

Utah's Coordinated Action Plan for Water

November 2022

A collaborative effort from:

Governor's Office of Planning & Budget
Governor's Office of Economic Opportunity
Department of Agriculture and Food
Department of Environmental Quality
Department of Natural Resources
Colorado River Authority of Utah



Table of Contents

Executive Summary & Introduction	3
Investing in Infrastructure (released Jan. 2022)	14
<i>The Role of the State</i>	17
<i>Key Policy Issues</i>	18
<i>Action Plan</i>	30
Vibrant Communities (released Apr. 2022)	37
<i>The Role of the State</i>	41
<i>Key Policy Issues</i>	45
<i>Action Plan</i>	47
Productive Agriculture (released Jul. 2022)	56
<i>The Role of the State</i>	58
<i>Key Policy Issues</i>	59
<i>Action Plan</i>	68
Healthy Waters & Watersheds (released Nov. 2022)	75
<i>The Role of the State</i>	77
<i>Key Policy Issues</i>	84
<i>Action Plan</i>	96
Glossary & References	104

Executive Summary & Introduction



A Coordinated Action Plan

Rapid growth and new challenges, including climate change, means that Utah must take a comprehensive, proactive approach to conservation and planning for our future. Recognizing the interconnectedness of water through our communities, through the geography of our state, and through the water cycle, Gov. Cox instructed state agencies to undertake a groundbreaking effort to tackle water issues through bold action. Strategies outlined in this action plan will secure a sustainable and prosperous future for Utahns.

Utah's Coordinated Action Plan for Water is a collaborative effort between the state Governor's Office of Planning and Budget (GOPB), the Department of Natural Resources (DNR), the Department of Environmental Quality (DEQ), the Department of Agriculture and Food (UDAF), and the Governor's Office of Economic Opportunity (Go Utah) as directed by Gov. Cox's One Utah Roadmap action item "Establish a statewide water cooperative action plan that prioritizes conservation, storage, agriculture preservation, and use optimization."

Much planning work has been completed in the water space over the past decade. Past planning efforts, including the 2021 State Water Resources Plan, the 2017 Water Strategy, the work of the

Legislative Water Development Commission, the Water Task Force, the Agricultural Water Optimization Task Force, House Concurrent Resolutions on the Great Salt Lake and Bear Lake, the state's Water Finance Board, the work of the Great Salt Lake Advisory Council, the Prepare 60 and Reclaim 60 partnerships, and many others. These efforts have generated a list of over 200 recommendations and actions to safeguard and improve the state's water resources for a healthy and prosperous Utah.

Some of these recommendations are in conflict with each other, some have the potential for greater impact than others, and some can be implemented by the executive branch, while others require partnerships. The goal of *Utah's Coordinated Action Plan for Water* is to compile past recommendations, prioritize them, negotiate trade-offs among competing objectives, and create a plan of action for the state's top priorities to ensure the best use of this valuable resource.

This action plan will be used by Gov. Cox to guide the work of Utah's executive branch. Outcomes may include executive orders, directives to state agencies, recommendations for policy changes, new studies and initiatives, or prioritization of projects in the state's budget. Gov. Cox also hopes to establish a culture of collaboration across state agencies to guide future water planning efforts.



Participating Agencies

Department of Natural Resources

- Division of Water Rights
- Division of Water Resources
- Division of Fire, Forestry, and State Lands
- Division of Wildlife Resources
- Public Lands Policy Coordinating Office

Department of Environmental Quality

- Division of Drinking Water
- Division of Water Quality

Department of Agriculture and Food

Governor's Office of Planning & Budget

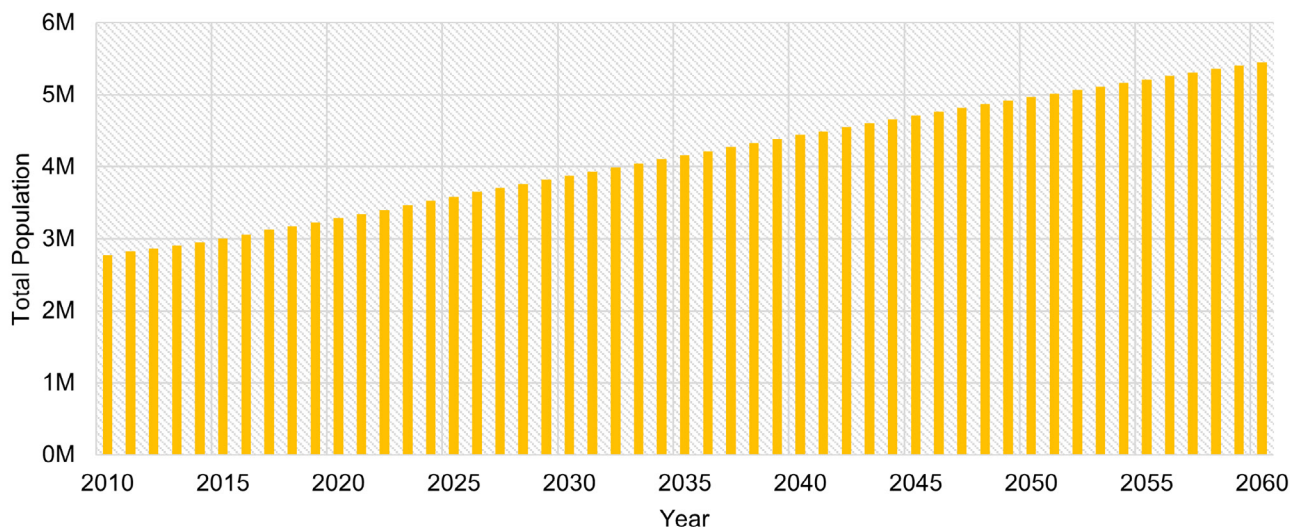
Governor's Office of Economic Opportunity

An Uncertain Future

Utah is facing dual challenges: rapid growth and increasing uncertainty of water resources. Utah has experienced nearly 20 years of below-average precipitation trends, with the summer of 2021 breaking records for both heat and drought.¹ Storage reservoirs are reaching historic lows, harmful algal blooms are increasing, exceptionally dry soil moisture levels are reducing spring runoff, and the state's drinking and agricultural water sources are increasingly at risk.

Beyond simply reducing the availability of water, drought creates the environment for a series of cascading disasters. As our state becomes increasingly arid, the risk of wildfires increases. Fighting wildland fires requires significant amounts of water, depleting water storage, increases risk of landslides in burn scar areas, impacting communities, and directly threatens essential drinking water infrastructure. Further, thunderstorms following fire events increase water quality impacts within and downstream of burned areas which poses problems for water-supply reservoirs, drinking-water treatment plants, and downstream aquatic ecosystems.

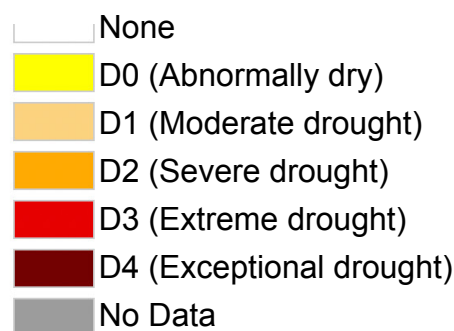
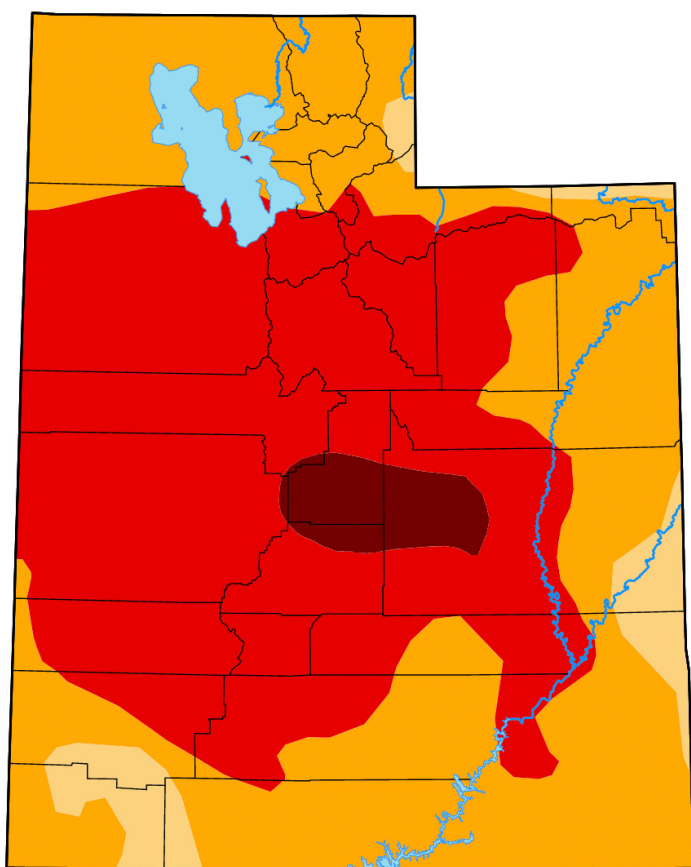
2020-2060 Long-Term Planning Projections



Source: Kem C. Gardner Policy Institute

State of Utah

Drought map as of October 13, 2022



(Source: University of Nebraska-Lincoln, 2022)

Growth also increases pressures on water resources. Over the last decade, Utah has been the fastest-growing state in the nation, a fact confirmed by the latest census data showing an 18.4 percent growth rate.² The trend does not appear to be slowing down. Growing population and the expansion of cities require a tremendous amount of water. With the uncertainty of Utah's water resources, the future of our communities must include careful consideration about land use, conservation, healthy watersheds, urban landscaping practices, drinking water supply, storage, and treatment, and household and industry water consumption.

Much of Utah's water infrastructure is nearing the end of its engineered lifespan. Risk of a major earthquake further threatens the reliability of these critical infrastructure resources and an event could pose devastating public safety risks.

Growth in the state also puts increasing pressure on sewer and stormwater systems. Persistent drought will only exacerbate water quality challenges, meaning that our state must make investments in new infrastructure and implement policies to ensure that our streams, rivers, and lakes can continue to provide us with safe recreational opportunities, productive industry, and healthy habitats for Utah's wildlife.

Ensuring the continued prosperity and high quality of life that makes our One Utah vision possible will require swift and bold action in water policy. It is critical that we face challenges head-on through increased collaboration, direct investments, and addressing the difficult decisions about conflicting goals. We need Utah-based solutions that are designed to meet our state's unique needs, and that reflect Utah's collaborative approach to problem solving.

Statewide Water Commitments

The state of Utah has established the following commitments to better secure Utah's water future:

1

Utah is committed to increasing the resiliency of our water supply and quality by maintaining and improving our current **water infrastructure**, improving data collection, and by investigating opportunities for new water supply and storage.

2

Utah is committed to using our existing water supply as wisely as possible, by reducing the amount of water consumed through **conservation**, ensuring access to safe and reliable drinking water, and improving the quality of water as it leaves our communities.

3

Utah is committed to optimizing the use and management of our finite water supplies in order to preserve the state's **agricultural economy** and ensure a sustainable and prosperous future.

4

Utah is committed to maintaining and improving the **health of our waters and watershed**—with emphasis on our forests, Great Salt Lake, Bear Lake, and Utah Lake—to support their continued multiple uses.

Plan Structure

Utah's Coordinated Action Plan for Water was released in a series of quarterly chapters, each focused on a different aspect of the state's water commitments:

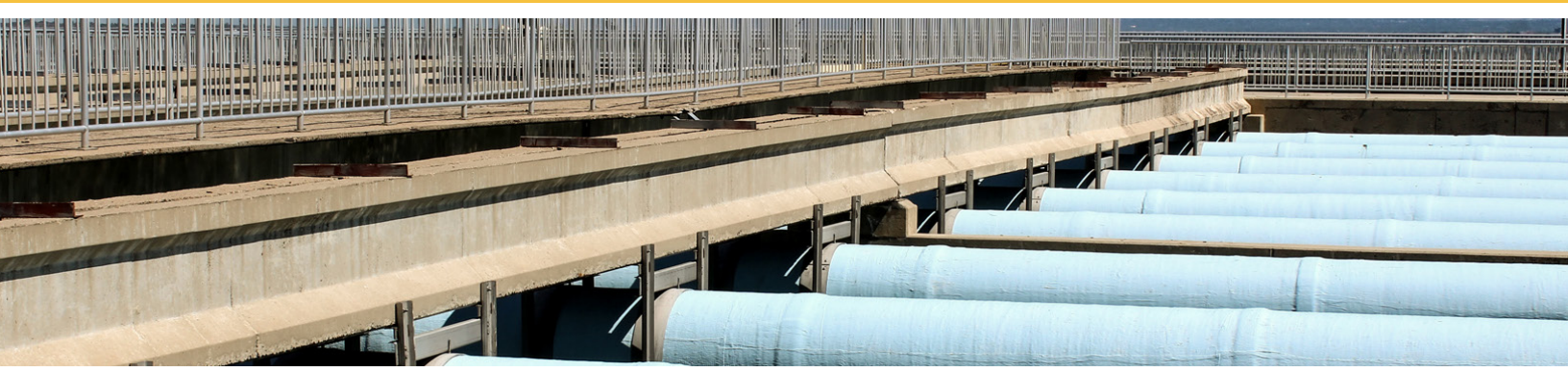
1. Investing in Infrastructure - Jan. 2022
2. Vibrant Communities - Apr. 2022
3. Productive Agriculture - Jul. 2022
4. Healthy Waters & Watersheds - Nov. 2022

Each report summarizes key issues, present executive branch priority strategies, and contains an action plan for each strategy. Action plans outline a clear plan, including identifying:

- initiative champion(s),
- participants,
- timelines,
- resources needed, and
- progress benchmarks.

Action plans break large objectives into manageable tasks and will help ensure implementation accountability.

Progress towards plan implementation will be tracked at gopb.utah.gov/waterplan, and reviewed annually as part of agency strategic planning and budgeting processes.



1 Investing in Infrastructure

Utah is committed to increasing the resiliency of our water supply by maintaining and improving our current water infrastructure, improving data collection, and investigating opportunities for new water supply and storage.

Utahns today are benefiting from historic investments in our state's water infrastructure that facilitated the expansion of jobs, created new recreation opportunities, and allowed new neighborhoods to develop. These aging facilities are in need of significant capital investments and improvements. As our community continues to grow, so do our new infrastructure needs. Protecting public health will require us to fund new water treatment and distribution avenues to ensure all Utahns have access to safe, reliable, and clean drinking water. A generational investment in water infrastructure is needed to meet the needs of current and future generations.

This report will outline the magnitude of the water infrastructure needed to accommodate the growth of our state as well as the protection of our natural resources, delineate resources already available to the state for infrastructure projects, and clarify the state's role in addressing these needs.

Project needs identified will take a holistic approach to our state's water system, ranging from water storage and delivery projects to wastewater treatment, and investments in municipal, industrial, and agricultural water optimization. Critically, this report outlines an action plan for prioritizing the state's advancement of necessary investments.



2 Vibrant Communities

Utah is committed to using our existing water supply as wisely as possible, reducing the amount of water used in our communities, and ensuring the continued vibrancy, success, and growth of the state's cities and towns.

Utah's population is expected to reach 5 million by 2050, requiring an increase in drinking water supply, treatment, and storage.³ As our state grows, agricultural lands have and will continue to transition to developed communities. While developed lands typically utilize less water than agriculture, growth which occurs on non-irrigated land increases demand for municipal and industrial water use—making conservation an even more critical need.

The vast majority of municipal and industrial water in Utah's cities and towns is used for outdoor landscaping irrigation. Factors that affect how much water a community uses include lot sizes, park strip and local open space requirements, planting choices, irrigation technology, water prices, landowner water use awareness, and homeowner association codes, covenants, and restrictions.

Commercial and industrial land uses provide Utahns with important employment opportunities and support Utah's overall economy. Some uses consume more water than others, such as data centers, bottling plants, and paper product manufacturers. As a business input, water must

be recognized as a cost to production consistent with its scarcity such that efficient market outcomes can be achieved.

Utah communities also play a role in protecting downstream water quality. Water that travels through our sewer systems and the stormwater that runs off impervious streets and parking lots are all tied to the health of Utah's water bodies. These wetlands, rivers, and lakes provide much of the state's recreation opportunities and aesthetic beauty, as well as supporting wildlife habitat and additional economies.

The state holds regulatory authority over water quality and drinking water to protect public health and the environment. Federal land management agencies govern two-thirds of the land in the state, and land use regulations and economic development are primarily the jurisdiction of local governments.⁴ Therefore, the state's role in these areas is largely one of education and support. This report presents a series of priority actions that the state will undertake to support local communities in becoming better stewards of our water resources, while maintaining a prosperous, high quality of life.



