

White Paper on Utah Municipal and Industrial Water Use
Utah Division of Water Resources
December 2022

Potable Water

Every water system supplies water to connections within its service area. The area served includes the property associated with the connection, not just the distribution pipes and connection. Many connections are residential. However, businesses, parks, schools and industries are also connected to public water supplier systems. Every connection is counted in one of the reporting categories: domestic (residential), commercial, industrial, or institutional. Each of the connections should be metered.

Billing data is used to report water system use to the Utah Division of Water Rights (Water Rights). Data reported to Water Rights is used by the Utah Division of Water Resources (Water Resources) to calculate water use for each public water system in gallons per capita (person) per day (GPCD). Indoor and outdoor water isn't metered separately, so GPCD for potable water use includes both indoor and outdoor uses. Water Resources calculates domestic (residential) GPCD for structures where people live. Domestic (residential) GPCD includes single family houses, multi-family houses (town houses, twin homes, condominium), apartments, retirement communities, and assisted living communities. Apartments should be reported in the domestic category, but are sometimes reported as commercial use. Generally, full medical care facilities are reported in the commercial category.

Water Resources also calculates GPCD for commercial, industrial, and institutional categories. These numbers inform the water system about water use in their area. It is beneficial for planning purposes: If a community uses two times as much water for institutional use (parks, cemeteries, schools, government offices) as for residential use, a conservation plan might place stronger focus on reducing institutional water use than on industrial water use.

Because the service area population is the same for each of these water system calculations, these GPCD numbers can be summed to find the total GPCD use for the system. Water Resources calculates GPCD by summing all the water use and dividing by the water system population. We check our calculation by summing all the GPCD values. Both answers should be the same, that is to say, within the error associated with rounding.

The population used to calculate GPCD is the full-time, permanent residents in the service area. Full-time means they reside in the dwelling for more than six months out of the calendar year. If someone owns rental property that is used for short-term rentals (a condo near a resort area), the population for the condo unit is probably zero. If it was rented to the same person for more than six consecutive months, the tenant would be counted as full-time, permanent residents. If it was rented continuously for more than six months to different tenants, the tenants would NOT be counted in the population numbers for the water system.

If someone owns a home in Salt Lake City and a condo in Park City and they live in the city Monday through Friday and spend the weekends in Park City, they would be counted in the population for Salt Lake City. They would NOT be counted in the population for Park City. If they split the time between

locations more evenly, they would still need to declare a principal (primary) residence where they would be counted in the population and not be counted in the secondary location.

Second (vacation) homes are a challenge for Utah because most of our residential water use occurs outdoors. When someone owns more than one residence, both locations are landscaped and irrigated. The outdoor irrigation occurs whether a person is “home” or not. Although vacation homes are often referred to as cabins, many are houses on lots which are landscaped and irrigated.

Know your community. If there is an atypical characteristic of your community, reflect it in your water use description and population estimate. If your water system provides water to a correctional or long-term (more than one year) treatment facility, learn how many people live in the facility. Find what the capacity of the facility is and learn if the facility is at capacity. Note: General staff don’t count as full-time, permanent residents because they don’t live at the facility. A convent or monastery would count their full-time permanent residents as population.

What is the problem with over-counting population?

All state agencies, including the Division of Water Resource use the Kem C. Gardner Policy Institute’s county population data as the official population. When systems over estimate their population, county and state population sums exceed the official population numbers. The difference raises questions about accuracy of all agencies associated with the data.

If a water system uses their design (build out) population before those connections are in use, the GPCD calculation will be artificially low. As the community reaches the design population, GPCD will increase and aggressive measures will need to be initiated to reduce water use in order to decrease GPCD values and meet water conservation goals.

On the other hand, if a low population estimate is used, the initial GPCD will high and in the short-term it may appear water conservation is occurring. However, behavior of water users will not have changed and it will be more difficult to implement actual water conservation programs in the future.

Secondary Water

Secondary water systems should follow the example of potable water systems. They serve water to a number of customers at a customer connection. Ideally each connection is metered and each customer is billed for their actual use. A secondary water system should identify the area they service, with the boundary being the parcel which is served by each connection. Unlike potable water systems, secondary water service areas may overlap. A single user may be served by more than one secondary water provider.

Secondary water use is calculated and reported as GPCD. Several assumptions are made by the Division of Water Resources to estimate secondary water use. First: All secondary water use within a public water system service area is residential use. Second: Averages for each county reflect the actual conditions for each public water system; therefore, it is reasonable to apply average lot size, average irrigated area, average application efficiency, and average evapotranspiration (ET) values for the county to each water system within the county.

Water Resources uses the reported secondary water use provided by the public water system. When a system reports 100% of secondary water use for service area, no further action is required. When a

system reports secondary water use for a fraction of their connects and indicates additional fraction of connections use secondary water provided by another water provider, Water Resources estimates the additional secondary water use.

