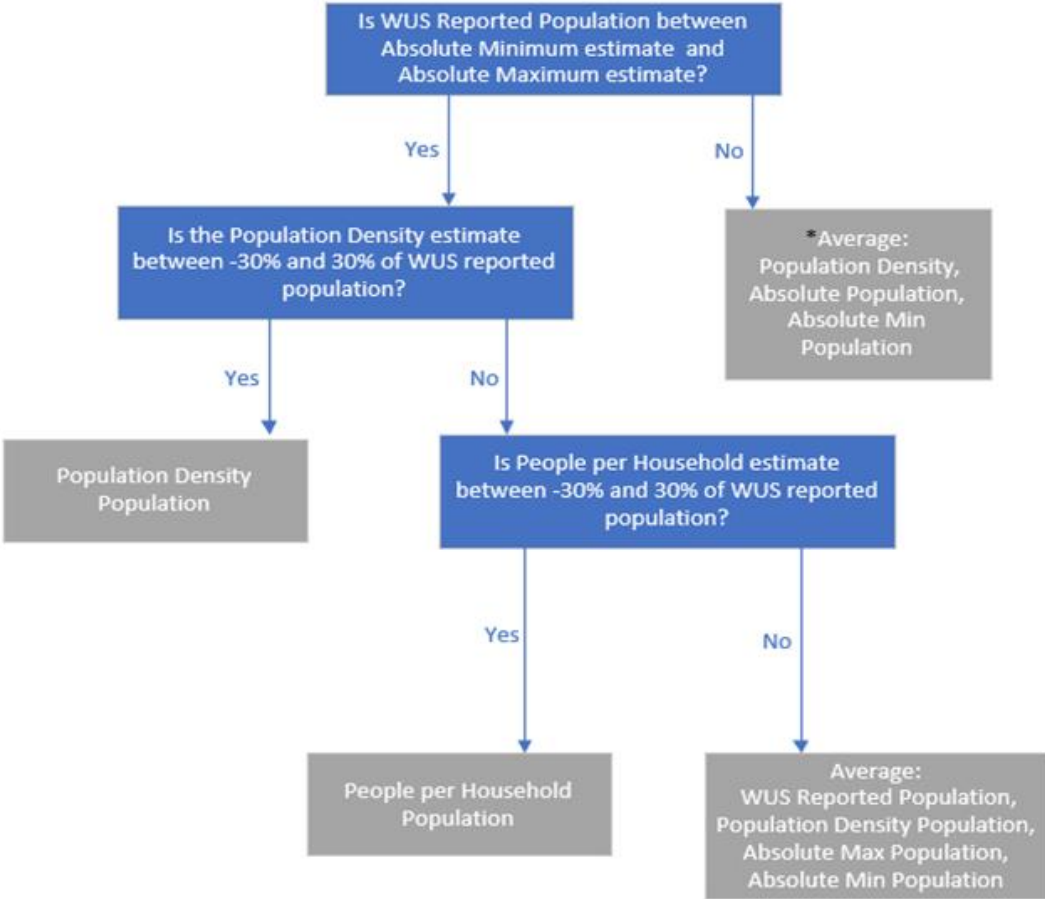
Calculate People per Household (PPHH)

- Uses population density, housing density, and WUS-reported residential connections

| PWS | Population (GIS) | Households (GIS) | Calculated PPHH | Reported Connections (WUS) | Population Estimate |
|---------------|------------------|------------------|-----------------|----------------------------|---------------------|
| Dawson City | 540 | 235 | 2.30 | 260 | 598 |
| Sharyland WSC | 77,441 | 23,281 | 3.33 | 19,558 | 65,057 |
| Angelina WSC | 2,853 | 1,193 | 2.39 | 1,242 | 2,971 |