3 Productive Agriculture

Utah is committed to optimizing the use and management of finite water supplies in order to preserve the state's agricultural economy and ensure a sustainable and prosperous future.

Long before our state was established, agriculture has been essential to civilization in this area. Utah's agricultural heritage retains a critical role in the continuation of our society, in our culture, and in our state's future. Utah's agricultural industry accounts for 2 percent of the state economy.⁵ Agriculture comprises the majority of Utah's water usage. The long-term average (1989-2018) water diversion for agriculture is 79 percent, while the most recent five-year period (2014-2018) is 75 percent.⁶

Agriculture is facing relentless pressure from growth that is transforming agricultural lands and increasing demands on a limited water supply. Long-term climate trends are decreasing the supply of available water. The state is committed to continuing to support agricultural industry growth, while minimizing any unnecessary or excessive water use.

This report focuses on action items the state can undertake to support Utah's agricultural producers as they optimize irrigation practices. Agricultural optimization increases agricultural

resiliency, expands the industry's ability to survive periods of drought, and can increase production by stretching limited water resources.

Investments must be coupled with policy changes that incentivize consuming less water, while still maintaining commercially viable production of agricultural goods. Gov. Cox is committed to working with the legislature to implement needed tools.



4 Healthy Waters & Watersheds

Utah is committed to maintaining and improving the health of our waters and watersheds throughout the state to support their function, importance, and uses.

With Utah's population growing, and less precipitation falling in the form of snow, it is important for our state to protect surface water resources and ensure that they can continue to serve the state into the future.

Utah's watersheds span from high mountain summits, canyon streams and rivers like the Colorado, reservoirs, communities, farmlands, natural open spaces, the wetlands of the Great Salt Lake, Bear Lake, Utah Lake, and to places beyond the state's borders. Each part of the state's many watersheds supports multiple uses that benefit the state including drinking and agricultural water, recreation, industry, and wildlife. Protecting and managing Utah's watersheds and water bodies requires a multi-pronged approach. Source protection, wastewater treatment, stormwater management, aquifer recharge, agricultural practices, and riparian restoration all play a role in maintaining healthy waters.

The forest management practices of the last century have led to conditions ripe for

catastrophic wildfires and the subsequent water quality and erosion issues that occur post-fire. Water levels in Great Salt Lake are in decline, threatening billions of dollars in economic activity, a globally important ecosystem, local public health, and the lake's essential contribution to Utah's water cycle. Increasing occurrences of harmful algal blooms have heightened concerns over the future of Utah Lake, and Bear Lake is facing declining lake levels, invasive species, water quality and increased use.

Many of Utah's rivers, which are the source of critical water supplies for the state, have declining flows. Management of these rivers into the future will require increased collaboration—especially Interstate rivers such as the Colorado.

This report focuses on priority actions that state agencies will undertake to advance watershed health. These actions may include the use of regulatory tools, education and outreach efforts, and incentive programs to ensure responsible management of our watersheds and long-term protection of our water resources.

Action Steps

Investing in Infrastructure

1. Create a framework to assist local governments and agricultural water providers in data collection and analysis, prioritization of needs, access to funding, and asset management planning.
2. Develop a series of needs assessments for local-scale water systems across the state, including both municipal and agricultural systems.
3. Continue to be a matching partner in funding the state's water infrastructure needs as the state grows, and assess the evaluation criteria to ensure these state grant and loan programs are advancing the state's priorities, including conservation.
4. Streamline project approvals, rules, and regulations to encourage innovation in Utah's water management such as aquifer storage and recovery (ASR), water reuse, desalinization, green infrastructure, new storage, and public-private partnerships.
5. Invest in research, data collection, and operator training to ensure the state's water infrastructure benefits from the most accurate information and best practices.

Key Policy Issues

- Conservation and water infrastructure needs
- The relationship between water pricing and infrastructure needs
- The role of asset management
- The responsibility for maintaining water quality
- Increasing Utah's water supply
- Funding water infrastructure

Vibrant Communities

1. Determine and quantify the contributions that increasing water use efficiencies and conservation, including water rates, can make to future water supplies.
2. Continue to expand secondary metering throughout the state, along with education for Utah residents on the importance of water conservation.
3. Initiate and facilitate ongoing conversations to link economic growth strategies with improved and reduced water usage.
4. Assist local governments with the development of plans, ordinances, policies, regulations, and programs to link land use and water planning, encourage conservation, improve water quality, and protect drinking water.
5. Assist local governments with the implementation of low-impact development and stormwater treatment systems to reduce pollution from development and increase conservation.
6. Look for opportunities for water initiatives to serve multiple goals and priorities for communities, including water quality, outdoor recreation access, and wildlife management.

Key Policy Issues

- Conservation at the state, local, and individual levels
- Economic growth and water
- Transbasin delivery and directing growth
- The relationship between energy and water
- The responsibility for maintaining water quality
- Prioritization in a crisis

Productive Agriculture

1. Continue to execute and invest in agricultural infrastructure, including water optimization program projects, irrigation system automation, metering, and data storage and dissemination.
2. Deploy strategies such as water banking, split season leases, and in-stream flows to create water use flexibility and protect critical habitats.
3. Continue to invest in water quality programs related to agriculture.
4. Educate and engage producers and the public to improve understanding of water rights, and their role in maintaining water quality and conservation.
5. Invest in agricultural research and data collection to ensure decisions and investments are based on the most accurate information and best practices.

Key Policy Issues

- Agricultural water optimization,
- Understanding water rights,
- Incentivizing conservation and protecting water rights
- Addressing nonpoint sources of water pollution
- Highest and best use of Utah's water and farmland
- Public lands and grazing

Healthy Waters and Watersheds

1. Maintain and improve efforts to collaborate with relevant agencies, policy makers, and land and water managers at the watershed scale to affect watershed health.
2. Develop and enhance communications strategies and educational tools to assist the public in water conservation and help them understand their role in maintaining healthy watersheds.
3. Improve our understanding of the critical thresholds impacting the Great Salt Lake and its tributaries, the Colorado River, and forest health, and develop management strategies to preserve and augment water supplies.
4. Prioritize and target land conservation and restoration in riparian corridors, floodplains, and other areas with high values for watershed health, wildlife habitat, and public access and recreation.
5. Control invasive plant and animal species to minimize water loss and restore natural ecosystems.

Key Policy Issues

- The interconnectedness of the water system
- Water quality and harmful algal blooms
- Wetlands, waters of the U.S., and permitting
- Instream flows and riparian and aquatic ecosystems
- Forest health, fire, water quality and quantity
- Groundwater aquifers
- Urban watersheds and drinking water supply
- Invasive species
- Multiple uses and outdoor recreation
- Great Salt Lake
- Colorado River

Investing in Infrastructure

Released January 2022





1 Investing in Infrastructure

Utah is committed to increasing the resiliency of our water supply by maintaining and improving our current water infrastructure, improving data collection, and investigating opportunities for new water supply and storage.

Introduction

Utah's water infrastructure includes a broad spectrum of water storage reservoirs, drinking water sources, storage tanks, treatment facilities, and distribution pipelines, to wastewater treatment facilities, storm drains, catchment basins, agricultural canals and irrigation systems and man made wetlands. In Utah, all must prioritize conservation.

Understanding Utah's current water infrastructure system requires understanding its history. The foundation of this system are the natural rivers, streams, and lakes that have emerged over Utah's geologic history.

The Fremont and Ancestral Puebloans were the first Utah residents to construct canals and ditches that diverted water from these natural systems to irrigate crops and sustain their communities. Many decades later, Utah pioneers expanded this early water infrastructure network to support larger agricultural operations, expand the geographic area of settlement, and build Utah's early economy. Some of these same

canals continue to deliver water to Utah's farms and today's suburban neighborhoods.

In the late 1800s, the industrial revolution allowed for water to be pumped and moved even further, which created the opportunity for Utah to urbanize. The 1900s were accompanied by significant construction of water pipelines and small reservoirs to support these growing urban centers as well as the state's earliest sewage collection systems. Many of these same pipes are still in daily use in the older parts of our cities.

The early 1900s also signaled the first major federal investments in water infrastructure in the west. Some estimates identify the extent of federal participation as constituting about one-third of all municipal water infrastructure financed and constructed in Utah since 1903.⁷ Most of Utah's large storage reservoirs, drinking water systems, and wastewater treatment facilities were constructed between the 1930's and 1990's and continue to support the current population of our state.

While continuous expansions and improvements have been made to water infrastructure since that time, much of the infrastructure that we rely upon is aging and nearing or past the end of its engineered life. New advances in conservation technologies should be incorporated into the state's existing infrastructure, as well as technologies that keep our wildlife populations healthy.

Our water infrastructure needs are expanding as our population continues to grow. Changes in funding approaches from the nation's capital have dramatically reduced the potential for future federal support to replace aging systems originally funded with federal dollars. Compounding these challenges is a changing climate that is altering Utah's precipitation patterns and levels, creating water quantity and quality challenges, and ultimately affecting the way that we meet the water needs of our state.

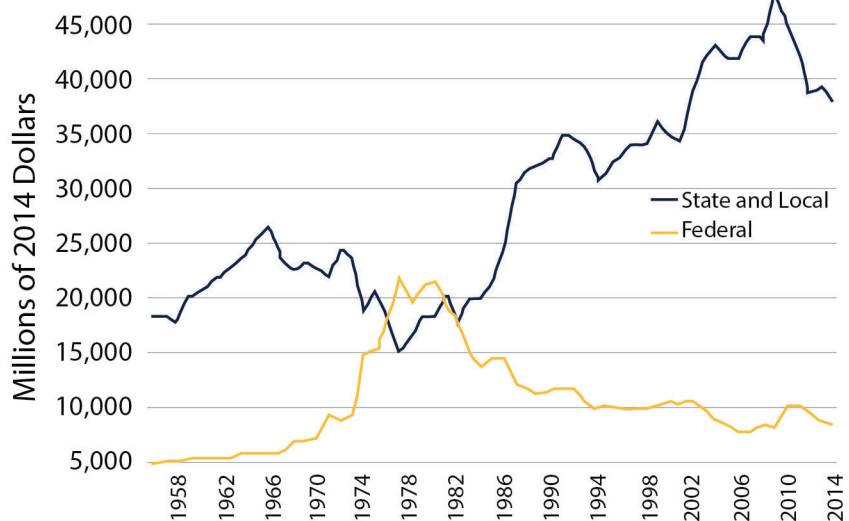
The state is charged with ensuring public welfare, fair regulation and management of water systems, and maintaining the health of Utah's water resources. Every water infrastructure decision the state makes should work towards achieving the following outcomes:

- all Utahns have access to safe and reliable drinking water,
- Utah communities have access to the water resources necessary to meet the public health and economic needs of current and future generations,
- the state's agricultural industry is productive and resilient to drought, and
- water quality is sufficient to protect aquatic life, recreation, agricultural, municipal and industrial uses.

HISTORIC FEDERAL FUNDS

Many of Utah's large water projects such as the Central Utah Project and the Weber Basin Project were funded in part with federal dollars. However, since the 1980s, the federal government has contributed less to the development of water and wastewater capital projects, leaving states and local governments to find different ways to replace federal dollars.

State and local spending on capital projects has increased in part to offset declines in federal spending since the 1980s.



Credit: Utah Foundation
Source: Congressional Budget Office

In order to achieve these outcomes, our state must continue to invest in water infrastructure to meet the needs of future generations. In addition to conservation efforts, the types of water infrastructure projects needed include:

- agricultural irrigation optimization projects,
- agricultural water metering, telemetry, and water measurement tools,
- dam safety projects to meet minimum dam safety standards,
- drinking water system repairs, replacements, and expansions,
- drinking water system expansion to support regionalization of small water systems,
- lead fixture and pipe remediation,
- new water development projects,
- nonpoint source pollution prevention projects,
- pipelines and treatment facilities to facilitate future agricultural to M&I conversion,
- redundant or replacement source water projects for drinking water systems,
- sewerage of growing rural communities that currently rely on septic systems,
- stormwater infrastructure to protect water quality and for flood control,
- source and secondary water metering, telemetry, and water measurement tools,
- seismic retrofits,
- water storage expansion and maintenance,
- wastewater reuse technology,
- wastewater treatment plant upgrades and expansion, and
- watershed and riparian restoration projects.

The Role of the State

Addressing the scale and magnitude of Utah's water infrastructure system needs will require strong state leadership, effective policy decisions, and collaborative partnerships with state, regional, and local water managers. Funding

the maintenance, replacement, redesign, and expansion of Utah's water infrastructure will take a collaborative approach.

The state's large water conservancy and reclamation districts, and municipalities in the state have the responsibility to plan for the current and future needs of the majority of Utah's population. Their ability to fund, collect taxes, charge rates, and issue bonds for future projects gives them the tools to maintain and expand our state's major water infrastructure. These districts will need the state's support in utilizing all the various funding mechanisms available to them as they undertake these large replacement projects.

At the municipal level, cities and towns typically build out their water infrastructure along with new development. Cities that fall within urbanized areas are generally within the service area of a major water district. These communities have the ability to purchase water on the retail market and to participate in water reclamation districts or regional wastewater treatment facilities to meet most of their infrastructure needs. New development can help pay for new infrastructure, but maintaining the existing infrastructure can be a large expense and requires careful planning and financing.

Many of Utah's small, rural communities are not served by the large districts, and instead rely on their own wells, springs, and local water treatment and distribution facilities. Some rural communities are not sewered and rely on septic tanks for wastewater disposal, in some cases threatening the quality and beneficial uses of local water resources. Because of their dispersed geographic locations and the size of these communities, many towns do not have the resources to maintain their local water systems, sewer their communities, or implement updated technology to protect public health and waters. The state has an important role in providing technical and financial assistance to small or rural communities, as necessary improvements

can be cost prohibitive for local governments. At the same time, there is an expectation that small communities do everything they can to contribute to the cost of these projects, which may include increasing rates.

Similar challenges exist for agricultural water systems. Repair and replacement costs are high and very difficult for mutual irrigation companies and irrigation districts, both of which derive their funds from users of the system. Because farmers generally operate on relatively small profit margins, most projects to restore and improve agricultural infrastructure will require funding aid.

The state of Utah has three primary roles in planning for and managing the state's water infrastructure.

1. **Preparing the state for growth.** This includes support of major statewide water conservation and development projects, and drinking water and wastewater regionalization projects.
2. **Protecting and enhancing resources that are of importance to the public.** This includes protecting water quality for all of its beneficial uses which, in addition to drinking and agricultural uses, include riparian and aquatic ecosystems, recreational assets in waters of the state.
3. **Assisting in the development of projects that require the convening and facilitation power of the state.** Examples include projects in which the stakeholders have limited ability to bear the full cost of the necessary investments. Or, where there is no other entity appropriately positioned to facilitate the project, such as those requiring collaboration with other states, native nations, or federal entities.

Water conservancy districts, wastewater reclamation districts, municipal wastewater

facilities, municipal water suppliers and retailers, agricultural districts, and other stakeholders must continue to play a significant role in filling gaps in the state's water infrastructure needs.

Key Policy Issues

Conservation and Water Infrastructure Needs

Utah is one of the driest states in the nation. The last twenty years have produced lower than average precipitation levels, and the 2020-2021 water year was one of the driest on record.⁸ The state and the large water providers were effective in messaging efforts asking Utahns to conserve water in response to the drought, and Utahns responded. According to data collected by DWRe:

- Jordan Valley Water Conservancy District's water deliveries were down nearly 31 percent in August 2021 as compared to the previous year.
- Washington County Water Conservancy District's service area reduced consumption by almost 400 million gallons of water over the 2021 summer as compared to 2020 use, and despite a 5 percent population increase.
- The city of Sandy saved over 1.3 billion gallons of water in 2021 as compared to 2020.
- Salt Lake City Public Utilities water use in the summer of 2021 (July 1 - September 30) was reduced by almost 2.3 million gallons when compared to the average of the previous three years (2018, 2019, 2020).

Conservation must be a prerequisite to all water infrastructure projects. While the need to maintain and replace existing infrastructure persists, conservation efforts can reduce or delay the state's need to expand water infrastructure. The Bear River Water Development project was

originally projected to be needed by 2015, but thanks to increases in both water conservation and efficiency, and despite our population having grown by 500,000, current projections now put the need for this project out to 2050.⁹ The total potential impact of greater water efficiency on delaying or reducing the need for new water development is unknown but could be significant. Conservation efforts can also reduce the size of needed future infrastructure projects, resulting in cost savings.

There are many opportunities to continue to decrease Utah’s per capita water use through conservation efforts at the household, municipal, and regional levels. Tools to encourage conservation include education, incentives for appliance and landscape retrofits, secondary water meters, smart irrigation timers, water rates and pricing, fines and penalties for excessive water use, or restrictions to water only on specific days. Regardless of the mechanism, using less water must be a core goal for all Utahns and must be part of our state’s infrastructure planning conversation.

