

# 07

## Chapter

### Agricultural Water Use Optimization

#### Chapter Highlights

- As the industry with the greatest water need, agriculture is at the center of the very difficult choices facing community and industry leaders.
- Agricultural producers around the state have been active in seeking advancements in irrigation and water use technology to optimize water use and will continue to do so.
- Many strategies, programs, and best management practices are available to help optimize agricultural water use.
- Water banking is an opportunity to promote greater collaboration and flexibility within the water community.

Agriculture is the industry that uses land, water, and other resources to grow food, fiber, and fuel. Because of Utah's semi-arid climate, agriculture requires significant volumes of water to be productive. The demand for water by agriculture is reflected in the Division of Water Resources' (Division) Water Budget Model, which estimates approximately 75% of the state's water diversions are for agriculture. Clearly, any discussion of water in Utah would be incomplete without addressing agriculture.

Agriculture is an essential industry. Everything that grows on the farm and ends on our tables requires water. Fortunately, agricultural producers around the state are actively seeking advancements in irrigation and water management technology to optimize water use. In this context, optimize means to make the best or most effective

use of the water that is available and in some cases even reducing consumptive use. Optimizing agricultural water use will not only help ensure agricultural productivity, but will improve overall water management within a watershed and basin.

Utah is at a crossroads in water need as population growth, drought and climate variation, and the need to maintain viable natural systems all converge. Add to this the very high public and social interest in maintaining food production and other valuable services provided by agriculture and you have a recipe for potential conflict. As the industry with the greatest water need, agriculture is at the center of the very difficult choices facing community and industry leaders. While there is little debate about the need for agricultural water to be transferred to meet growing M&I demands as farm lands are developed to accommodate growth, there are still many questions about who should bear the costs and who should receive the benefits of agricultural water use optimization.

While this plan is not able to resolve all these issues, it is hoped that it can help lay a foundation for future processes and discussions that are necessary to ensure future water security. As such, this chapter summarizes some broad strategies, programs, and best management practices that are available to help optimize water use in agriculture.

## Recommended State Water Strategy

In 2017, the Governor's State Water Advisory Team issued the [Recommended State Water](#)



Picking Utah strawberries

**Strategy.** One of the key policy questions addressed in this document was “How does Utah provide water for agricultural lands and food production in the face of competing water demands?” The document made several recommendations in response to this question, including the following:

- Support agriculture’s infrastructure, water use measurement, data, and reporting needs.
- Establish basin-level councils to create benefits for farmers who help optimize regional water supplies, conserve in-stream flows, or enhance water quality.
- Create mechanisms that help agricultural water users contribute to improving water quantity and quality management.

Since then, the State Legislature has taken several actions on these recommendations that help establish a foundation for agricultural water management and optimization efforts. The following four sections provide a brief description of these actions.

## Agricultural Water Optimization Task Force

In 2018, the State Legislature created the Agricultural Water Optimization Task Force ([Utah Code 73-10g-Part 2](#)) and appropriated \$1.2 million to help address some of the recommendations of the strategy document related to agriculture. The task force was directed to: (1) identify critical issues facing the State’s long-term water supply, particularly how to optimize agricultural water supply and use in light of future needs; (2) identify obstacles and constraints on the quantification of agricultural water use and recommend ways to improve the quantification on a basin level; and (3) identify ways to maintain or increase agricultural production while reducing the agriculture industry’s water diversion and consumption.

So far, the task force has funded a few demonstration projects and produced several reports investigating various issues and sharing the results of specific



Low head center-pivot irrigation system in Utah Valley

agricultural water optimization projects. For more information on the Task Force's work, see the [Division's Agricultural Water Optimization webpage](#).

## Utah Department of Agriculture and Food Water Optimization Program

In 2019, the State Legislature also began providing funding for the implementation of agricultural water optimization projects directly with agricultural producers. In 2019, 2020, and 2021, the legislature allocated \$3 million. This funding is administered by the Utah Department of Agriculture and Food (UDAF) and is provided as a matching grant to eligible applicants. The purpose of the grants is to reduce consumptive water use, provide increased operational flexibility for agricultural water users, and show accurate, real-time measurement of diverted water to demonstrate water savings.

Grant recipients are required to report data to the state for three years following implementation of their project. For further details, see [UDAF's Water Optimization Program webpage](#).

## Utah Watershed Councils Act

In 2020, the Utah Legislature passed the Watershed Councils Act ([Utah Code 73-10g-Part 3](#)), which directs the Division of Water Resources to create the Utah Watersheds Council (a state council) and 12 local watershed councils. The intent of the Act is to “develop diverse and balanced



stakeholder forums for discussion of water policy and resource issues at watershed and state levels.”

Providing opportunities for the agricultural community to have a seat at the table is a clear priority of the act. The Utah Watersheds Council will include the Commissioner of the Department of Agriculture and Food, the Utah State University Extension Vice President, as well as a representative of agricultural interests selected by the governor from persons nominated jointly by the Commissioner of the Department of Agriculture and Food, the President of the Utah Farm Bureau, and the Utah State University Extension Vice President. The act also encourages each local watershed council to include representatives from agriculture, mutual irrigation companies, and local sponsors of reclamation projects.

Although these councils are not vested with regulatory, infrastructure financing, or enforcement powers or responsibilities, they provide the opportunity for all council members to have a voice in water-related discussions.

For more information about watershed councils, see the [Division's Watershed Councils webpage](#).

## Water Banking Act

In 2020, the Water Banking Act became law ([Utah Code 73-31](#)). This act authorizes the Board of Water Resources (Board) to approve the creation of formal water banks. A water bank is an institutional mechanism that facilitates the temporary transfer of water and can help agricultural water users contribute to improving water management in a watershed where there are many competing needs.