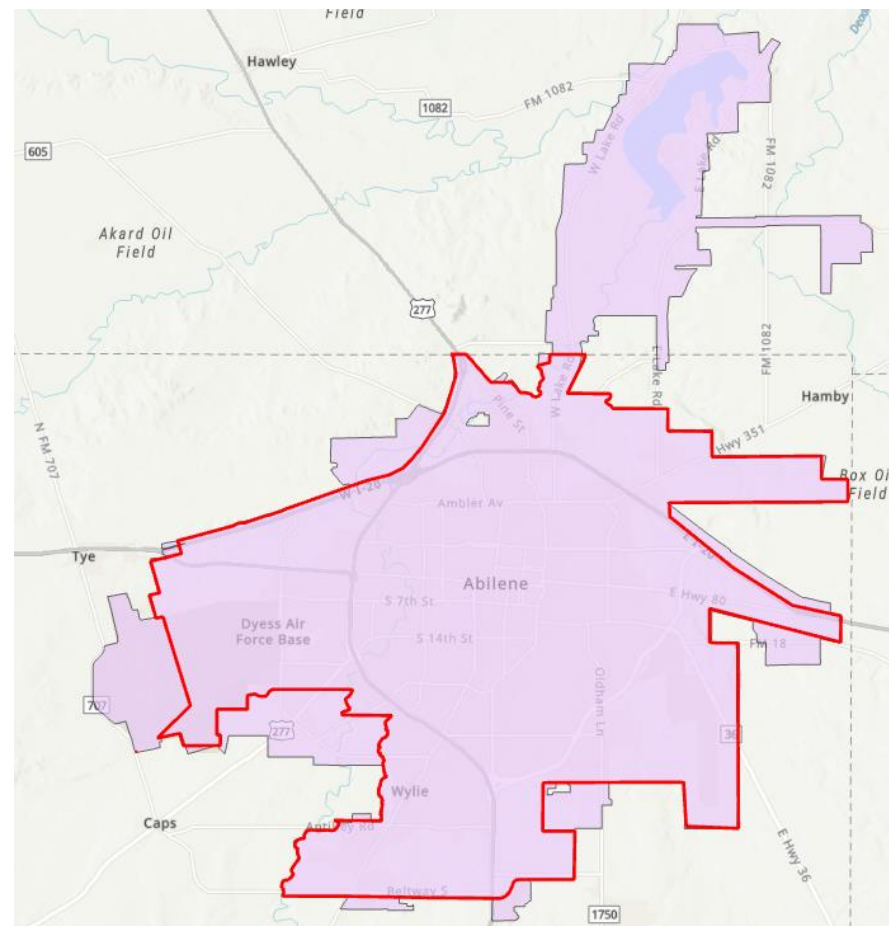
Decision Flowchart

- Population Density
- People per Household
- Absolute Min/Max
- WUS Reported
- Average (w/ WUS Reported)
- Average (w/o WUS Reported)



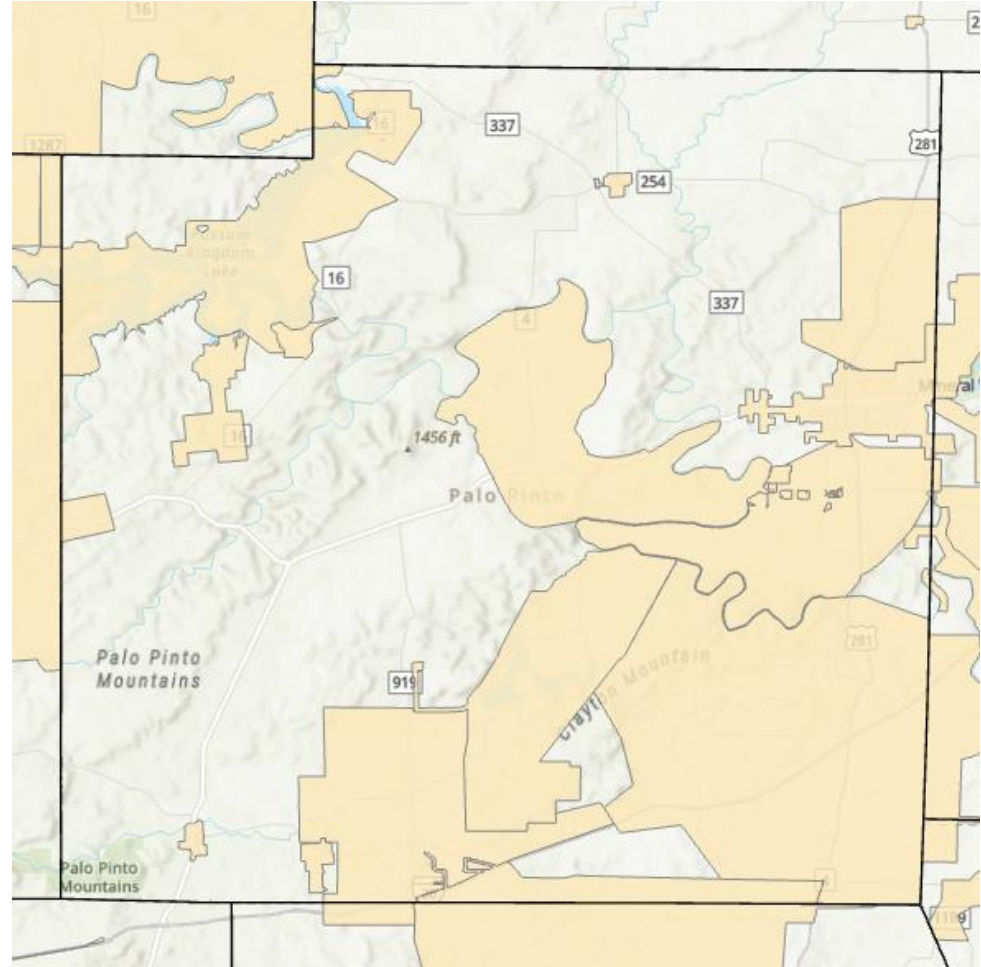
Secondary QC Checks

- Census Place estimates
- WUS-reported population
- TWDB historical estimates
- Census County population