[Gov. Cox’s FY 23 budget recommendations](#)

include an unprecedented \$200 million investment in secondary meters, on top of \$50 million already authorized, to:

- encourage greater conservation among water users,
- help water managers better understand how much water is being used, and
- implement measurement tools that can ultimately be linked to pricing or regulatory mechanisms to manage use.

Additionally, the governor is working with regional water districts to promote turf removal programs and household appliance retrofits to incentivize Utahns to voluntarily reduce their water usage. The governor has also emphasized the importance of better integrating our land use and water planning to reduce the water used by our cities and towns. The Vibrant Communities chapter addresses these topics in greater detail.

Finally, optimization of our agricultural irrigation systems creates the opportunity for conservation as well. [The governor’s FY 23 budget recommendations include \\$50 million for agricultural optimization, which is in addition to \\$20 million previously allocated to optimization by the legislature](#)¹⁰. This topic is addressed in greater detail in the Productive Agriculture chapter of this plan.

The Relationship Between Water Pricing and Infrastructure Needs

Utah currently has among the lowest water and sewer rates in the nation because our population is located close to high quality water supplies. However, some of the full cost of water at a household or business level may be included within property tax rates, and therefore is less visible to the water user. It has been suggested that a transparent water bill that outlines the full cost of water, and makes water use data more understandable, would encourage conservation and reduce demand.

There is a large body of research that identifies a relationship between user fees and individual consumption behavior for typical commodities. Research by the Utah Foundation found that, “Comparing Utah’s water providers shows that, on average, providers with 10 percent higher rates have 6.5 percent lower water use”.¹¹ Charging higher rates could delay or reduce the need for future infrastructure projects in Utah. Rates should be set based on the true cost of service, which includes maintenance, replacement, renewal, and expansion to accommodate new growth and regulations. However, discussions about increasing water rates raises concerns about equity among those at the lower end of the economic spectrum. One possible solution is block rate pricing, or block rate pricing on a household size basis, to ensure that everyone continues to be able to afford clean water for drinking and household uses. Discussions about equity in rates should be transparent, as should any community decisions to provide subsidies.

Regardless of the mechanisms utilized, reducing water demand can delay or reduce both the cost of water service and the need for future infrastructure investment. However, extensive conservation efforts can create financial challenges for water retailers if rates are held constant. User fees typically comprise the majority of a water retailer's revenue stream—paying not only for operations and maintenance, but also for debt repayment. Water rates are tied to the volume of water used. When more water is used, the water retailer has more financial resources available to fund new projects, make expensive capital repairs, or repay debt. Conservation efforts that significantly reduce the amount of water used, and therefore the total rates paid, could cause financial strain for utilities that must still meet debt obligations. Increases to rates could minimize this concern. This is an issue that water providers will need to address, as robust conservation must be a focus for our state.

The Role of Asset Management

Regular maintenance can extend the life of Utah's water infrastructure. Beyond ongoing, annual operations and maintenance needs, most infrastructure has an engineered lifespan at which time capital replacement is necessary.

Typically, municipalities and irrigation companies build into their revenue streams sufficient funding for water works operation and maintenance, but it is common for these utilities to under-fund their infrastructure replacement (i.e., asset depreciation). Instead, most finance major capital projects for asset expansion and replacement over the engineered lifespan of the asset.¹² Inevitably, financing these projects results in a need for increased revenue (a rate increase), which can be distressful in the community, particularly in smaller communities that have a limited ratepayer base and especially where rates have been kept artificially low through deferred maintenance and capital asset improvement.

One of the challenges the state faces in supporting small and rural water and wastewater systems is to incentivize them to plan long-term investments rather than simply addressing their short-term needs. State programs that offer hardship grants must ensure that water and wastewater systems have access to the technical assistance necessary to evaluate life-cycle alternatives, consider consolidation with other systems when possible, draft asset management plans that will help to make those systems more resilient over the long term, and address infrastructure maintenance in a way that limits reliance on state resources.

Fiscally sound and sustainable management of our vital infrastructure includes full funding for the replacement of our infrastructure as it ages, preferably on an ongoing basis such as under an asset management program. Local governmental utilities may not be aware of their ability to utilize accounting practices that allow for the cost of full capital replacement to be built into annual budgeting.

This practice is currently used by the Utah Department of Transportation (UDOT). According to [Utah's 2020 Comprehensive Annual Financial Report](#),

The state has adopted an allowable alternative to reporting depreciation for state roads and bridges (infrastructure assets) maintained by the Utah Department of Transportation (UDOT). Under this alternative method, referred to as the "modified approach," UDOT must maintain an asset management system and demonstrate that the infrastructure is being preserved at or above established condition levels. Infrastructure assets accounted for under the modified approach are not depreciated, and maintenance and preservation costs are expensed.

The Responsibility for Maintaining Water Quality

Clean water is essential to life, and the public health, security, and welfare of the residents of Utah. It also provides the motive force that drives our economy and supports our growth. The state is responsible for protecting water quality for all of its beneficial uses under delegation from the U.S. Environmental Protection Agency (USEPA). This means protecting the headwaters that are the source of much of our drinking water, our reservoirs and streams that are critical to wildlife, livestock, and recreationists, our groundwater which supplies half of our water in the state, and the unique and fragile attributes of the Great Salt Lake.

As Utah is experiencing great growth and prosperity, we are also faced with greater demands for clean water for all of its uses amid a serious drought and supply concerns. Unlike with water supply, water conservation does not slow the production of waste by communities or pollutants from dispersed sources; waste production increases in proportion to population and its growth.

Treated wastewater also puts a demand on its receiving water, the waters of the state. This demand is attenuated (through dilution) in the receiving waters; treatment effectiveness together with in-stream attenuation is regulated to achieve water quality standards that protect the uses. When the receiving waters decline (less dilution), water quality standards cannot be met without additional treatment, technology and cost. The constant increase in pollutant loads coupled with declining stream flows and reservoir levels is adversely affecting water quality throughout Utah. This increasing pressure on our natural waters contributes to the current impairment, i.e., not meeting water quality standards required to protect its uses, of some 40 percent of the waters across the state.¹³

Utah will not be able to maintain the health of our rivers and lakes with the level of treatment that has served our communities in the past. Utah must make additional improvements to wastewater treatment and stormwater management to protect and improve our water quality into the future. Investing in water quality infrastructure at the time of growth and on an ongoing basis is critical for the lasting health and well being of our communities and toward our successful stewardship of Utah's vital and miraculous natural environment.

Wastewater services and their infrastructure are generally funded by direct users (through fees and taxes) of that infrastructure. What many people do not realize is that in addition to paying to take away their waste, they are also paying to protect the natural waters, often far downstream from their community. And in many cases, someone upstream did them the same valuable service. Hence, the state and the public at large are major benefactors from proper and effective wastewater treatment by each citizen, community, and water user that pays a sewer bill.

Increasing Utah's Water Supply

Finding ways to increase the amount of water available to support a growing population is a primary concern for the state. There are six ways to increase the state's water supply: conservation, agricultural water conversion, increased water storage capacity, water reuse, new water development, and weather modification. All six options require some infrastructure investment and each include elements that raise policy questions.

Conservation

As discussed above, conservation has the potential to make significant amounts of water available for other uses. Infrastructure investments to advance conservation include: secondary meters, diversion telemetry, and agricultural optimization.

Agricultural Conversion

As our state urbanizes there will inevitably be some conversion of agricultural land to development. The water rights associated with these irrigated acres will then become available to support the new growth. An acre of developed land typically uses less water than an acre of agricultural land, which means large-scale agricultural conversion could potentially result in a substantial amount of newly available water for growing communities.

The conversion of agricultural water to municipal and industrial (M&I) uses means that the same water is no longer available to support the state's agriculture. Agriculture is a major contributor to our state's economy and is part of our heritage, landscape, and culture. As our communities grow, there will be an increased demand for food production. The agricultural lands' food production role will become increasingly important over time. Utah must strike the right balance between meeting our cities' future water needs and supporting Utah's agricultural industry.

Water distribution pipelines and treatment facilities will be needed to make agricultural quality water available for M&I consumption. The farther water is transported, the more expensive the water infrastructure needed becomes. As our state's population grows, community leaders must consider directing development to the places where the water already exists. Some of Utah's rural communities are eager to receive new growth and development, while others feel growth is a threat to their community's historic character. Again, Utahns must strive to find the correct balance.

Increased Storage

A third way to increase the availability of water to Utah's growing communities is to increase the amount of water storage capacity in the state. The water stored in Utah's reservoirs during previous wet cycles has made it possible for our communities to stay healthy and beautiful during

the extreme drought conditions of recent years. Utah must be prepared to capture and store as much water (above and below ground) as possible during future wet periods. We can then draw down these reserves in dry periods, and fill them again in more favorable weather. However, given the increasing likelihood of extended droughts, many of these storage facilities may be dry for significant periods of time.

It is possible to expand the storage capacity of many existing reservoirs by increasing the height of the dams or by dredging sediment that has accumulated over time. Opportunities to expand capacity should be considered along with the repair and maintenance of large dams as their useful life spans expire. As these reservoirs have already been set aside for water storage, their expansion may enjoy more public acceptance than proposals for new reservoirs. Expanding existing storage facilities may have additional benefits over new sites, such as a potential for reduced regulatory permitting, being located in proven locations, and expanding existing recreational destinations. Any expanded storage will require associated water rights.

There is the potential for new subsurface and surface water storage on Utah's public lands. Any projects on federal lands or funded with federal dollars will require environmental analysis that can span years. These projects would also result in changes to the landscape and ecosystems and should be considered thoughtfully. Implementation of any new storage projects should align with water conservation efforts and expansion of current storage facilities. Given the uncertainty of Utah water resources and the need to support a growing population, Utah will continue to explore these opportunities to create additional water infrastructure on public lands.

Aquifer storage and recovery (ASR) projects are another opportunity available. In these projects water is seeped or pumped into naturally porous geologic layers underground to be stored until

it is needed in the future. An advantage of this approach is that there is no loss of water to evaporation. These projects are likely to result in less public opposition due to less surface disturbance, and may require less in infrastructure investments. Maintaining the quality of water in our aquifers is critical, however, and these projects too must proceed with caution.

Water Reuse

A fourth option to expand the supply of water available in Utah is to increase water reuse practices. Most large water sewer systems already meet the water quality requirements for some irrigation and industrial uses, but the infrastructure to deliver this treated water to a future economic use does not currently exist. Treatment of sewer system effluent could be further increased to a level at which water could be safely reused for higher purposes, including drinking water uses. Infrastructure investments to implement this concept would include investments in water treatment technology and a delivery system to transport the recycled water to its next use.

An important concern in northern Utah is that reusing wastewater will result in less water being returned to Utah's natural water bodies. This example comes up most frequently in the context of Utah Lake, the Jordan River, and the Great Salt Lake, as much of the water in these water bodies is treated sewer effluent. Reusing this water would change the current flow of water. However, the reuse of treated water would also reduce the need to divert fresh water from our rivers and streams upstream. Diverting less water from the natural system would potentially leave more, and cleaner, water to flow naturally throughout the system. More research is needed to determine the actual impacts of such a water reuse project. Additionally, the state water agencies should coordinate on updates to policies and regulations governing water reuse.

Weather Modification

Finally, technologies to modify the weather, such as cloud seeding, can tap into atmospheric water "reservoirs." In 1973, the Utah Legislature passed the [Modification of Weather Act](#), authorizing DWR to manage a cloud seeding program. In 2015, DWR completed a study that indicated an increase of 3-17 percent Snow Water Equivalent (SWE) in cloud seeding areas. This resulted in an average annual increase in runoff of nearly 186,700 acre-feet at a cost of \$2.20 per acre-foot, making this a valuable and economical tool.¹⁴ In the recently published [Water Resources Plan](#), DWR listed a goal to, "Identify areas that would benefit from water modification (cloud seeding) enhancement." However, weather modification at a large scale may spur interstate discussions and environmental analyses of the impact of modifying atmospheric conditions.

New Water Development

The legislature has directed the state agencies through state code ([Utah Code §73-28-101/105; 201/203; 301/302; 401/405](#) and [§73-26-102/107; 201/203; 301/302; 01/404; 01/507](#)) to continue to explore opportunities to further develop and transport water to growing population centers. Again, conservation must be a prerequisite to any new water infrastructure project as reducing water demand has the ability to delay the need for these projects.

Utah's Water Infrastructure Need

The scale of Utah's needs for water infrastructure maintenance, replacement, redesign, and expansion may take generations to address. Large water projects can require as much as 30-year lead times from identification of need to delivery of water. Utah must ensure that infrastructure investments simultaneously realize both water and financial efficiencies and utilize the most cost-effective approaches for the benefits produced.¹⁵ Fortunately, we are in a time when Utah has potential to access significant, yet one-time, federal resources, which Utah can use to leverage our own resources and maximize impact.

A number of studies and publications have been produced attempting to estimate the cost of outstanding water infrastructure needs. These include:

- Utah Department of Agriculture, *2021 Annual Report: Utah Agricultural Water Optimization Task Force*,
- Utah Division of Water Resources, *2021 Dam Safety and Repair List*,
- Utah Division of Drinking Water, *2021 Drinking Water Infrastructure Survey*,
- Utah Seismic Safety Commission, *Improving Resilience in Utah's Lifeline Infrastructure*,
- Prepare 60 Partnership, *2021 State Water Infrastructure Plan*, and
- Reclaim 60 Partnership, *2019 State Wastewater Infrastructure Plan*.

These publications have estimated many billions in repair and replacement and new infrastructure needs over the next 50 years.

Funding Water Infrastructure **Funding Mechanisms**

Water infrastructure projects are funded through several mechanisms including municipal bonding, user rates, impact fees, property taxes, and state and federal loans and grants. Most large municipalities and water districts pay for their needs with a combination of user rates and municipal bonds. Small towns and districts often require state supported, low-interest loans and grants.

Identifying the best mechanism for funding water infrastructure projects is project dependent and often involves a combination of different funding tools, each with their own benefits and limitations. Available tools include:

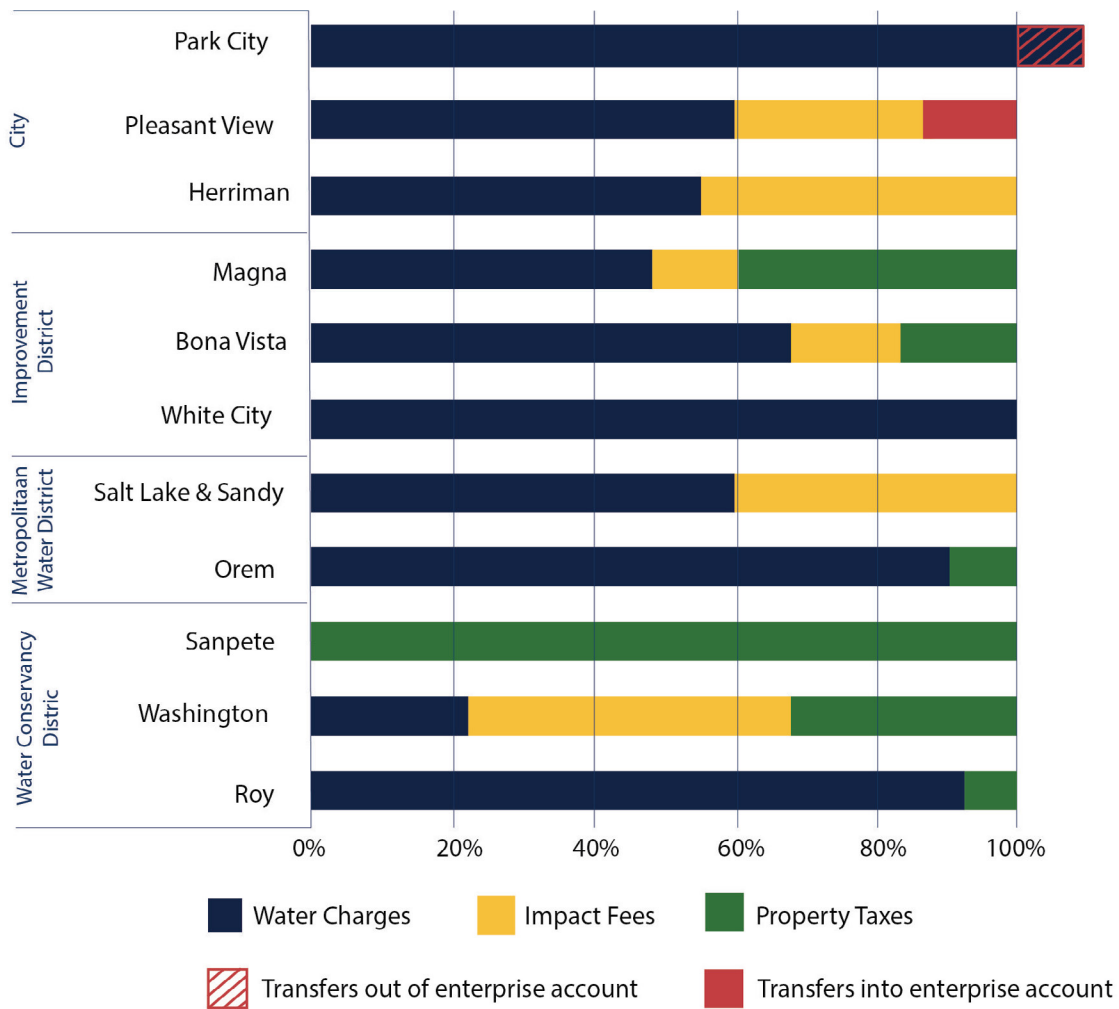
- **Federal Grants** - Federal funding is useful for large scale projects. These funds come with federal restrictions such as National Environmental Policy Act analyses, Buy America requirements, etc., which can all increase project costs.

