

NASCIO 2021

1. Title: **Innovation in Water Management in Utah**
2. Category: Data Management, Analytics, and Visualization
3. Project Initiation and Completion Date: January 2018 - December 2020
4. Project Contact: Bill Boudreau

Project Website: <http://dwre-utahdnr.opendata.arcgis.com/>
<https://conservewater.utah.gov>
<https://water.utah.gov>



Executive Summary

Utah is a dry state. As such, access to water is key to long-term growth across the state. The importance of quantifying water supply and use, and improving the data collection and planning processes are underscored by the following facts.

- Utah is one of the driest states in the United States (National Weather Service, Average Annual Precipitation by State). On average, Utah has about 300 sunny days a year.
- Utah was the fastest growing state in the U.S. over the past decade, with an overall growth rate of 18.4 percent.

The combination of these factors along with climate changes that are impacting drought across the western U.S. have caused the state to increase its focus on solutions to improve the management of its water resources. Many of those solutions involve an increase in the use of data and technology.

- Using GIS to track over 1500 projects to improve water efficiency (<https://water.utah.gov/development-branch/board-projects/>)
- Digital marketing and collaboration to promote the use of water-efficient technologies throughout the state (<https://water.utah.gov/agwateroptimization/>)
- Development of Utah's Open Water Data Portal (<https://dwre-utahdnr.opendata.arcgis.com/>)

In 2019, the Utah Division of Water Resources announced that Utahns can now easily access water use data through a new interactive data portal. Since its release, the Open Water Data Portal has added many new services and information sources. These resources have improved decision making and driven the development of new water management programs.

- Municipal and Industrial Water Use <https://dwre-utahdnr.opendata.arcgis.com/pages/municipal-and-industrial>
- Water Related Land Use <https://dwre-utahdnr.opendata.arcgis.com/pages/wrlu>
- Utah's Water Budget <https://dwre-utahdnr.opendata.arcgis.com/pages/water-budget>
- Water-wise Plant Zones <https://utahdnr.maps.arcgis.com/apps/View/index.html?appid=5c30663a38114e17a4914f0c327e6d2e>

Utah's Open Water Data portal allows Utahns to zoom and click an area of interest on an interactive map, resulting in a pop up that shows the water use in that area. Citizens can also download the underlying data. The tool improves water data accessibility and transparency. It can be accessed at: www.Water.Utah.Gov/OpenData.

"We wanted to present the water use data in a way that is accessible and understandable. This tool allows anyone to easily find, explore and download this important information," said Aaron Austin, Senior GIS Analyst for the Division.

The portal was released in conjunction with a report that contains an analysis of residential, institutional, commercial and industrial water use data gathered by the Utah Division of Water Rights for the 2015 water year: <https://water.utah.gov/2015WaterData.pdf>. The analysis reflects updated and improved methodology based on recommendations from a 2015 Legislative Audit, 2017 Legislative follow up Audit and a 2018 third party analysis of the division's processes.

"We are excited about the methodology accuracy and other improvements this data release represents. A lot of people worked very hard on this," Rachel Shilton, the division's River Basin Planning Section Manager, said.

While the improvements are encouraging, these changes make comparing the 2015 numbers to past water use data problematic due to the significant methodology differences. Changes in recommended secondary water use estimate inputs, as well as the transfer of second homes from the commercial category to the residential category, are examples of updates that impact categorical or total use estimates. As a result, the division will use the 2015 data as the new baseline for comparison and planning moving forward.

Likewise, comparisons from region to region within Utah are problematic due to differences in climate, number of vacation homes and other factors. Comparisons between Utah's water use numbers and data from other states have little value given there is no nationally consistent methodology standard for analyzing and reporting water use numbers.

Concept

The Utah Division of Water Rights collects water use data from hundreds of state water providers across the state, from large water districts and municipal governments to private water companies and neighborhood irrigation systems.

In 2015, the Office of the Legislative Auditor General issued a report entitled "A Performance Audit of Projections of Utah's Water Needs" (no. 2015-01). The report raised several concerns about the quality of data used to project the state's future water demand, namely:

- DWRe does not have reliable local water use data.
- DWRe needs a better process for collecting and evaluating water use data.