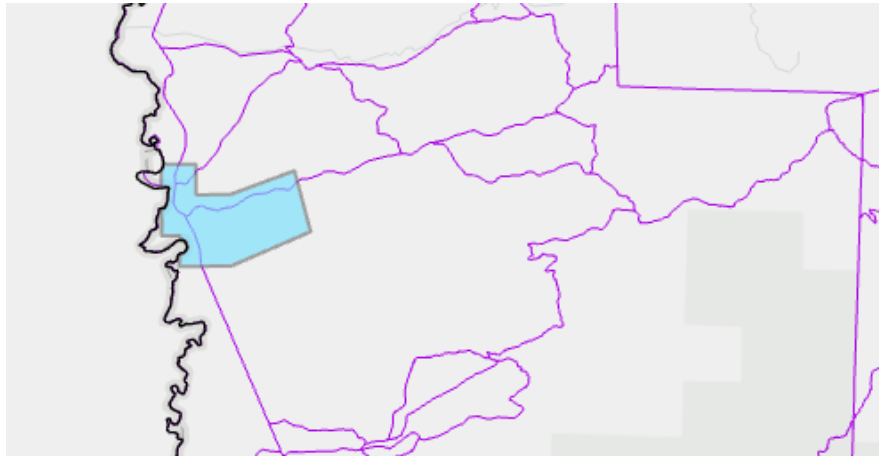
Assumptions

- Population distribution
- Non-system population
- Living in service area
- Type of service area
 - (i.e., prisons, universities)

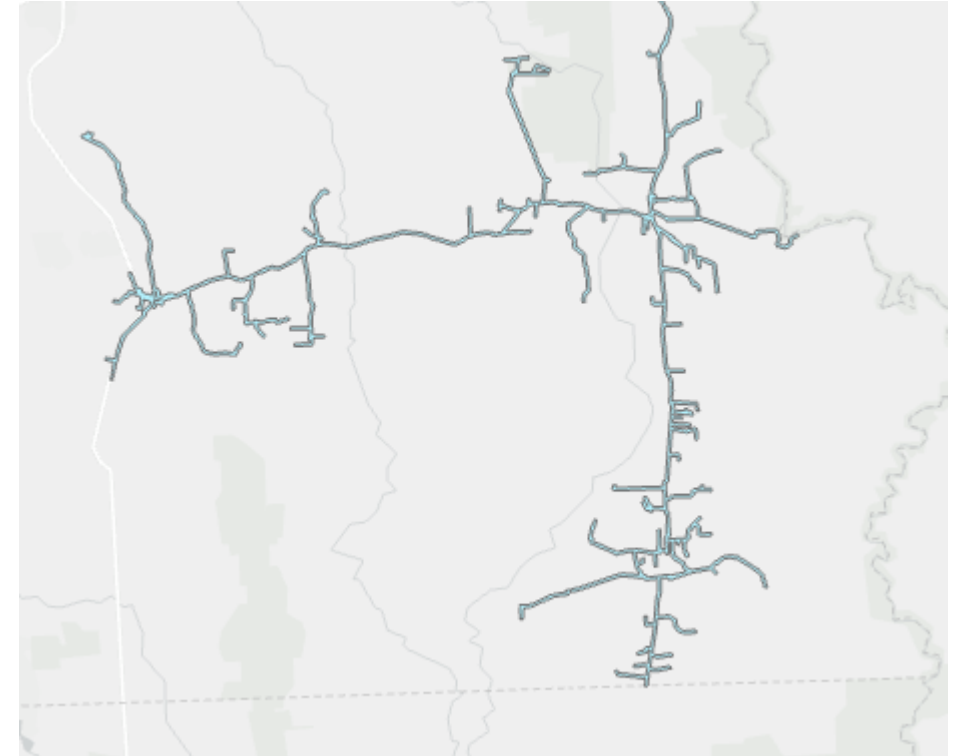


Challenges/Limitations

- Public Water System boundary accuracy
- Census Undercount
- U.S. Census Bureau Differential Privacy
- Rural Census blocks



Candelaria WSC in west Presidio County

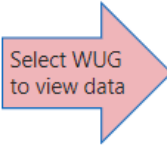


Population Projections

- Texas Demographic Center (TDC) county-level projections
- Use 2010-2020 growth rates
- Regional Water Planning Groups review
- State Water Plan – Water Demand Projections
- Municipal Dashboard
 - <http://www.twdb.texas.gov/waterplanning/data/projections/2027/municipal.asp>