- **State Revolving Loans** - Projects funded with state revolving loans will be repaid to the state by local governments, allowing those dollars to be reinvested again and again. However, this tool requires local governments to have a revenue stream to be able to repay the loan.
- **State Grants** - Grants to local governments are useful in supporting small projects when the local government does not have the ability to repay a loan. Because these are grants, the funding is one-time, limited, and unavailable to revolve over time.
- **Impact Fees** – An impact fee is a one-time charge that local governments can impose to mitigate the impact on local infrastructure that new development causes. Charging impact fees to new developments can help fund public facility expansions or enlargements to maintain the same level and quality of public services for current and future residents. This is an important tool for local governments to fund necessary expansions and new capacity. However, impact fees are not available to maintain existing infrastructure. Additionally, there can be questions of fairness and proportionality associated with impact fees, both in how they are charged and how they are used. The [Impact Fees Act](#) provides uniformity and predictability to the process.
- **Water and Sewer User Fees** - Water providers can charge water users fees in the form of rates to cover the cost of water or sewer service. Culinary water providers are required by state law to have a tiered rate structure, in which rates increase with volume used. Many cities have incorporated the graduated rate approach into their sewer rates as well,

but the majority of sewer rates use a flat rate structure. Rates typically cover only ongoing operations and maintenance of the water system and are not used to fund new infrastructure. However, rates can be used to support ongoing renewal (replacement) of existing infrastructure and capacity.

- Bonding** - Local governments and water providers with sufficient credit can issue bonds, backed by either property tax or water rates, to finance larger water infrastructure projects. Revenue bonds, or bonds backed by current revenue streams, can be issued by the bonding entity at their discretion. General Obligation bonds, or bonds backed by new revenue streams (i.e., a new tax), must be approved by voters. Bonding is considered a pay-as-you-go strategy.

WATER PROVIDERS SHARE OF REVENUE, 2014-2017



Credit: Utah Foundation

Source: Utah Foundation calculations based on water district financial reports posted on the Utah State Auditor's website, 2014-2017.

- **Property and Sales Tax** - Many water providers utilize property taxes as a source of revenue to fund water service operations and maintenance. Property taxes can also be used to back revenue bonds. Sales tax revenue can be used similarly.

Addressing the scale of Utah’s infrastructure needs will require a multi-pronged approach with participation at all levels of government. In general, the state of Utah’s approach is to:

- maintain its strong bond rating to ensure access to financing tools,
- revolve state funds sustainably to ensure access to low cost financing,
- maximize the use and leveraging of federal funds,
- assist local governments in planning for and fully funding renewal and replacement of existing and aging infrastructure, e.g., life cycle and consolidation analyses, and asset management planning,
- provide state grants to projects meeting judicious prioritization and sequencing criteria,
- help local governments achieve and maintain high bond ratings,
- support regional and municipal water managers in implementing bonding and rate increases, and
- support local governments in charging impact fees.

Existing State and Federal Funding

Current, ongoing state funding for water infrastructure programs is largely derived from revenues from a one-eighth percent sales tax.¹⁶ These revenues vary based on tax receipts and in Fiscal Year 2021 (FY 21) contributed \$82 million in available funding for revolving loans and limited grants.¹⁷ Due to the revolving nature of these funds, loan repayments and interest return to these funds and become available for future investments. Additionally,

the [Permanent Community Impact Fund Board](#) (CIB) has contributed significant funding for water infrastructure to communities that are impacted by mineral resource development on federal lands. While the CIB does not have a specific amount allocated to water projects, the Board has allocated an average of \$23 million a year over the past ten years.

Federal funding through the USEPA also provides approximately \$11 million in federal drinking water revolving grant and loan funds and \$8.4 million in wastewater revolving grant and loan funds each year. In addition to these annual amounts, Utah is receiving historic one-time funding through the American Rescue Plan Act (ARPA) Coronavirus State Fiscal Recovery Fund and the Investing in Infrastructure and Jobs Act (IIJA). Based on current estimates and the governor’s proposed use of these funds (detailed below), approximately \$1 billion from these sources could be invested in water-related uses over the next five years.

ARPA COVID-19 Local Assistance Matching Grant Program (2021 Awards):

\$34 million - Water and sewer projects (\$50 million was appropriated for various ARPA eligible categories. Water and sewer projects comprised approximately 68 percent of the funded projects.)

Additionally, Gov. Cox has recommended an additional \$100 million for the COVID-19 Local Assistance Matching Grant Program which could fund additional water projects if appropriated by the Legislature.

ARPA First Tranche May 2021 Appropriation

- \$50 million Secondary Metering
- \$25 million Drinking Water
- \$20 million Agricultural Optimization
- \$5 million Great Salt Lake

\$100 million Total

Gov. Cox FY 22/23 Recommendations for ARPA

\$200 million	Secondary Metering
\$75 million	Drinking Water
\$50 million	Agricultural Optimization
\$45 million	Great Salt Lake
\$25 million	Utah Lake
\$5 million	Southern Utah Water Reuse
\$400 million	Total

IIJA (Estimated FY23-FY28)

\$50 million	Completion of Central Utah Project
\$93 million	Clean Water Revolving Fund
\$305 million	Drinking Water Revolving Fund
\$448 million	Total

Additional federal funding has been allocated to water infrastructure projects and wildfire mitigation and post-disaster recovery across the nation, but has yet to be distributed to the states. Some of these funds may be direct contributions to states, while others may be allocated through competitive processes.

Finally, the Inflation Reduction Act (IRA) allocates \$4 billion in drought mitigation funds to western states. Specific state allocations have yet to be announced.

SUMMARY OF UTAH'S WATER FINANCIAL ASSISTANCE FUNDS

Fund (Authorizing Body)	Eligibility		Loan Terms					Financials			Year of Inception	# Recipients since Inception	Total Assistance since Inception
	Project Type	Applicants	Interest Rate	Criteria Considered	Affordability Consideration	Loan Conditions	Water Conservation	Current Funding Capacity	Annual Funding Sources	Notes			
Clean Water State Revolving Fund (Water Quality Board, DEQ)	Wastewater and storm water infrastructure with a water quality nexus. Non-Point Source Projects	Municipalities and Water Districts	Varies (0-2.5%) + grant in cases of hardship	Public health, water quality impact, affordability, applicant contribution	Economic hardship (sewer rate > 1.4% of local MAGI); poverty level; unemployment; trends	Asset management plan; Water Conservation Plan	Water Conservation Plan; interest rate reductions for "green" projects	\$5 million/year through 2023	Federal grants: ~\$8 million/year; State sales tax: \$3.6 million/year; Loan Repayments; Interest	Governed by Title 19-5-104 and 11-8-2 NPS also governed by 73-10-4,5	1972	670	\$ 1,442,000,000
Drinking Water State Revolving Fund (Drinking Water Board, DEQ)	Drinking water infrastructure and associated engineering/planning	Public water systems (Municipalities, Special Service Districts and private water companies)	Varies (0%-2.3%). Reduction of municipal rate based on affordability and other financial considerations	Public health, affordability, regionalization, cost effectiveness and applicant contribution	Monthly water rate > 1.75% of local MAGI or a local MAGI < 80% of statewide MAGI	A plan to address documented deficiencies on the Improvement Priority System (IPS) report	An approved Water Conservation Plan as required by DWRe must be completed	\$15 million	Federal grants: ~\$9 million/year; State sales tax: \$3.6 million/year; Loan repayments; Interest		1984	662	\$ 501,125,000
Water Resources Revolving Construction Fund, Conservation and Development Fund and Cities Water Loan Fund (Water Resources Board, DNR)	Water development, conservation, and irrigation	Irrigation companies, water municipalities, water districts, special service districts and Indian tribes	Private water company projects < \$1M at 0%; Ag projects > \$1M at 1%; Municipal projects at 0% - 3+%	Public health & safety, benefit-cost ratio, affordability	Municipalities with monthly water cost > 1.4% of local MAGI, if local MAGI < 80% of statewide MAGI, eligible for lower interest rate	Agricultural projects, Water Conservation Plan, Municipal projects, Water Conservation Plan, watering ordinance, tiered water rate structure	An approved Water Conservation Plan	~\$89 million	\$7.175 million + ~38% of 1/16% of state sales tax; Loan Repayments	Governed by Title 73-10	1947	1,501	\$ 920,000,000
Water Infrastructure Restricted Account	Bear River and Colorado River Water Development; Repair/replacement of federal water projects	Water Districts	TBD	As established by the Utah Legislature	NA	TBD	NA	~\$30 million	1/16% of state sales tax *Full 1/16 not available until 2021	Governed by Title 73-10g			
FY2022 Permanent Community Impact Fund Board	Planning, construction and maintenance of public facilities, and provision of public services including water and wastewater in impacted communities.	Countries and municipalities impacted by mineral resource development on federal lands	An established funding tool provides funding scenarios. Outside the scenario, developments are required. Interest rates 0-2.125% Intermediate: 1.750%; Poverty: 1.25%	Project need; Funding options; Producing counties; Area impacted by mineral resource development; Public benefit	Base affordability for water and sewer projects DWQ and DDW criteria. Annual Budget, Location	Planning, study or design requests require a 50% local cash contribution. Plan review by state agencies	N/A	Loan funding \$70 Million; Grant Funding currently limited	Mineral lease payments; Resource development payments; Loan repayments.	Governed by Statute: 35A-8-3 UAC R990-8	1979		
USDA Rural Development Water & Wastewater	Funds may be used to finance the acquisition, construction or improvement of drinking water, sewer, solid waste, and storm water	Communities <10,000 population	Standard: 2.125% Intermediate: 1.750%; Poverty: 1.25%	Projects that conserve soil, water, product protection, New technology, Emergency Disasters	Yes	Public purpose; Financially sustainable; Legal authority to operate the utility	NA	\$13 million; Local allocation	Federal Grant	7 CFR, Part 1780 and 1782, Section 306 of Consolidated Farm and Rural Development Act	1976 2017 2020	3,224	\$ 389,000,000 \$ 438,915,680
Agricultural Resource Development Loan (Utah Conservation Commission)	Agricultural Products including irrigation	Farmers, Ranchers, Small Agricultural Business and Irrigation Companies	2.5%-3% depending on loan amount	Projects that conserve soil, water, product protection, New technology, Emergency Disasters	Base on credit analysis and other loan criteria	Plans approved with technical assistance planners from UDAF and NRCS on expert designers; NRCS Guidelines for approved conservation practices	All water conservation plans are designed to conserve water or manage water usage by technical planners	\$6.153 million	\$525,000 of state sales tax; Loan repayments	Governed by Title 4-18-105 Rule 64-1-1-8			

SUMMARY OF UTAH'S WATER FINANCIAL ASSISTANCE FUNDS													
Fund (Authorizing Body)	Eligibility		Loan Terms				Financials			Notes	Year of Inception	# Recipients since Inception	Total Assistance since Inception
	Project Type	Applicants	Interest Rate	Criteria Considered	Affordability Consideration	Loan Conditions	Water Conservation	Current Funding Capacity	Annual Funding Sources				
Agricultural Optimization Program/Legislative Appropriations to Utah Department of Agriculture and Food (UDAF)	Water Optimization Grant	Agriculture producers, irrigation companies, water conservancy districts (funding only for agriculture, no secondary water projects)	NA	Water savings, water quality benefit, cost, metering, etc.	NA	NA	10% water savings, measured on both CFS or acre feet bases	2 funding cycles of \$3 million (2019, 2022)	Legislative Appropriations	2022-81 applications totaling \$10,666,142 in requests; \$3,200,000 available for projects;			
Water Infrastructure Finance and Innovation Act	Wastewater, drinking water projects >\$20 million		US Treasury Rate					\$6 billion nationwide	Fedreg Grant (Leveraged)				

Funding Gap

Utah is fortunate to have a generational opportunity for consequential, one-time investments from the federal government through IIJA and ARPA. However, the current backlog of projects, aging infrastructure, a changing climate, and a growing population will necessitate further investments in the state's existing water infrastructure. With the potential for many billions in water infrastructure needs over the next 40 years, the millions of dollars being invested today fall short—even with significant conservation efforts.

The financial responsibility to address these water infrastructure needs falls to many stakeholders. Water conservancy districts, wastewater reclamation districts, municipal water suppliers and retailers, and individual water users must all continue to play a significant role in filling gaps in the state's water infrastructure needs. The state must also work with the federal government to ensure that it continues to provide ongoing funding and does not deinvest in water infrastructure funding in the future.

The state's contributions to local water, sewer, and agricultural optimization projects typically fund only a portion of the total cost of a project, with significant matching contributions coming from local or private sources. Historically, the Division of Water Quality (DWQ) has typically funded between 25-33 percent of the total value of wastewater infrastructure projects in the state using revolving loans or grants. Every dollar contributed by UDAF's agriculture water optimization program in the 2019 funding cycle, has been leveraged into \$5.77 in matching contributions.¹⁸

Over the past five years the Drinking Water Board, through the Drinking Water State Revolving Fund financial assistance program, has provided over \$157 million to the state's drinking water systems for infrastructure construction and improvement projects.

The 2021 Drinking Water Infrastructure Survey identified an additional \$1.8 billion in infrastructure needs over the next few years.

Action Plan

Previous water planning efforts have identified over 200 unique recommendations to better secure Utah's water future. The intent of this report is to identify specific actions that Utah's executive branch can undertake immediately to help move some of these many recommendations forward.

The state has identified five key priority actions, and associated implementation steps, to address Utah's water infrastructure needs.

ACTION 1 Create a framework to assist local governments and agricultural water providers in data collection and analysis, prioritization of needs, access to funding, and asset management planning.

ACTION 2 Develop a series of needs assessments for local-scale water systems across the state, including both municipal and agricultural systems.

ACTION 3 Continue to be a matching partner in funding the state's water infrastructure needs as the state grows, and assess the evaluation criteria to ensure these state grant and loan programs are advancing the state's priorities, including conservation.

ACTION 4 Streamline project approvals, rules, and regulations to encourage innovation in Utah's water management such as aquifer storage and recovery (ASR), water reuse, desalinization, green infrastructure, new storage, and public-private partnerships.

ACTION 5 Invest in research, data collection, and operator training to ensure the state's water infrastructure benefits from the most accurate information and best practices.