The audit recommended the following actions to improve the reliability of water use data:

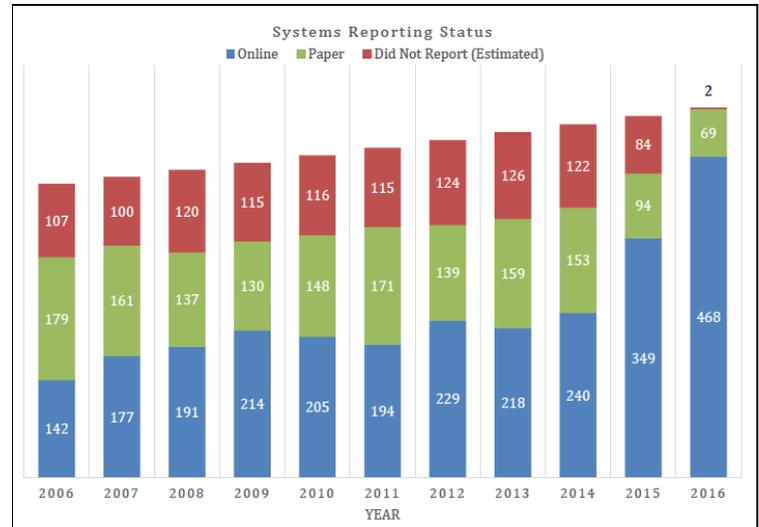
- DWRe review water use data annually to perform trend analysis
- Department of Natural Resources work with State water agencies to develop an efficient and effective system of collecting accurate water use data for public water providers
- Give statutory authority to the Division of Water Resources to validate the annual water use reported by public water providers
- Make local water managers responsible for submitting accurate water use data more accountable by requiring them to sign their report and identify their position and

credentials

- Incorporate a routine data check feature in the online data collection form that is used to validate the accuracy of the data submitted by the public water providers
- Validate the accuracy of the water use data by comparing it to other sources with similar information
- Conduct data validity checks, periodic audits, and training for local water systems to verify the accuracy of water supply and data use
- Committing additional staff and resources to improving the State's water use database

In responding to these concerns, Utah has dramatically improved data collection and reporting. The Open Water Data Portal provides publicly available data that addresses these concerns, while also providing data that is used by 473 water systems and utilities across the state. It also provides decision makers with data to guide important water conservation programs and operational governance.

The portal is cloud-based, built on the ESRI GIS platform, making it scalable and providing user tools that make it convenient for water managers to find new benefits.



Water Supply Data

Determining reliable annual supply of sources is unique to each water system. It depends on the types of sources (e.g., stream, reservoir, spring, well, wholesale) and how they are used. Surface water sources depend on precipitation and storage. Reliable supply also depends on available water rights. Another dependency is water treatment plant capacity for surface water sources and pump capacity for wells. Water availability in aquifers is a constraint that is difficult to quantify and account for with any single method. Wholesale supply agreements, which constitute much of Utah's deliveries, further complicate matters since the supply may or may not be double-counted by the wholesaler and customer. There is also the difficulty in some systems of separating potable supply from secondary supply when they come from the same sources.

Significance

Utah's Open Water Data portal allows Utahns to zoom and click an area of interest on an interactive map, resulting in a pop up that shows the water use in that area. Citizens can also download the underlying data. The tool improves water data accessibility and transparency.

The data produced by the water-related land use program are used for various planning purposes. Some of these include: determining cropland water use, evaluating irrigated land losses and conversion to urban uses, planning for new water development, estimating irrigated acreages for any area, and developing water budgets. Additionally, the data are utilized by many other state and federal agencies. Water-related land use can be used to depict Irrigation type (Irrigated, Sub-Irrigated, Non-Irrigated, Riparian, Urban, etc).

The availability of improved water data helped to bring a greater awareness of the nature of Utah's water resources, resulting in better water management.

New programs have been developed that are making an impact:

1. Utah is promoting the use of smart sprinklers throughout the state and providing rebate incentives to those who purchase them. For example, the University of Utah Research Park has 55 acres of land to water and realized they were paying 200% more for water than they needed. Smart sprinklers were able to save them \$120,000 in water bills and 25 million gallons of water. Rebates on commercial smart controllers are about 50% of the cost of the controller for eligible systems. Smart sprinklers monitor water usage and prevent waste by shutting off the water flow when a leak is detected, adjust water usage when there is rainfall, sense soil moisture to prevent root rot and create customized reports to show how the property's water is being used.
2. Waterwise landscaping. The waterwise plants database (<https://waterwiseplants.utah.gov>) helps users find plants that are:
 - a. Water-wise,
 - b. adapted to Utah's arid climate and cold winters,
 - c. available in the industry,
 - d. relatively easy to maintain in the landscape, and
 - e. have desirable landscape characteristics which remain desirable under limited water availability.