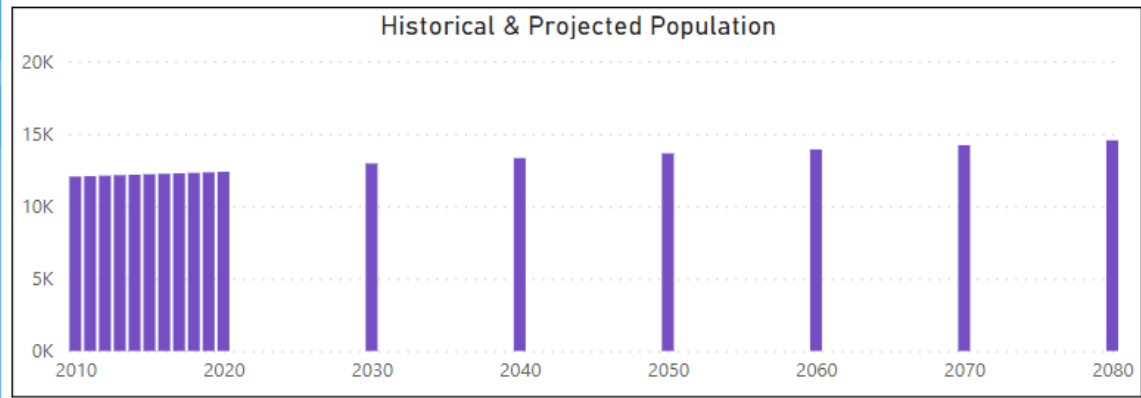


Draft WUG Data Page: Athens

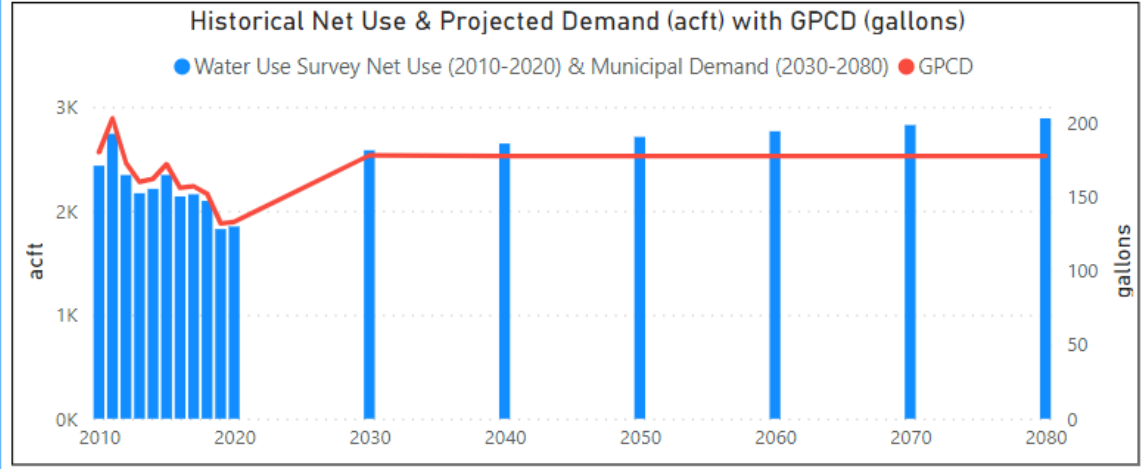


Entity Name

WUG level historical net use and GPCD are not split by region or county. To view Region-County-WUG level historical and projected population please visit the **Population** page. To view Region-County-WUG level draft projections please visit the **Projections** page. To view Region-County level net use data please visit the **SWP Comparison** page.



Projected Demand = (Population * (Baseline GPCD – PC Savings) * 365) / 325,851



Baseline GPCD represents historical 'dry-year' water use minus accumulated plumbing code savings.

Baseline GPCD: 183

Projected Plumbing Code (PC) Savings represent future water efficiency gained from upgrading existing water fixtures (toilets, showerheads, and clothes washers) to meet current governing standards and are measured in GPCD.

| Year | PC Savings |
|------|------------|
| 2030 | 5.03 |
| 2040 | 5.62 |
| 2050 | 5.62 |
| 2060 | 5.62 |
| 2070 | 5.62 |
| 2080 | 5.62 |

Historical net use for County-Other WUGs only represents the water use reported by Public Water Systems. County-Other GPCD was estimated based on system use and the combined system and non-system population.

Questions

Contact:

Amanda Covington

amanda.covington@twdb.texas.gov

512-463-4209

Emma Jones

emma.jones@twdb.texas.gov

512-475-1562