ACTION

1

Create a framework to assist local governments and agricultural water providers in data collection and analysis, prioritization of needs, access to funding, and asset management planning.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Identify the resources available within state agencies to assist local governments and agricultural water providers.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner, GOPB Executive Director	DWRi, DWRe, DWR, DDW, DWQ, PLPCO, UDAF, Utah Conservation Commission, Water Development Coordinating Council, State Planning Coordinator (GOPB)	2023	Existing staff time	Comprehensive inventory of existing resources completed
Compile available technical assistance and data resources in a format that is comprehensive and easy for both state agencies and local stakeholders to access.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner, GOPB Executive Director	DWRi, DWRe, DWR, DDW, DWQ, PLPCO, UDAF, Utah Conservation Commission, Water Development Coordinating Council, State Planning Coordinator (GOPB)	2023	Existing staff time, software, and printing	Published resource website, database, or document
Promote the availability of these resources to stakeholders through regional watershed councils, task force/advisory council meetings, water user associations, conferences, etc..	DNR Executive Director, DEQ Executive Director, UDAF Commissioner, GOPB Executive Director	DWRi, DWRe, DWR, DDW, DWQ, PLPCO, UDAF, Utah Conservation Commission, Water Development Coordinating Council, State Planning Coordinator (GOPB)	2023	Existing staff time, printing, travel costs	Documented list of outreach activities
Identify communities or agricultural water systems that could benefit from a needs assessment.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF	2023	Existing staff time, travel costs	Inventory of systems completed

ACTION 2 Develop a series of needs assessments for local-scale water systems across the state, including both municipal and agricultural systems.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Identify communities or agricultural water systems that could benefit from a needs assessment.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF	2023	Existing staff time, travel costs	Inventory of systems completed
Develop a process and template for conducting needs assessments, and compile existing system master planning information. Needs assessment should estimate the needed investment from state/ federal resources and what can be financed locally.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF	2023	Existing staff time	Project proposal to support budgeting process and agreed-upon process and template to ensure consistency in assessments and the ability to make fair comparisons of needs across the state
As needed and dependent upon available resources, develop budget request for statewide water infrastructure needs assessment.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, GOPB	2023	Existing staff time	Budget request submitted to GOPB

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Complete the decennial Clean Water Needs Survey, prepare for the next federal Drinking Water Needs Assessment, and undertake individual needs assessments for agricultural systems.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF	2022: Clean Water Needs Survey 2022: Agricultural Assessments 2025: Drinking Water Needs Assessment	May need \$10,000 - \$450,000 per assessment depending on size, complexity, and location, dedicated staff time, contracted assistance	Individual needs assessments completed, 90 percent of communities or utilities respond to surveys, survey results (needs as \$ and service capacity) are publicly available statewide infrastructure planning and analysis.
Utilize needs assessment to drive future investments, technical assistance efforts, and state decision making.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, Water Resources Board, Water Quality Board, Drinking Water Board, Utah Conservation Commission	Ongoing	Existing staff time, existing state grant and loan programs	Projects identified in needs assessment are prioritized for implementation and eligibility for state grants/loans

ACTION

3

Continue to be a matching partner in funding the state’s water infrastructure needs as the state grows, and assess the evaluation criteria to ensure these state grant and loan programs are advancing the state’s priorities, including conservation.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Review state program evaluation criteria to determine if the programs are adequately advancing the state’s priorities.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, Water Resources Board, Water Quality Board, Drinking Water Board, Utah Conservation Commission, State Planning Coordinator (GOPB)	2023	Existing staff time	Assessment of evaluation criteria and recommendations for updates as needed
Update state program evaluation criteria to better reflect current priorities, if determined to be needed.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, Water Resources Board, Water Quality Board, Drinking Water Board, Utah Conservation Commission, State Planning Coordinator (GOPB)	2023	Existing staff time	Approved, updated evaluation criteria
As needed and dependent upon available resources, develop budget requests for state grant and loan programs to maintain strong state support in water infrastructure development.	GOPB Executive Director, DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, Water Resources Board, Water Quality Board, Drinking Water Board, Utah Conservation Commission, GOPB analysts	Review annually as part of budget cycle	Existing staff time	Budget request submitted to GOPB

ACTION 4 Streamline project approvals, rules, and regulations to encourage innovation in Utah's water management such as aquifer storage and recovery (ASR), water reuse, desalinization, green infrastructure, new storage, and public-private partnerships.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Assess the state's current rules and regulations guiding the above areas of water infrastructure and innovation and identify opportunities for streamlining.	GOPB Executive Director, DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, State Planning Coordinator (GOPB)	2023	Existing staff time	Preliminary list of opportunities for revision
Convene stakeholder working groups by topic to draft new regulation proposals and develop solutions to barriers.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, Water Task Force, key stakeholders, Watershed Councils	2023	Existing staff time	Working groups meeting and producing draft solutions
Propose new regulatory framework to state government leadership.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, Working group chair(s)	2023	Existing staff time	Draft regulatory framework presented to Water Task Force, Drinking Water Board, Water Quality Board, Utah Conservation Commission
Adoption of revised statute or rules.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, State Legislature, Water Quality Board, Drinking Water Board, Water Task Force	2024	Existing staff time	New rules or statute in effect

ACTION 5

Invest in research, data collection, and operator training to ensure the state's water infrastructure benefits from the most accurate information and best practices.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Develop a prioritized list of data collection, research, and training needs within each agency.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, PLPCO	2023	Existing staff time	A prioritized list of research, data and training needs developed
As needed and dependent upon available resources, develop budget request(s) for specific research, education, and training projects.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, PLPCO	2023	Existing staff time	Budget request submitted to GOPB
As resources allow, conduct the data collection, research or training efforts.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRi, DWRe, DDW, DWQ, UDAF, PLPCO	Ongoing	Existing staff time	Research projects initiated, data collected, training implemented

Vibrant Communities

Released April 2022





2 Vibrant Communities

Utah is committed to using our existing water supply as wisely as possible, reducing the amount of water used in our communities, and ensuring the continued vibrancy, success, and growth of the state's cities and towns.

Introduction

Utah's enviable economic success and unmatched quality of life have not gone unnoticed. Year after year, Utah continues to be one of the fastest-growing states in the nation.¹⁹ While this growth expands economic and cultural opportunities, it also requires thoughtful planning to ensure wise use of limited natural resources. No natural resource has shaped development in Utah more than water. While modern water storage and delivery systems have allowed our state to develop and thrive in a semi-arid climate, continued efforts will be needed to ensure adequate supplies of high-quality water for municipal, agricultural, recreational, wildlife, and commercial uses.

Just as water shaped settlement patterns throughout our state's history, water continues to play a critical role in shaping the vitality and vibrancy of our communities today. Vibrant communities thrive on access to jobs, recreational opportunities, diverse housing options, and supporting an economically healthy agriculture sector. Water quantity and quality are

foundational to enabling the continued livability of our communities.

Maintaining vibrant communities will require a holistic approach to water management. This includes conserving, managing, and becoming more efficient with our existing supplies, developing new water supplies, optimizing agricultural water, innovating water rights agreements that benefit both agriculture and the environment, integrating water with land use planning and development standards, ensuring there is adequate drinking water capacity, implementing stormwater management, ensuring fiscal sustainability while maintaining infrastructure, setting optimal water rates, and considering downstream users and water quality impacts.

Utah's rapid population growth is expected to continue for the foreseeable future;²⁰ however, the amount of water available to supply that growth is limited. Just as we owe much of our prosperity to the investments and efforts of past generations, proactive planning and strategic

investments will allow us to prepare for growth in a way that maintains and amplifies attractive communities, economic growth and opportunities for all, abundant recreation, and strong ecosystems.

State Priorities

The state has an interest in facilitating livable and beautiful communities. Facilitating this vibrancy requires that we manage and plan our water systems in a way that supports:

- Economic opportunities for all
- Attractive, livable communities
- Clean drinking water
- Water-based recreation
- Healthy ecosystems and waterways
- Thriving agriculture

To achieve these outcomes in Utah's semi-arid climate, purposeful coordination and strategic investments must be made. Utah must:

- **Integrate land use planning and water planning.** While it may have been possible in the past for land use planning to occur separately from water planning, future land use decisions must take water into consideration. DWR is currently working with The Babbitt Center for Land and Water Policy at the Lincoln Land Use Institute to find ways to more fully integrate water and land use planning in Utah. In 2021, the legislature approved \$270,000 to fund this effort.

The design and density of our communities impacts the amount of water and infrastructure needed for landscaping and residential uses. Considering water use and infrastructure costs in planning and designing our cities can save water, land, and investment dollars. This will make water system management more efficient and cost-effective.

While local governments have the primary responsibility for directing local land use decisions, state law establishes certain elements that must be included as part of a community's general plan. With the passage of [SB 110, Water as Part of General Plan \(M. McKell\)](#), in the 2022 General Legislative Session, counties and municipalities are now required to include a water use and preservation element as well as identifying drinking water source and storage capacity in their general plan.

- **Harness market mechanisms to promote optimal economic growth and decision-making.** Communities should consider how the economic factors of supply, demand, and price impact the allocation of water as a scarce resource across agriculture, households, firms, recreation outlets, and other uses. If a community's economic development strategy is not integrated with these foundational principles of market structures, achieving positive, robust, and durable economic outcomes will be challenging.
- **Invest in conservation programs such as secondary water metering, turf removal programs, smart irrigation timers, and plumbing fixture rebates.** The state has set a goal to reduce per capita water use by 25 percent by 2025.²¹ The state has also developed regional water conservation goals that call for additional water conservation beyond 2025.²² Recent legislation requires water suppliers to incorporate these regional goals into their Water Conservation Plans ([SB 89, Water Amendments \(J. Iwamoto\)](#)). To support the achievement of these goals, policies and incentives must be implemented across the state to ensure wise use of our water resources. Unprecedented state funding has been

allocated to these efforts in recent years—including \$250 million for secondary meter installation, \$5 million for turf removal efforts, and \$5.25 million for water-saving devices. The state collaborates with water conservancy districts and other local governments to leverage this funding. Water is a finite resource in Utah. We have a shared responsibility to manage it wisely to enable continued growth.

- **Recognize the importance of water in outdoor recreation and wildlife management and align goals and resources accordingly.** Participation in outdoor recreation has grown significantly in recent years and represents an increasingly important economic sector. Many outdoor activities are water-based or enhanced by the presence of water. In addition to fishers, boaters, and swimmers, waterways draw joggers, bikers, and wildlife watchers—contributing to a community’s vibrancy while also providing an urban sanctuary. As Utah’s population grows and becomes increasingly urbanized, close-to-home recreational opportunities will become increasingly important in our communities. Riparian areas are often ideal areas for trails and parks while also offering prime wildlife habitats and migration corridors. Additionally, public-private partnerships, such as the Division of Wildlife Resources’ (DWR) [Walk-In Access](#) and [Community Fisheries](#) programs or conservation easement funding through the [LeRay McAllister Critical Lands Conservation Program](#), can provide win-win opportunities that incentivize communities and landowners to maintain working agriculture, open spaces, and recreational opportunities that also serve as wildlife habitat and flood plains in proximity to our growing urban and rural communities.

- **Rehabilitate urban waterways.** Urban waterways can provide a unique amenity that improves quality of life, spurs economic development and urban renewal, and encourages outdoor recreation. Unfortunately, many of our urban waterways have been subjected to years of neglect. Communities throughout the state have demonstrated the benefits of urban stream restoration. Ogden City, in collaboration with DWR and others, invested significant resources into the Ogden River Restoration Project. The effort removed more than 6,000 tons of recyclable debris, 9,000 tons of trash, 7 automobiles, 2,500 tires, and 200 batteries from the river and floodplain.²³ Additionally, the city’s innovative efforts improved fish habitat, provided flood control, and expanded active transportation opportunities. The Ogden River is now a crucial asset in revitalizing Ogden’s downtown and attracting businesses and residents alike.
- **Provide state leadership through education and training resources to highlight and share best practices, policies, and plans that have proven successful in improving water management in our state.** The state can assist local governments, individuals, and businesses in minimizing their water consumption. These resources may include case studies or model plans and ordinances.
- **Innovate new technologies to protect our water quality.** As population grows and water supplies decline, it will be necessary to improve and increase wastewater treatment to maintain current water quality. Improving the quality of water beyond current levels will take a deliberate investment of resources and focus, but will result in clean and attractive

communities, recreational areas, and ecosystems.

- **Recognize the importance of water in the agricultural industry and align goals and resources accordingly.** Agriculture, or the production of food, fiber, and resources, is an essential industry that makes our modern economy and life possible. The farming and ranching lifestyle is an iconic aspect of Utah’s heritage and continues to play an important role in many Utah communities. As Utah’s population grows, the state and local communities must work to balance decisions about land and water use to ensure we meet both our agricultural production and future drinking water needs. A critical component of this will be continued agricultural optimization efforts to reduce the consumptive use of water.

The Role of the State

While many of the decisions that impact planning, development, and water use happen at the local government level, effective management and use of water resources takes collaboration across all levels of government and the private sector. Each entity has a role to play in creating vibrant and resilient communities.

The state of Utah has identified three primary roles in planning for and ensuring the continued vibrancy of the state’s communities.

1. **Preparing the state for growth.** To support vibrant communities, Utah must prepare statewide and basin-level water resource planning, and the establishment of conservation goals. All communities must have access to safe and reliable drinking water. A common misconception is that to support the increasing demand for municipal and industrial water in Utah, we must shrink our state’s agricultural sector. This is a false choice. By continuing

to fund agriculture water optimization projects that result in reduced consumptive use, we can meet both farm and non-farm water needs in Utah. In some instances, optimizing agricultural water use may create the opportunity for this water to become available for municipal or other uses.

2. **Protecting and enhancing resources that are of importance to the public.** Cities and towns must understand their quantity of water and maintain water quality for a wide range of beneficial uses including agricultural uses, recreation, drinking water, and aquatic wildlife. While water in Utah is public, a regulated system of water rights governs the use of this public resource. As part of its statutory mandate, the Division of Water Rights (DWRi) maintains a publicly available [central repository](#) for all rights to the use of Utah’s water. Administrative supervision of water rights protects resources and provides order and certainty of use.
3. **Assisting in the development of projects that require the convening and facilitation power of the state.** Since political boundaries do not align with watersheds, water management requires significant regional and statewide coordination and cooperation. The state can play a convening role and provide forums for stakeholder engagement. For instance, [HB 166, Watershed Councils \(T. Hawkes\)](#), created a statewide watershed council and the opportunity for 12 basin councils. While these councils have no regulatory or enforcement authority, they can play a valuable role in bringing together balanced stakeholders to tailor solutions to the unique needs of our state and its distinct regions.

This facilitating role can also include water conservation education, development of technical assistance tools, promotion of best practices, discussion forums, or assistance in developing ordinances, source protection plans, or infrastructure reviews. It also means setting an example for Utah communities to follow, such as implementing low water use landscaping at state facilities. DWRe’s [irrigation guide](#) can provide region-specific information on the amount of irrigation needed for parks and other landscaping. State assistance is particularly beneficial in small communities with limited staffing. The state can play a supportive role to businesses, homeowners, and individuals by providing education and financial incentives that enable wise water use in each of our communities.

Conservation

Meeting the water needs of a growing Utah depends on every Utahn making a concerted effort to conserve water. Meaningful conservation actions can occur at the state, regional, local, neighborhood, business, and household levels.

Conservation at the State Level

Conservation at a state level includes investing state resources into conservation programs and water-saving infrastructure and providing leadership.

- **Resources** - The state has played an active role in assisting homeowners with conserving water. The [Utah Water Savers](#) program—in cooperation with Utah’s water conservancy districts—offers financial incentives and rebates for homeowners who install water-efficient plumbing fixtures or purchase smart irrigation timers. The legislature appropriated \$5 million during the 2022 General Session to reimburse homeowners, business owners, and institutional water users

who replace all or part of their turf with drought-resistant plants through [HB 121, Water Conservation Modifications \(R. Spendlove\)](#). The [Flip Your Strip](#) program, which incentivizes residents to remove turf from their park strip (the area that lies between the sidewalk and the street) can save anywhere from 5,000 to 8,000 gallons of water per year.²⁴ The state will earmark over \$100 million in FY2022 in state collected general sales taxes to support various water programs and projects.

The [Slow the Flow](#) campaign, a partnership between the DWRe and the state’s large water conservation districts was initiated nearly 20 years ago. It has been successful in educating Utah residents on ways to reduce their individual and household water consumption. In addition to providing targeted conservation messaging through regular and seasonal advertising, the program offers a lawn watering guide, tips for reducing internal and external water use, information about rebate programs, and more.

- In addition, DWRe is in the process of developing a program to advance the integration of water and land use planning. Phase I of the effort produced the [“Integrated Water and Land Use Planning Assessment Framework”](#). Phase 2 will focus on collaborative approaches and practical application efforts as demonstrated in pilot cases by municipalities, counties, and other stakeholders.
- **Infrastructure Investments** - The state has invested \$250 million to accelerate the installation of secondary water meters to measure non-potable irrigation water to protect drinking water supplies.

Based on analysis from the Weber Basin Water Conservancy District, there was a reduction of 22-40 percent in water use when secondary meters were installed on residential connections.²⁵

- **Leadership** - As the third-largest statewide employer and the second-largest land manager, managing more than 10 percent of the state's land area, the state government has an important role to play in many communities throughout the state.²⁶ Residents take note of how state buildings use water. Through careful implementation of best practices, state buildings can become attractive demonstrations of wise stewardship of water resources. [HB 121, Water Conservation Modifications \(R. Spendlove\)](#), requires the state to implement certain conservation measures at state buildings, such as following recommended watering schedules, implementing a leak detection and repair program, and limiting turf to 20 percent in buildings constructed after 2022.

Conservation at the Local Government Level:

Most non-agricultural water use occurs at the municipal level. Cities and counties have the authority to establish standards and expectations for how their communities grow—and consequently, how much water they use. Locally elected officials shape land and water use by crafting long-term visions and plans for our communities and implementing them through daily development decisions. Additionally, political subdivisions own and maintain much of the state's water infrastructure.