For example: A water system indicates 100% of their residential connects use secondary water and they provide metered water to 35% of those connections. Water Resources accepts the reported water use number for the 35% of residential connections and estimates water use to the remaining 65% of residential connections. The estimate is calculated as:

the number of connections (.65 times the number of residential connections) to be estimated

times

the irrigated area per connection (average lot size for the county times the average fraction that is irrigated area for the county)

times

the water healthy plants need (average ET for the county, based on weather conditions)

divided by

water application efficiency (average application loss for the county – system leaks, over spray, over water for plan need, etc.)

The calculation results in an estimate volume (measured in gallons or acre-feet) of secondary water used for the remaining residential connections. To sum the system provided data with the estimated numbers, Water Resources converts data to gallons and adds the values. GPCD is then calculated as:

the total secondary gallons (reported and estimated)

divided by

number of days in a year (365)

divided by

the full-time, permanent population within the water provider's service area.

Secondary water use is reported in GPCD.

Water Resources recognizes limitations to this estimate: secondary water provided to commercial, industrial, and institutional users is estimated as residential water use. Proactive water systems may not be given credit for efficiencies implemented in their secondary water systems. Both of these limitations can be resolved by metering each connection and reporting secondary water use to Water Rights.

Population

Water system population is used by the Utah Division of Water Resources to calculate water use in gallons per capita (person) per day (GPCD). GPCD is a standard metric used across the nation to report municipal and industrial water use. It is, however, calculated differently in every state. In Utah, the Division of Water Resources uses data from every public water system to calculate the GPCD for that

water system. To make the calculation as consistent between systems as possible, we used the same components for every water system. Full-time, permanent residents are used as the population for each service area. This standard practice, also used by the US Census Bureau, assures each Utah resident is only “counted” at one location. Being consistent with the US Census Bureau allows Water Resources to validate water system population estimates by comparing the sum of all water system populations to the state population published by the US Census Bureau. A second validation is possible by comparing the sum of water systems populations within a county to the county population published by the Kem C. Gardner Policy Institute. The Policy Institute publishes official county populations for government agency use. Each year between census years, population at the county level is estimated to increase at a rate published by the Policy Institute.

Water System Population Estimates

The Division of Water Resources works with the Division of Water Rights and each public water system to identify accurate service area boundaries. When the boundaries are delineated, a senior GIS analyst overlays each system boundary with associated US Census Bureau blocks. The population of each census block that fall completely within a service area boundary is attributed to that water system. This process is repeated for traffic analysis zones (TAZ). A TAZ is an area defined by the Utah Department of Transportation (UDOT) with associated population, similar to a census block. TAZ are used by UDOT for future road planning purposes. The Division of Water Resources and other government organizations use census blocks and TAZ to inform local planning.

Where a census block or a TAZ overlaps more than one service area boundary, aerial imagery is used to identify the location of structures. Based on this visual observation, population is distributed between the systems in the same proportion as structures are distributed between the water systems in the imagery.

The final population estimate computed by Water Resources is shown on each water system’s Annual Water Use Report form. This is where knowledge of each water provider is critically important: If the estimate is wrong, please correct it.

As a local water system operator, you know your system better than Water Resources, Water Rights, or Drinking Water know your system. Help us serve you better. Your population may be growing either faster or slower than the county average. Your service area may be closed and you aren’t experiencing any change in population. You may have seen strong growth, but it is in vacation homes with no population associated with them. You may have seen average “growth” from new construction, but the number of persons in a household is greater than the county average.

Please also exercise caution. If you have issued permits for new construction, but the home isn’t occupied and no water is being used, population associated with each of those unoccupied homes decreases the calculated GPCD for the year. This also applies to residences that are occupied after June. The new occupants, don’t live and use water in the residences for more than six months. However, next year will reflect actual water use associated with the connections, increasing the calculated GPCD.

On a larger scale, the same situation occurs when using the system design (or build-out) population instead of active-connection population. The Division of Drinking Water publishes the system design population on their website. If the published Drinking Water system design population is used on the

Annual Water User Report form, population is artificially inflated. Over-counting population results in a lower calculated GPCD and a false sense of accomplishment toward water conservation. It appears a reduction in water use has occurred as a result of actions taken, when that isn't the case.

On the other hand, if population is under-estimated, water users may be reducing water use, yet not seeing a reduction in calculated GPCD. This is discouraging and leads to a "why try" attitude. Later, when population is accurately reflected, calculated GPCD decreases, but the reduction isn't related to actions taken by the water users.

Population Definition

The water system population is the number of full-time, permanent residents actively using water from the provider for more than six months of the calendar year.

The population count should reflect:

- the same individuals from the same connection during the time period.

- only connections to residences that were occupied for at least six months of the year.

- renters who live in residences served by the water system more than six months of the calendar year.

The population count should not:

- be adjusted for commuter populations, part-time residents, daytime only users, tourists, or vacationers.

- include new construction that is unoccupied for more than six months of the calendar year.

- include design or build out population.

- reflect short-term (leases or rental agreements for less than six months) housing population.