Water banks facilitate the voluntary, temporary transfer of a water right from one user to another through low-cost transactions. Water banking isn't new, but the concept hasn't been formally used in Utah. Water banking is a market tool that may provide both income to water right owners and greater access to water. Water banking is an alternative to "buy and dry" practices and is an opportunity to promote greater collaboration and flexibility within the water community. Water banks could also allow water users to invest in water saving technologies that reduce consumption through the potential lease or sale of water.

In 2019, the Division received a \$400,000 WaterSMART Water Marketing Strategy grant from the Bureau of Reclamation to develop a statewide strategy – how water banks could be set up and operate. Information gathered from three pilot water banks will be used to develop the strategy. The legislature appropriated an additional \$400,000 for the study.

## Best Management Practices

There are numerous ways to improve the management of agricultural water. These are typically divided into two categories: off-farm or conveyance system improvements and on-farm improvements. The following sections discuss some best management practices for each and also provides relevant data demonstrating the effectiveness of certain practices or the progress that has already been made.

### Conveyance System Improvements

The effectiveness of conveyance systems to deliver water to farms varies depending on the conveyance type, soil, slope, length of the canal or ditch, and condition of the infrastructure. In unlined, earthen canals, conveyance water loss can be as high as 50%. Concrete or polymer-lined canals experience much lower losses, while properly maintained and piped irrigation water that is monitored for leaks can nearly eliminate losses.

Conveyance systems can also be greatly improved by the use of Supervisory Control and Data Acquisition (SCADA) technology. SCADA systems utilize a network of water level and flow measurement devices to automate system operations. With real-time capability to monitor and manage entire irrigation systems, SCADA technology reduces excess application, improves canal safety, and reduces system losses.

Since 2010, the Board has funded 95 projects that improve the performance of conveyance systems. These projects



Utah County farmland

primarily included piping open channels or lining canals and ditches to reduce seepage and evaporation losses. More than 350 miles of open canals were improved through these Board-funded projects, with an estimated reduction of water loss of over 119,000 acre-feet annually (DWRe 2019). The Division of Water Rights' database indicates that only about 20% of the nearly 4,600 miles of irrigation canals are piped in Utah (DWRi 2018). The remaining 3,600 miles of open canals represent a significant opportunity to improve conveyance of Utah's agricultural water.

## On-farm Improvements

In addition to conveyance improvements, there are many opportunities to improve water management at individual farms. A few of these are listed below:

- Selecting a crop that has a lower water demand.

- Carefully monitoring soil temperature and moisture and adjusting irrigation schedules to only replenish the root zone as needed.
- Changing the irrigation application method to optimize water use.
- Enhancing the soils to improve water retention and crop growing conditions.

An example of how crop selection can make a big difference in water consumed is the Beryl-Enterprise area in Iron County. Irrigators there recently converted many acres of alfalfa to corn, grain, or pasture in order to reduce groundwater depletions. Subsequent data from the Utah Division of Water Rights shows that average annual groundwater depletions have declined by an average of over 6,000 acre-feet annually (DWRi 2012 & DWRi 2013–2018).

Recent land use data from the Division (2017) indicates that 77,000 agricultural acres were converted from flood to sprinkle

irrigation since 2007. Additionally, more than 1,200 acres have been converted to drip irrigation (DWRe 1986-2017). Drip irrigation systems are about 85% – 90% efficient (Peters, et al 2020).

In 2018, the Utah Legislature provided \$200,000 to convert pivot sprinkler systems to Low Elevation Spray Application and Mobile Drip Irrigation systems in Cedar Valley, Iron County. With this funding, the Central Iron County Water Conservancy District helped retrofit more than 20 irrigation systems. These systems are now being studied to determine their potential to help reduce the average 7,000 acre-foot per year overdraft of the Cedar Valley aquifer.

## Recommendations

The Division will work with cooperating partners to implement the following recommendations:

- Encourage agricultural water users to actively participate in local watershed councils.
- Continue to fund water conveyance improvement projects through the Board of Water Resources.
- Continue to fund on-farm water optimization projects through the Utah Department of Agriculture and Food.
- Prepare and publish a Statewide Water Marketing Strategy that includes water banking lessons learned from pilot projects around the state.

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## Chapter 7 Links

Recommended State Water Strategy - <https://envisionutah.org/utah-water-strategy-project>

Agricultural Water Optimization Task Force Statute - <https://le.utah.gov/xcode/Title73/Chapter10G/73-10g-P2.html>

Division Agricultural Water Optimization Task Force Webpage - <https://water.utah.gov/agwateroptimization/>

UDAF's Water Optimization Program - <https://ag.utah.gov/farmers/conservation-division/water-optimization-program/>

Utah Watershed Councils Act - <https://le.utah.gov/xcode/Title73/Chapter10G/73-10g-P3.html>

Division's Watershed Councils Webpage - <https://water.utah.gov/watershed-councils/>

## Citations

DWRe 2019. Division of Water Resources, Pacheco, J., Project Funding Database, 2019.

DWRi 2018. Utah Division of Water Rights, Canals [Shapefile]. (2018, July 1).

DWRi 2012. Utah Division of Water Rights, *Beryl Enterprise Ground Water Management Plan*, 2012.

DWRi 2013-2018. Utah Division of Water Rights, *Beryl Enterprise Groundwater System Annual River Commissioner Report*, 2013 to 2018.

DWRe 1986-2017. Division of Water Resources, Utah Water Related Land Use (1986-2017).

Peters, et al 2020. *Literature Review of Current & Upcoming Irrigation Technologies and Practices Applicable to Utah*, University of Utah, November 25, 2020.