Within these roles of local governments, there are ample opportunities to promote and advance water conservation:

- **Planning, Zoning, and Building Codes**
- The way we grow and develop our

land has significant long-term impacts on our water demand. Outdoor water use for landscaping irrigation comprises the largest portion of household water use. Smaller lot sizes and waterwise landscaping ordinances can result in significantly less outdoor water use. Multi-family housing results in less outdoor water use per household than a typical single-family detached home. Local governments set the vision for the future of our communities through a local general plan and land use ordinance which determines allowable uses of land, types and density of housing, location and types of commercial and industrial development, landscaping requirements, and stormwater infrastructure that will be built.

In addition to understanding and adapting to the preferences of growing residential populations, cities must also coordinate with water managers to ensure adequate water supplies. Developments and landscaping set the stage for water use for generations to come, and localities should consider that plumbing fixtures are often in use for decades once installed.

Proactive, thoughtful planning and ordinances that consider the impacts to a community's water future are imperative to ensure vibrancy. Communities should consider the impacts of current landscaping ordinances, building setbacks, building codes, and stormwater requirements to find appropriate ways to make meaningful adjustments that will positively impact water use within the community. Thoughtful ordinances can mitigate downstream impacts on water quality and quantity.

An example of a community closely integrating their water and land use planning is Summit County, which

adopted its [water concurrency ordinance](#) in May 2001. This ordinance restricts the approval of subdivision development plans and the issuance of individual building permits within the unincorporated area of the Snyderville Basin, until each of the water supply entities serving the area demonstrate the availability of water rights and water sources to meet the long term needs of its service area. This demonstration of water availability occurs through an annual water supply Concurrency Report.

- **Water Infrastructure and Pricing** - Nearly all water and sewer infrastructure in Utah is owned or managed by local governments, and these same entities often establish water rates as well. Between optimally pricing water use, clearly communicating how water is funded, and building water infrastructure, municipalities and water districts have the opportunity to conserve a tremendous amount of water. Funding is available at the state and federal levels for construction and implementation of conservation infrastructure.

Brigham City is using existing water rights for aquifer storage and recovery. The city diverts water into a series of injection wells, which is later recovered for use. Aquifer recharge and aquifer storage and recovery reduce evaporation losses, improve the integrity and health of groundwater aquifers, and store water for future use.

Provo City is developing infrastructure that will allow the city to manage surface and groundwater supplies to achieve the greatest benefit for the city and its citizens. The city plans to construct a new treatment plant near the Provo River and pump the treated water through existing

infrastructure and new pipes to the mouth of Rock Canyon. During periods of low demand, the city will release water into the normally dry streambed of Rock Creek, where it will infiltrate into the aquifer for future use. This unique aquifer storage project will allow Provo City to use its surface water rights on the Provo River, and help ensure the long-term sustainability of its groundwater rights.

The city of Santaquin constructed a water reclamation facility in 2013 to save on outdoor water use in the city. Municipal wastewater from residential homes and commercial businesses is piped to the facility. The wastewater is treated in an advanced treatment facility to a level that can be used for outdoor irrigation. 25 percent of Santaquin's outdoor water needs are met from this system.²⁷ This type of infrastructure is an important contribution to water conservation in the state.

Transportation infrastructure can also impact the water cycle. Normal pavement such as concrete or asphalt does not allow water to seep through and recharge the groundwater aquifers. This type of pavement can also increase floodwaters by concentrating stormwater runoff. Pervious pavement, by contrast, is a type of pavement that allows storm water to seep through and enter the ground and can recharge the aquifers and reduce stormwater runoff. Using pervious pavement is also a more efficient land use type because it reduces the need for retention ponds, basins, or other stormwater management areas.²⁸

- **Leadership** - Local government elected officials and staff can provide critical leadership that is tailored to their community's unique needs. Local leaders

set the tone for community planning and can engage with local residents to encourage wise stewardship of water resources. Additionally, community facilities, such as public buildings and parks, can serve as demonstration areas for attractive water-wise landscaping that is appropriate to the local climate and water resources. While turf at parks may require substantial irrigation, communities can use best practices to irrigate wisely while providing green spaces for residents to enjoy as an alternative to individual yards—particularly in urban settings.

Local governments can also amplify education for homeowners and businesses. In cooperation with Utah State University Extension, cities can provide [information on drought-tolerant plants](#) that are suited to Utah’s soils and climate. In addition to informing irrigation for localities, the DWRe [irrigation guide](#) can help homeowners and businesses make informed decisions based on current climate conditions.

Conservation at the Business, Neighborhood, and Household Level

Each business, household, and individual in our state impacts water use. We all have a role to play in water conservation to ensure the long-term vibrancy of our communities.

- **Water Efficient Landscaping, Fixtures, and Practices** - Our total water use is the cumulative effect of a myriad of individual decisions. Each homeowner and business can make a positive contribution by making water-wise choices when installing new plumbing fixtures or landscaping. Well-designed products and landscaping result in significant water savings without losing functionality. Incentive programs or rebates can be effective in motivating individuals to implement these types of conservation efforts.

The [Utah Water Savers](#) program maintains a list of current rebates and programs geared toward homeowners. Replacing aging toilets with newer low-flow models can save water with each flush. Similarly, replacing a traditional irrigation timer with a smart timer provides the convenience of a smartphone interface with the ability to automatically adjust watering schedules to adapt to real-time weather information. The [Flip Your Strip](#) program results in long-term water savings by providing financial incentives for removing non-functional turf areas. The [Localscapes](#) program prioritizes aesthetically pleasing and functional designs in a manner that requires much less water than traditional landscaping, demonstrating that water conservation can be an attractive option.

Key Policy Issues

Economic Growth and Water

Utah’s competitive tax structure, highly-educated workforce, accumulated social capital, investments in public infrastructure, smart regulations, entrepreneurial spirit, natural growth and migration patterns, and pragmatic government policies have made the state’s economy one of the most successful in the country. Workers and businesses have prospered in our state, supporting Utah’s growing and thriving communities. Adequate water is a necessary condition for Utah’s continued economic growth.

As Utah’s population and economy expand, water considerations must be an ongoing part of economic development and land use planning to ensure that state and community goals and resources are aligned. Utah currently has among the lowest water and sewer prices in the nation because our population is located close to high-quality water supplies. Some of the full cost of water at a household or business level may be included within property tax rates, which is less visible to the water user, and therefore

and not connected to water use. As businesses make expansion and relocation decisions in Utah, the cost of water as an input to production will shape the industrial mix and make-up of our state's local economies. In turn, these decisions have implications for job growth, tax revenue collections, water availability for non-commercial purposes, and general social and economic well-being. Without efficient water usage that takes into account the equilibrium price of water at given levels of use, water will increasingly become a constraint on long-term economic growth.

Transbasin Delivery and Directing Growth

Initial settlements in Utah were shaped by existing water availability. Modern storage and delivery methods have allowed for growth to take place further from water sources. Interbasin water transfers have been vital to the economic growth of the Wasatch Front and have allowed Utah to utilize its share of the Colorado River in our most populous regions. Additionally, interbasin transfers increase the resilience of the water supply by decreasing a region's reliance on a single watershed. By expanding the area from which a region can draw water, each region becomes less impacted by low precipitation or snowpack in a localized area. While these interbasin transfers provide significant benefits, it will be crucial that potential outcomes are fully understood to mitigate unintended negative impacts to agriculture, the environment, or the economies and communities in the originating basins.

While interbasin transfers remain an important water management strategy, the state can also facilitate remote work and economic development in rural areas with closer proximity to potential water supplies. Facilitating growth in originating basins is one option to leverage existing infrastructure, bolster rural economies, and reduce infrastructure costs—providing more affordable options for residents and increasing the vibrancy of rural communities.

The Relationship Between Energy and Water

Energy enables vibrant communities. Most of our current energy sources require water. In the face of growing demand for both water and energy and decreasing water supplies due to drought and a changing climate, it will become increasingly important to understand the water and energy nexus.

The state and private entities must understand the impact of emerging energy technologies on water supplies and the water cycle. The DWRi has been tasked under [HB 393, *Water Reporting Amendments \(J. Ferry\)*](#), with conducting a study to better understand how emerging energy technologies may impact the water cycle. [HB 168, *Preferences for Water Rights Amendments \(C. Albrecht\)*](#), also addresses the nexus between water, drought, and competing needs.

Responsibility for Maintaining Water Quality

Vibrant communities thrive on high-quality water, in their homes, businesses, and environment. Utah is fortunate to derive most of its water from mountain snowpack and groundwater, waters that are clean, pure, and mostly unaffected by upstream users. The ways that we use water to grow our communities and economy affect the quality of our downstream water, which has become increasingly important for our future. Communities must work together and with the state to:

- Protect upstream waters with healthy watersheds,
- Protect groundwater aquifers and recharge areas from sources of pollution,
- Protect and restore downstream waters from wastewater and stormwater pollutants, and
- Balance effluent water reuse opportunities with instream flow benefits.

Prioritization in a Crisis

Recent research shows that the current drought is the most severe that our region has experienced in 1,200 years.²⁹ If this trend

continues to persist and the population continues to grow, the western United States will face difficult decisions. This includes determining who receives priority for water if all legal rights cannot be met with available water supplies.

[HB 231, *Water Rights Priorities in Times of Shortage* \(K. Gibson\)](#), from the 2010 General Legislative Session enacted [Utah Code 73-3-21.1](#) to establish direction for the DWRi if a temporary water shortage occurs. [HB 168, *Preferences of Water Rights Amendments* \(C. Albrecht\)](#), from the 2022 General Legislative Session requires the DWRi to evaluate this state code and make recommendations to improve the state's crisis response procedures to minimize harm.

Action Plan

Previous water planning efforts have identified over 200 unique recommendations to better secure Utah's water future. The implementation of many of these recommendations will require changes to state water law, other legislative actions, or partnerships with non-state entities. The intent of this report is to identify specific actions that Utah's executive branch can undertake immediately to help move some of these many recommendations forward.

Many of the water needs of Utah's communities are related to infrastructure. The Investing in Infrastructure chapter of this report addresses these needs. This chapter includes action plans for continuing to invest in water infrastructure, conservation incentive programs, and secondary water meters.

The state has identified six key priority actions, and associated implementation steps, to advance Utah's strategic goal to support vibrant communities.

**ACTION****1**

Determine and quantify the contributions that increasing water use efficiencies and conservation, including water rates, can make to future water supplies.

**ACTION****2**

Continue to expand secondary metering throughout the state, along with education for Utah residents on the importance of water conservation.

**ACTION****3**

Initiate and facilitate ongoing conversations to link economic growth strategies with improved and reduced water usage.

**ACTION****4**

Assist local governments with the development of plans, ordinances, policies, regulations, and programs to link land use and water planning, encourage conservation, improve water quality, and protect drinking water.

**ACTION****5**

Assist local governments with the implementation of low-impact development and stormwater treatment systems to reduce pollution from development and increase conservation.

**ACTION****6**

Look for opportunities for water initiatives to serve multiple goals and priorities for communities, including water quality, outdoor recreation access, and wildlife management.

ACTION**1**

Determine and quantify the contributions that increasing water use efficiencies and conservation, including water rates, can make to future water supplies.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Evaluate and review existing research and identify data gaps.	DNR Executive Director	DWRe DDW	2023	Existing staff time	Critical information, data, or knowledge gaps have been identified
Develop a research proposal, scope of work, and budget.	DNR Executive Director	DWRe DDW	2023	Existing staff time	A scope of work and research needs have been identified
As resources allow, procurement of technical consulting assistance, if necessary.	DNR Executive Director	DWRe DDW	2024	Existing staff time, potential consulting contract	Contractor is under contract, or DWRe staff time has been assigned to project, and project is advancing

ACTION Continue to expand secondary metering throughout the state.

2

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Develop secondary water metering program rules.	DNR Executive Director, DEQ Executive Director	DWRe	2022	Existing staff time, up to five (5) additional FTEs to develop and manage program	Program rules have been established and adopted
Promote program availability and solicit applications.	DNR Executive Director	DWRe	2022	Existing staff time	Program is publicly available and applications are being received
Evaluate applications and award funds.	DNR Executive Director	Board of Water Resources, DWRe	Ongoing	Existing staff time	Program funding is being dispersed to local governments
Track implementation and reporting.	DNR Executive Director, GOPB Executive Director	DWRe	Ongoing	Existing staff time	Program funds are being implemented as intended
Identify any funding gaps between available resources and the needs of local governments.	DNR Executive Director	DWRe	2023	Existing staff time	Funding gap for meter implementation is known and can be demonstrated with data
Evaluate the need for expansion of the secondary metering program.	DNR Executive Director, GOPB Executive Director	DWRe	2023	Potential budget request	Budget request submitted

ACTION Initiate and facilitate ongoing conversations to link economic growth strategies with improved and reduced water usage.

3

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Identify a facilitator to design and conduct a situational assessment.	Go Utah Executive Director, DNR Executive Director, GOPB Executive Director	State Planning Coordinator, and GOPB Chief Economist, DDW, DWQ, DWRe, UDAF	2024	Existing staff time, potential contractor	Facilitator identified and assessment process defined
Conduct a situational assessment to identify stakeholders, build relationships, and gauge their willingness to engage in a collaborative process to explore the relationship between water availability and consumption and economic growth.	Go Utah Executive Director, DNR Executive Director, GOPB Executive Director	State Planning Coordinator, and GOPB Chief Economist, DDW, DWQ, DWRe, UDAF	2024	Existing staff time, potential contractor assistance	Assessment completed
If the situational assessment suggests stakeholders readiness, design a collaborative process around addressing the relationships between economic development and water policy.	Go Utah Executive Director, DNR Executive Director, GOPB Executive Director	State Planning Coordinator, and GOPB Chief Economist, DDW, DWQ, DWRe, UDAF	2024	Existing staff time, potential contractor assistance	Agreed-upon scope of work and identification of resource needs
Implement collaborative process.	Go Utah Executive Director, DNR Executive Director, GOPB Executive Director	State Planning Coordinator, and GOPB Chief Economist, DDW, DWQ, DWRe, UDAF	2024	Existing staff time, potential contractor assistance	A robust conversation about the nexus of economic growth and water is occurring

ACTION 4

Assist local governments with the development of plans, ordinances, policies, regulations, and programs to link land use and water planning, encourage conservation, improved water quality, and protect drinking water.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Develop land use and water planning integration curriculum.	DNR Executive Director	Babbitt Center, DDW, DWQ, DWRe, UDAF	2022	Existing Babbitt Center contract, existing staff time	Program curriculum is approved
Promote the program and solicit applications from local governments.	DNR Executive Director, GOPB Executive Director	Babbitt Center, DDW, DWQ, DWRe, UDAF	2022	Existing Babbitt Center contract, existing staff time	Local governments are aware of the program availability and applications are being received
Implement land use and water integration workshops.	DNR Executive Director	Babbitt Center, DDW, DWRe, UDAF	2022	Existing Babbitt Center contract, existing staff time	Workshops with local governments are underway
Provide technical assistance to partner communities with the development of local action plans.	DNR Executive Director	Babbitt Center, DDW, DWRe, UDAF	2023	Existing Babbitt Center contract, existing staff time	Workshop participants are developing local action plans with assistance from the state
Provide technical assistance to partner communities with the implementation of their action plans.	DNR Executive Director, GOPB Executive Director	Babbitt Center, DDW, DWQ, DWRe, UDAF	2024	Existing Babbitt Center contract, existing staff time	Workshop participants are implementing local action plans with assistance from the state
Evaluate the merits of expanding the program.	DNR Executive Director	Babbitt Center, DDW, DWQ, DWRe, UDAF	2023	Existing staff time	Analysis completed and potential budget request developed

ACTION 5

Assist local governments with implementation of low impact development and/or stormwater treatment systems to reduce pollution from new and existing development.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Conduct an inventory of existing stormwater systems and their conditions.	DEQ Executive Director	DWQ	2025	Existing staff time	An inventory of stormwater system needs is complete
Conduct a prioritization process to identify the most critical stormwater system needs and funding gaps.	DEQ Executive Director	DWQ	2025	Existing staff time	A prioritized list of stormwater treatment needs is completed and funding gaps are documented
Bring stakeholders together to explore creating a mechanism to fund and address the stormwater treatment needs.	DEQ Executive Director	DWQ	2025	Existing staff time	Key stakeholders are working together to discuss the importance of water quality within communities and exploring mechanisms to fund critical needs

ACTION Look for opportunities for water initiatives to serve multiple goals and priorities for communities, including water quality, outdoor recreation access, and wildlife management.