Status of Data Collection Process Recommendations	
Data Collection Process Recommendations	Status
Articulate Purpose of Collecting Data	In Progress 
Improve Instructions in the Data Entry Process	
Define water use types	Complete 
Move from "water use" to "metered sales"	In Progress 
Request raw water use data and units	Complete 
Add instructional components to collection form	Complete 
Provide opportunity for feedback	Complete 
Simplify & Automate Data Collection and Evaluation	
Minimize requested data	Complete 
Pre-populate data entry fields	Complete 
Coordinate how billing software could improve data requests	In Progress 
Allow monthly reporting of metered sales data	Still Needed
Make data collection form tool for water providers	In Progress 
Collect Additional Water Loss Info	
Account for losses in DWRe planning	Still Needed
Collect info on type of losses	In Progress 
Improve Secondary Water Reporting & Encourage Secondary Metering	
Require metering of secondary water	Still Needed
Add categories for secondary use and production	Complete 
Focus Detailed Data Evaluation on Large Water Suppliers	
Reduce data reporting requirements for small systems	In Progress 
Limited data evaluation/verification for small systems	In Progress 

3. Weekly watering guide (Mobile app - <https://apps.apple.com/us/app/utah-water-guide/id1110178893>). Eliminating just one watering can save about 3,000 gallons for the average quarter-acre Utah yard with .17 acres of green space. The mobile app helps users prevent over-watering. Utah could save more than 20 billion gallons of water every summer if everyone watered according to the guide. The guide takes extensive data and simplifies it into how many days per week to water in each county.
4. Slow the Flow. This is a digital marketing campaign that uses social media and a website (<https://slowtheflow.org>) to enhance public awareness of the the need to conserve water and how they can be involved.

Impact

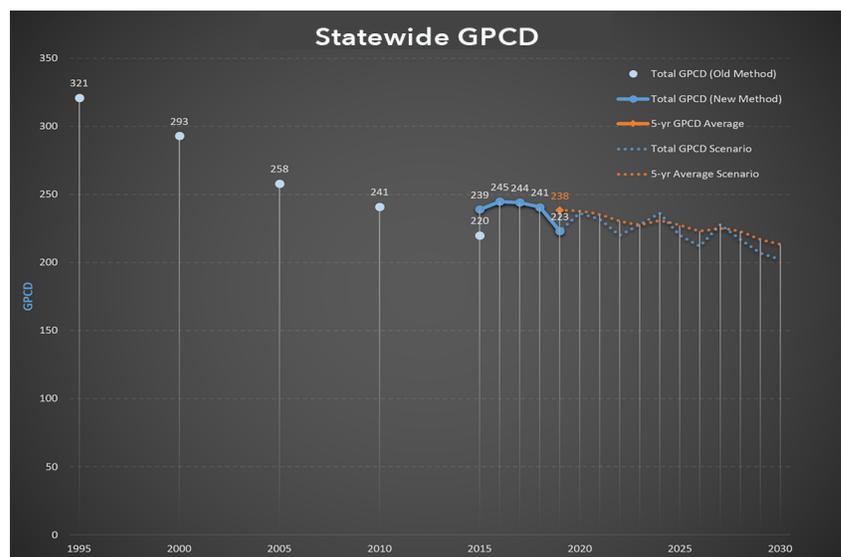
The availability of more reliable statewide water data has had an impact on water conservation planning. Every five years, systems with over 500 connections are required to submit a water conservation plan to the Utah Division of Water Resources to comply with the Water Conservation Act. These plans contain existing and proposed water conservation measures that outline how the entity and the end culinary water user will conserve water and limit or reduce per capita consumption so that adequate water supplies are available for future needs. Non-compliant water systems are ineligible for state loans or funding. Plans are submitted electronically and the State now provides digital resources that aid in the quality of local water planning

(<https://conservewater.utah.gov/water-conservation-plans/conservation-plan-resources/>).

“We wanted to present the water-use data in a way that is accessible and understandable,” said Aaron Austin, senior GIS analyst for the Utah Division of Water Resources. “This tool allows anyone to easily find, explore, and download this important information.”

Utah now has one of the most comprehensive water reporting practices in the nation because it includes all potable, secondary and reuse by all users

(residential, commercial, institutional and industrial) in its GPCD (Gallons per Capital per Day). This all-inclusive method is important for planning purposes but means that Utah’s water use numbers look higher than other cities or states that don’t include all water use in their calculations.



Overall, improved water data resources have resulted in improved water policy and program management, including the following:

- Manage water demand, conserve water, increase water delivery efficiency, generate new sources of supply, and identify opportunities to adapt reservoir operations.
- Evaluate and encourage wastewater reuse and recycling practices.
- Encourage the best agricultural practices and drought-resistant crops.
- Improve management of irrigated agriculture, e.g., changing the cropping calendar, crop mix, irrigation method, and repair and maintenance of irrigation infrastructure.
- Identify and remove invasive non-native vegetation from riparian areas.
- Introduce new efficient technologies such as desalination, biotechnology, drip irrigation, and smart technologies to monitor water uses.
- Expanded use of economic incentives to encourage water conservation through water pricing and water banking.