6

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Identify outdoor recreation, wildlife, and water quality programs and funding sources that communities could utilize and combine when planning water initiatives.	DNR Executive Director, DEQ Executive Director, GOPB Executive Director	State Planning Coordinator, DWQ, DWR, Division of Recreation	2023	Existing staff time	Evaluation completed
Review state programs that can preserve, protect, or provide access to riparian corridors and waterways on private lands and develop recommendations on how they can be improved from a water standpoint.	DNR Executive Director, UDAF Commissioner	Utah Land Conservation Board, DWQ, DWR, Division of Recreation	2024	Existing staff time, LeRay McAllister Critical Land Fund, Walk-In Access program	Recommen-dations produced
Evaluate how to work with/ assist communities to improve waterways and riparian corridors to improve outdoor recreation opportunities, wildlife habitat, and ecosystem services.	DNR Executive Director, UDAF Commissioner, DEQ Executive Director	DWQ, DWR, Division of Recreation	2023	Existing staff time, Babbit center contract, potential additional FTE or funding for contract assistance, project specific funding (e.g. Ogden River Restoration)	Technical assistance program established, technical resources available on state websites or publications
Develop strategy and tool to identify and prioritize waterbodies vulnerable to harmful algal blooms (HABs) for prevention and mitigation to minimize impacts to drinking water, recreation, wildlife, and agriculture.	DEQ Executive Director, DNR Executive Director, UDAF Commissioner	DWQ, DWR, Division of Recreation	2023	Existing staff time, potential project specific funding requests	A statewide strategy and tool that prioritizes water bodies to receive assistance in prevention or mitigation from HABs

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Development and outreach of strategic land use / in-lake actions to prevent and mitigate harmful algal blooms (HAB) to minimize impacts to drinking water, recreation, wildlife, and agriculture.	DEQ Executive Director, DNR Executive Director, UDAF Commissioner	DWQ, DWR, Division of Recreation	2023	Existing staff time, potential project specific funding requests	A HAB prevention and treatment plan for local government
Integrate water quality considerations into outdoor recreation funding applications and outreach materials.	DWQ Director	DWQ, DWR, Division of Recreation	2023	Existing staff time, printing costs	State outreach materials and grant applications include water quality and access considerations

Productive Agriculture

Released July 2022





3 Productive Agriculture

Utah is committed to optimizing the use and management of finite water supplies in order to preserve the state’s agricultural economy and ensure a sustainable and prosperous future.

Introduction

Agriculture, or the production of food, fiber, and resources, is an essential industry that makes our modern economy and civilization possible. It is a defining element of Utah’s heritage, culture, and quality of life, providing significant non-agricultural benefits like wildlife habitats, open space, and places to recreate—in addition to the obvious benefit of food production. It continues to play a vital role in communities throughout the state. For agriculture to be productive in Utah’s semi-arid climate, it requires significant amounts of water through irrigation. However, Utah’s water supply is limited. Today, Utah agriculture comprises 75 percent of Utah’s total water usage, which is down from the historical average of 79 percent.³⁰ Consequently, any discussion of water in Utah is incomplete without including agriculture.

Utah contains much more arable land than can be watered from incoming mountain streams. Dating back to 1847, the early Mormon pioneers established the first laws and social customs that consequently regulated the beneficial use of Utah’s limited water supplies. The principle

was established that those who first made beneficial use of water should be entitled to continued use in preference to those who came later. This fundamental principle was later adopted in law and is known as the Doctrine of Prior Appropriation. This means those holding water rights (the right to divert, or remove from its natural source, and beneficially use water) with the earliest priority dates, and who have continued beneficial use of the water, have the right to water from a certain source before others with water rights having later priority dates. Many understand the concept of prior appropriation to mean “first in time, first in right.” Utah’s agricultural producers commonly hold the state’s oldest water rights, and because of prior appropriation, have a higher priority to Utah’s water supplies. These priority rights also represent significant financial value for the water right holder.

Utah stands at a crossroads in terms of its water use and management. Competition for our state’s limited water resources is rapidly increasing due to rapid population growth, urbanization, and

long-term climate trends—all with the potential to have a significant impact on agriculture. At the same time, Utahns have indicated they want to both protect and even increase local food production in Utah.³¹ As the industry which diverts the greatest percentage of water, Utah agriculture is facing enormous pressure to optimize water usage.

A common perception is that to address these pressures, we must shrink our state’s agricultural sector. This is a misconception. Utah has ample water to meet all the life-sustaining needs of current residents, and with proper management, the needs of future residents as well. Indoor water use comprises a fraction of the state’s overall water consumption. Focused reductions in outdoor water use within our communities have the potential to make enough water available to easily support the state’s growing population. By continuing to invest in agricultural water optimization practices that result in reduced consumptive use and deploying other strategies to better use and manage our water supply, we can meet both agricultural and non-agricultural water needs in Utah. Further action to optimize Utah’s agricultural water use and management is needed to preserve the state’s agricultural economy, sustain future growth opportunities, and ensure productive agriculture.

The Role of the State

Optimizing the use and management of finite water supplies to ensure continued productive agriculture in Utah will require effective policy decisions and collaborative partnerships with state agencies and our agricultural water users.

The state of Utah has three primary roles in supporting Utah agriculture and agricultural water use.

1. Preparing the state for growth.

To support productive agriculture and sustain future growth opportunities, Utah must continue

to invest in strategies that optimize agricultural water use and management. All sectors of the economy need access to safe and reliable water resources. To help ensure this, the state can continue to fund agricultural water optimization projects using emerging technologies that result in reduced consumptive use, while simultaneously maintaining or even increasing agricultural productivity.

2. Protecting and enhancing resources that are of importance to the public.

While water in Utah is public, a regulated system of water rights governs the use of this public resource. Agricultural water users are stewards of the state’s water supply. The state plays a key role in helping agricultural water users understand the connection between the quantity and quality of water leaving their land and its impact on a wide range of beneficial uses, including recreation, drinking water, and aquatic species.

As part of its statutory mandate, the DWRi maintains a publicly available central repository for all rights to the use of Utah’s water. Administrative supervision of water rights protects resources and provides order and certainty of use. The state’s management of this system creates the foundation upon which water markets function. DWRi maintains a yearly land use dataset of the crops being grown, fallow/idle rotations, and irrigation methods. These yearly datasets are fed into models to better understand how the use of water is impacted by local climate and agricultural practices, providing an understanding of agricultural water use from year to year. These model results and management of water rights provide means for the state to manage the balance between the interest of public water and the private ownership of water rights.

Specific to agricultural water use, UDAF’s Conservation Division helps protect water

quantity and quality for all by offering farmers and ranchers conservation planning, technical assistance, and grant and loan programs. Additionally, the DWQ is responsible for water quality regulation and works with the agricultural industry to voluntarily reduce non-point source pollution through its Non-point Source Program.

3. **Assisting in the development of projects that require the convening and facilitation power of the state.**

Agriculture is generally a high-risk, low-margin industry. Just like everyone else, producers need to make money to support themselves and their families. For an agricultural operation to take on additional risk, such as investing in new and often expensive water optimization practices, it must have a reasonable expectation of earning a profit after doing so. The state can help alleviate this risk by providing the necessary capital and information to make water optimization practices more feasible for producers. This role can also include agricultural water optimization education, development of technical assistance tools, promotion of best practices, and discussion forums specifically tailored to our agricultural community. The state may also be able to help bring together a variety of partners (e.g. federal agencies like the National Resources Conservation Service, state, local, adjacent landowners, downstream water users, and non-profit organizations) to tackle water challenges on agricultural lands.

UDAF's Conservation Division is a key facilitator for the state's roles in preserving agriculture and optimizing water usage. Programs within the Division include the following:

- The [Agriculture Resource Development \(ARDL\) Program](#) provides low interest loans to farmers and ranchers for projects that meet certain conservation and pollution control goals. The goal of the program is to help farmers and ranchers

to: conserve soil and water, increase agricultural yields, maintain and improve water quality, conserve and improve wildlife habitats, prevent flooding, develop on-farm energy projects, and mitigate damages resulting from natural disasters (flooding, drought, etc.)

- The [Agricultural Voluntary Incentives Program \(Ag VIP\)](#) incentivizes farming operations to develop Comprehensive Nutrient Management Plans that will allow them to implement practices that can increase crop yields, improve soil health, and add value to operations while improving water quality.
- The [Soil Health Program](#) promotes the adoption of soil health practices through increasing our understanding of soil health and its impacts on productivity, economics, and environmental aspects of agriculture.
- The [Water Optimization Program](#) improves water optimization by reducing consumptive water use and providing increased operation flexibility for agricultural water users. It also improves water quantification by showing accurate, real-time measurement of diverted water to demonstrate actual water saving in cubic feet per second (CFS) or acre foot.
- The [Invasive Species Mitigation Program](#) (within UDAF's Division of Plant Industry) awards competitive grants to combat noxious and invasive weeds throughout Utah. The grants are awarded to projects based on water, agricultural, economic, environmental, and wildlife impact.

Key Policy Issues

Agricultural Water Optimization

Agricultural water optimization is the implementation of agricultural and water management practices that maintain or increase

viable agriculture while minimizing negative impacts on water supply, water quality, and the environment. The current strain on Utah’s water supply is significant. With agriculture accounting for roughly 75% of Utah’s diverted water, rapid population growth increasing demand for water, long-term climate trends decreasing our water supply, and the public continuing to desire local food production, the need to optimize agricultural water usage to benefit all water users in the system is greater than ever.³²

There is ample opportunity to optimize agricultural water usage. Utah’s Agricultural Water Optimization Task Force recently identified over \$1 billion in need to upgrade antiquated irrigation systems (such as outdated flood irrigation systems) to more-efficient, innovative systems (such as sprinkler/drip systems and laser-leveled flood technology).³³ The Task Force also identified over \$5 billion in need to improve conveyance systems (lining or piping canals or

ditches) to prevent seepage and evaporation loss.³⁴

To help begin addressing this need, the legislature created UDAF’s [Water Optimization Program](#) in 2019 and has allocated \$76 million to the program since then. (Appropriations included \$20 M from the first ARPA allocation, \$50 M from the second ARPA allocation, \$3 M in general funds from the 2021 General Session, and \$3 M in general from the 2019 General Session.) Funding is provided as a matching grant to eligible applicants. The purposes of the grant are to reduce consumptive water use, improve water quality, provide increased operational flexibility for agricultural water users, and show accurate, real-time measurement of diverted water to demonstrate actual water savings. Grant recipients are required to install meters on all diversions and to report data on the program for three years following implementation of their project.

UTAH'S CROP IRRIGATION TYPES BY ACREAGE

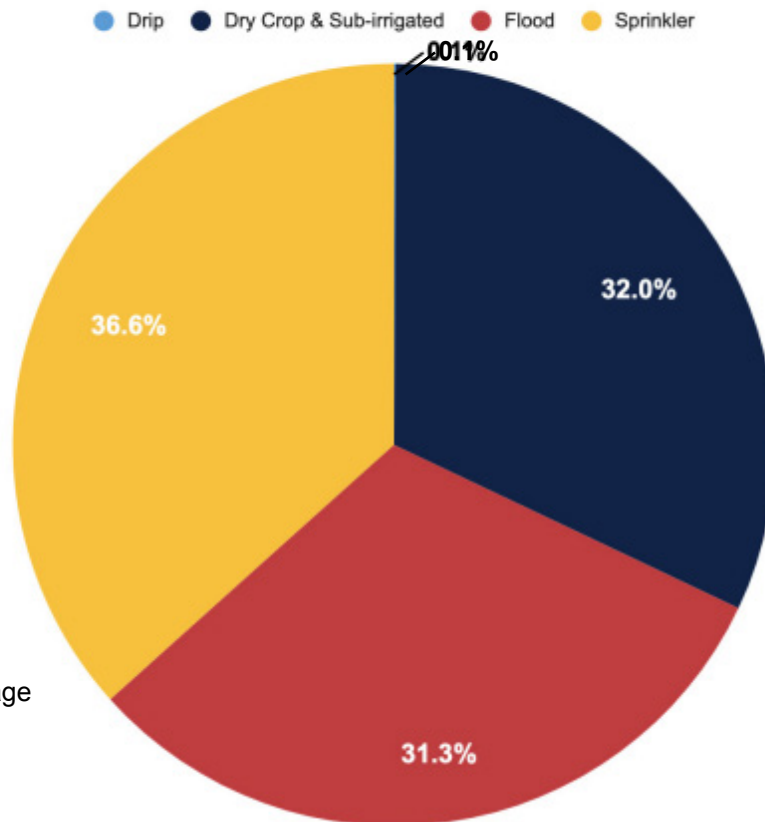


FIGURE 1 Utah Crop Irrigation Types by Acreage (Utah Division of Water Resources, n.d.)

Figure 1 displays the variety of general irrigation types used on crops throughout the state. While highly efficient technologies exist within each of these broad irrigation types (such as laser-leveled, surge flood irrigation), the amount of acreage using flood irrigation suggests that further water savings could be realized through water optimization efforts.

Because agricultural water users generally operate on relatively low profit margins, some are hesitant to take on additional risk, such as implementing new and often expensive agricultural water optimization practices. Agriculture is already a high-risk, capital-intensive, price-sensitive industry. On top of that, producers' current irrigation practices are likely working well. In order to prompt more agricultural water users to implement water optimization practices, they need to know the practices are both viable and profitable. They also need the right incentives and data to further embrace water optimization. Accessible data tools like Utah State University's [Irrigation Technology Cost/Benefit Analysis Calculator](#) can help agricultural water users analyze the profitability of water optimization in their unique circumstances. Empowering agricultural water users with data can help maximize crops and irrigation water while simultaneously saving water and earning more money for their communities and families.

Agricultural water optimization will be essential in supporting and sustaining Utah's overall economy and quality of life moving into the future. During the 2022 General Session alone, the legislature appropriated an unprecedented \$70 million of federal ARPA funding to UDAF's Water Optimization Program, on top of the previously appropriated \$6 million for the program. UDAF now has the incredible task of judiciously obligating this funding by the end of calendar year 2024, and ensuring the funds are spent by the end of calendar year 2026. To help accomplish this task, the state should implement strategies to increase the number of quality grant applications,

such as making data from past water optimization projects publicly available, continuing to host site visits with potential grantees at current and past water optimization projects, and promoting tools that help producers understand the value of water optimization practices. Continued investment and implementation of current funding in the Water Optimization Program will protect water quantity and quality for all users in the system for generations to come.

In addition, there are exciting advancements in farm practices, soil science, and technology that have the potential to provide more water savings. These include no-till seeding, hydroponics, utilization of cover crops, and interseeding.

Understanding Water Rights

All waters in Utah are public property. Consequently, an individual must possess a water right to legally divert (remove from its natural source) water. A "water right" is a right to divert and beneficially use water. "Beneficial use" is the purpose to which water diverted under a water right is applied and the amount of that beneficial use. Examples include, but are not limited to, irrigation (amounts measured in acres); stock watering (amounts measured in numbers of equivalent livestock units); domestic (indoor residential - amounts measured in numbers of equivalent domestic units); and commercial, industrial, and municipal. The defining elements of a typical water right will include a:

- defined nature and extent of beneficial use,
- priority date,
- defined quantity of water allowed for diversion by flow rate (cfs) and/or by volume (acre-feet),
- specified point of diversion and source of water,
- specified period of use, and
- specified place of beneficial use.

Another term associated with irrigation watering (any outside watering) is the “duty” of water. This refers to the quantity of water, as determined by DWRi, that is required to satisfy the irrigation water requirements in a certain area. For example, the “duty” of irrigation water ranges from two acre-feet (AF) per acre in cool, mountain meadow areas to six AF per acre in low, hot southern areas of the state. The underlying concept is that only so much water can be beneficially used for an authorized purpose, such as watering crops, in a geographical area.

Further, many producers’ water rights are in the form of shares of an irrigation company. The irrigation company is the official holder of the water rights, and shareholders in the cooperative own the ability to utilize a portion of these rights. An individual producer’s “turn” may be limited to a specific volume of water and specific irrigation schedule.

The state should continue to educate all water right holders regarding what a water right is and allows. Doing so will help ensure proper usage and understanding of Utah’s limited water resources.

Incentivizing Conservation and Protecting Water Rights

Because water in Utah is a scarce and valuable public resource, Utah’s laws have been designed to place water to full beneficial use. Consequently, the law stipulates that those who acquire rights to the use of Utah’s water must place it to beneficial use. [Utah Code Section 73-1-4\(2\)\(a\)](#) states the following:

. . . when an appropriator or the appropriator’s successor in interest abandons or ceases to use all or a portion of a water right for a period of seven years, the water right or the unused portion of that water right is subject to forfeiture in accordance with Subsection (2)(c) . . .

In other words, Utah law provides that when a water user fails to use all of or a portion of their water right for a period of at least seven years (except under certain circumstances), the water user is in danger of losing the water right. This is commonly known as the “use it or lose it” principle.

Water rights are the lifeblood of an agricultural water user’s operation. Due to the risk of water right forfeiture, Utah agricultural water users feel immense pressure to use their entire water allocation to retain the water rights essential to sustaining their livelihood. This pressure often causes a disinclination to optimize agricultural water usage.

In recent years, the state has approved a wave of water-related legislation to help address this issue and more:

- **Water Banking - [SB 26, Water Banking Amendments](#), (J. Iwamoto)** authorizes the Board of Water Resources to approve the creation of formal water banks, which can also be understood as local water markets. Water banks facilitate the voluntary, temporary transfer of a water right from one user to another through low-cost transactions. Water banking enables a financial incentive for farmers and ranchers to invest in water-saving technologies that reduce consumption because they can financially benefit from leasing their water rights through the water bank, while also providing more flexibility within the water community. Further, the concept has the potential to lower transaction costs, streamline the allocation of water rights to their most efficient uses, and spur the creation of innovative water markets.

Agricultural water users who participate in water banking can rest assured that their water rights are not subject to forfeiture for

the period of time the State Engineer authorizes them to be used within the bank (see [Utah Code 73-1-4\(2\)\(e\)\(xi\)](#)). Because of this, there is no danger of “buy and dry” schemes permanently taking water away from agriculture. This assurance, coupled with the financial incentive, should be leveraged to further encourage producers to participate in water banking and optimization.

- To date, DWRe has received \$800,000 from federal and state sources to develop a statewide strategy to set up and operate water banks. Utah currently has one approved pilot water bank, but it is facing protests. Other water bank proposals are being explored, but all require further development. Water banks are locally formed, voluntary to participate in, and the leases are temporary in nature. Information gathered from these water bank pilots will be used to develop a statewide water banking strategy to incentivize agricultural water users to optimize water usage. Targeted efforts should be made to educate agricultural water users about availability, mechanics, and assurances of Utah’s water banking system.
- **Instream Flows - [HB 33, Instream Flow Amendments, \(J. Ferry\)](#)** allows water right holders, including farmers and ranchers, to temporarily lease their rights to organizations for certain statutorily authorized purposes. Organizations are permitted to pay producers to keep the water in the source, which allows more water to stay in the system, increases flexibility in water sharing, and provides another financial incentive for producers to conserve.

It is important to note that both these laws allow for water to be used for another

purpose temporarily. The temporary nature of these programs means that agricultural water made available through optimization, banking, or leasing cannot be counted on as a permanent solution to shortages in municipal, industrial, or ecological water needs.

While these mechanisms represent significant strides in further incentivizing conservation and protecting water rights, the state should continue exploring and testing various mechanisms. Potential mechanisms include, but are not limited to, the following:

- **Split Season Leasing** - Consumptive water uses such as irrigation water would be used for their designated beneficial use during the first part of the irrigation season, but then be leased for instream purposes after a designated time. Late season water is typically less productive in producing a hay crop than early season water. Late season water is also important for water quality and the health of streams because this is when temperatures can become too warm or flows reach critical low levels. Split season leasing may improve base flow conditions, but larger-scale testing would be needed to determine if enough water could be delivered to meet objectives such as delivering meaningful amounts of water to the Great Salt Lake or Lake Powell. However, a reactive leasing program such as this may not be attractive to agricultural producers due to relative unpredictability.
- **Triggered Water Leasing or Banking Based on Drought Index** - A potential evolution of the current leasing program could be leasing triggered by a hydrological parameter, such as a drought index. An early warning system, such as a Standardized Precipitation Index

(SPI) may be viable to provide needed information early in the water year to trigger leasing or banking. Similar to the split season leasing, a triggered program would have more lead time, which would allow agricultural producers to enroll in a temporary leasing program earlier in the year.

- **Demand Management System Applied Consistently in Wet and Dry Years** - A demand management program would set consumptive demand reduction goals and work with water rights holders to reduce their consumptive use at a basin level. Water Banking could be an example of this, as long as a substantial amount of the transactions are for instream flow. This would also provide a consistent market to provide certainty to producers. However, it would require consistent and stable funding. It would also need to provide enough funding per acre to producers to incentivize temporary fallowing or leasing. This could potentially be the most effective way to get meaningful amounts of water to critical bodies of water or tributaries like the Great Salt Lake or the Colorado River.

Using these tools leverages one of the notable benefits to well-managed agricultural land: the potential flexibility of water leasing or voluntary reduction of water use during times of drought. Residential homes and commercial facilities continuously use water throughout the year with very little variation in demand for indoor water use. By contrast, agricultural irrigation demands can be altered by fallowing fields, planting less water-intensive crops, or reducing the number of hay cuttings. The water savings from these temporary adjustments can be leased, banked, or left in storage to create flexibility for other beneficial uses during times of drought. Once farmland is

developed, much of that water flexibility goes with it. In other words, as our prime agricultural lands are developed, our water demand hardens.

Addressing Nonpoint Sources of Water Pollution

Nonpoint source pollution includes all pollutants that are picked up and carried to water bodies by runoff moving over a wide variety of landscapes (i.e., agriculture lands, forestry lands, urban areas) and has negative impacts on water quality. Whereas DWQ regulates point sources of pollution (i.e., a concentrated source of discharge, including certain classes of concentrated animal feeding operations) through a system of permits, nonpoint source pollution is not regulated through permits. Instead it is managed on a best practices and voluntary basis, requiring cooperation among individuals and organizations seeking to protect and improve the quality of their water resources.

Nonpoint source pollution is not normally regulated because the contributors are innumerable and irregular in the way they distribute pollutants into water. In truth, everyone contributes to non-point source pollution to a certain extent through our day-to-day activities. Therefore, reducing non-point source pollution depends on voluntary changes in behavior and land management.

Agricultural lands are a contributor to non-point source pollution. Fertilizer and manure application to crops help maximize yields and improve soil health. However, the over application of nutrients can lead to their runoff, polluting water and adversely impacting its downstream beneficial uses, including the environment.

Various state programs are available to agricultural producers who desire to decrease possible nonpoint source pollution, including UDAF's [Agricultural Voluntary Incentive Program \(AgVIP\)](#). This program encourages farmers

UTAH'S IRRIGATED AG LANDS BY ACRES

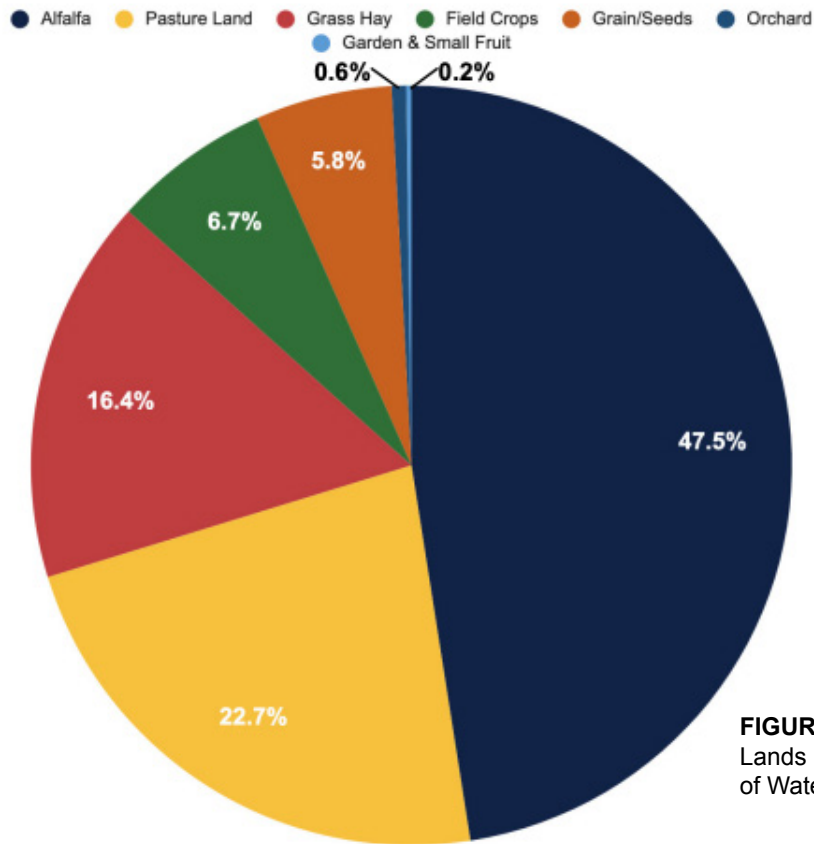


FIGURE 2 Utah's Irrigated Lands by Acres (Utah Division of Water Resources, n.d.)

and ranchers to develop Comprehensive Nutrient Management Plans (CNMPs) that help maximize crop yields while minimizing losses and protecting water quality. DWQ manages the [Nonpoint Source Program](#), which is a voluntary incentive-based program that works with partners to reduce non-point sources of pollution. The Nonpoint Source Program offers financial incentives to implement a broad range of on-the-ground Best Management Practices. These are investments that property owners and land managers can make to reduce nonpoint sources of pollution and improve their land and production. The Nonpoint Source Program also supports education and outreach activities that raise public awareness of water quality issues in the state and how to solve them.

For these and other related programs to be successful, the state needs willing partners and landowners to improve water quality.

However, producers who suspect they may have a non-point source pollution problem are sometimes hesitant to reach out to the state, which oversees water quality. This is due to a misperception that if they approach the state for a grant to address a potential non-point source pollution problem, they might be regulated, fined, or required to address the issue at their own cost if a water quality issue is identified.

Producers who contact the state for help managing non-point source pollution will not face regulatory action or mandatory costs as a result of reaching out for help. The state must find ways to help producers overcome this misconception and communicate the benefits to producers clearly. Doing so will encourage more participation in the state's Ag VIP and non-point source pollution programs and improve our water quality, ultimately benefiting our water quality for a healthy and prosperous Utah.

Agricultural Land Preservation

Protecting our agricultural land is crucial to maintaining local food production and a high quality of life throughout the state. The value of local and secure food supplies has become increasingly apparent over the past few years that have been riddled with supply chain disruption. As land values increase in some of our most productive agricultural areas, the risk of paving over our prime agricultural soils becomes ever greater. In fact, according to the latest Census of Agriculture, approximately 1.2 million acres of farmland were lost in Utah from 1997 to 2017³⁵. The [LeRay McAllister Critical Lands Conservation Fund](#) provides willing landowners, including farmers and ranchers, the opportunity to benefit financially from their land by selling the development rights and placing their land in a conservation easement. The public receives the benefit of locally produced food, open space, watershed protection, wildlife habitat, and the rural character that reminds us of our agricultural heritage.

Compared to developed land, a properly managed agricultural landscape produces a more natural hydrologic system. Well-managed agricultural land allows both irrigation water and stormwater to infiltrate more naturally into the soil. By contrast, impenetrable surfaces associated with developed land often cause water to rapidly run off into rivers and streams—often increasing the flashiness and magnitude of runoff events, carrying sediment and potential pollutants that impact water quality.

Highest and Best Use of Utah’s Water and Farmland

Much of the state’s agricultural water goes toward alfalfa irrigation—Utah’s largest crop by acreage (see Figure 2). Alfalfa is a thirsty crop that requires more water than other potential crops. Some question whether Utah farmers should consider growing a different crop that utilizes less water. Further, some critique the fact that a portion of Utah’s alfalfa hay is exported to out-of-

state or international markets, arguing that the state is exporting its water.

We live in a global economy. Utah products and labor of all types flow across state and international boundaries every day. Utah has a significant tech industry along the Wasatch Front that exports data products across the nation and world. This industry uses significant amounts of water to cool computer servers. To an extent, water is embedded in every product that Utah exports. Conversations about exporting Utah’s water should be considered in the context of a global economy, which includes ancillary benefits to Utah derived from trade partnerships with other states and countries. For example, Utah has a reciprocal agricultural trade relationship with California. Utah exports hay to support dairies in California, and Utah imports fruits and vegetables from California to feed Utahns.

This debate is rooted on how water is viewed as an economic input and how the use of Utah’s farmland and water may be maximized to produce the greatest value relative to the water and land used. For example, some question whether western water law prevents producers from realizing the true value of their water by treating water rights as a property right, rather than a priced commodity. This may cause producers to sell crops at a price that does not reflect the opportunity costs of their water use relative to other potential uses, such as its sale on the water market. Introducing market forces, like water banking and split season leases (as referenced above), may allow producers to make alternative financial decisions—particularly during times of high water demand or dwindling supplies that increase the value of water.

While the state continues to grapple with optimizing water law to achieve the highest and best use of Utah’s water and farmland and determining the desired balance between pricing, agricultural water use, economic output, and the need for a local food supply, the state

UTAH'S CROPLAND AND PUBLIC LAND GRAZING ALLOTMENTS

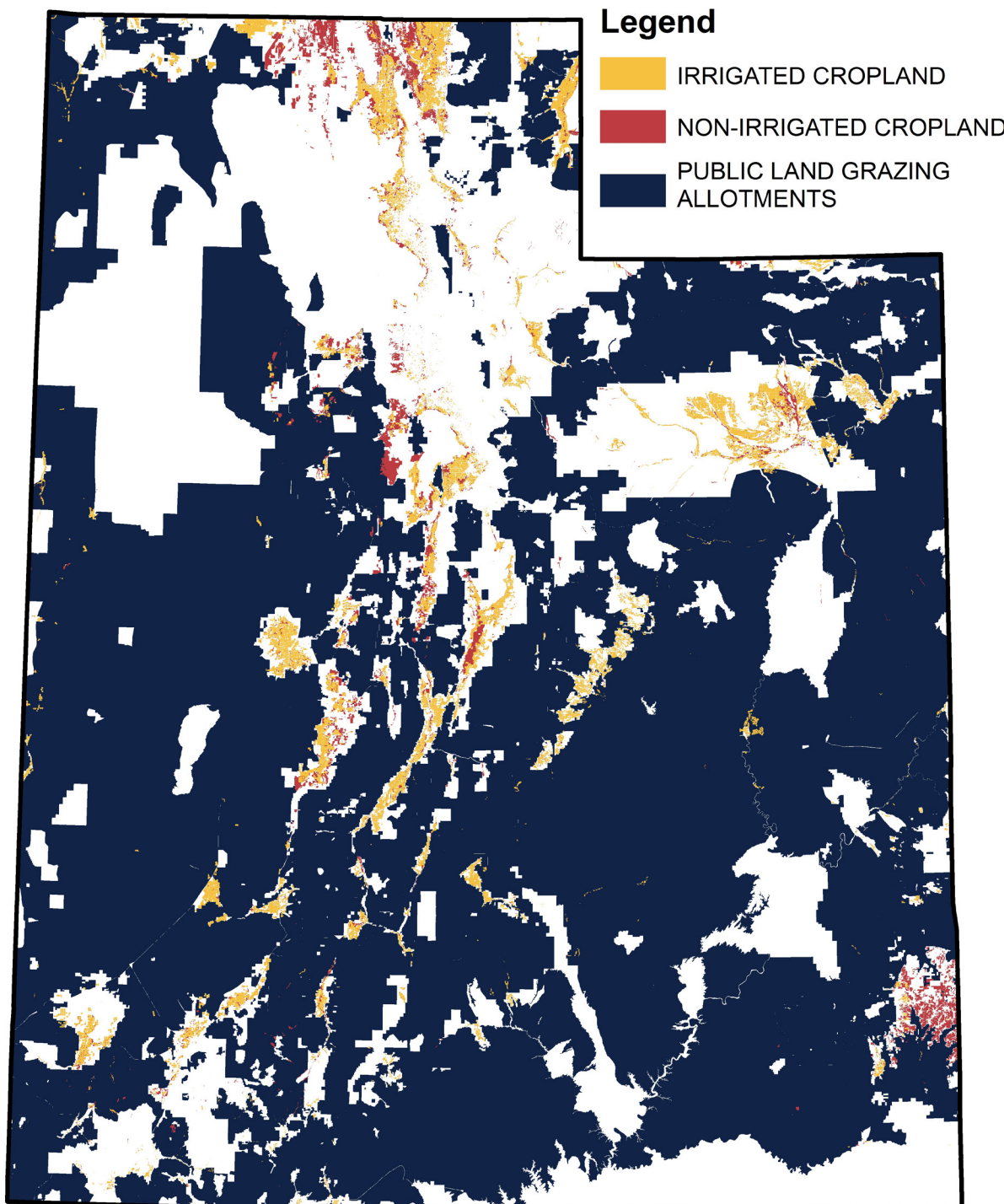


FIGURE 3 Utah's Cropland and Public Land Grazing Allotments

(Utah's State Geographic Information Database. Water Related Land Use Layer as maintained by the Utah Division of Water Resources: Summer 2022; USDA Forest Services Range: Allotment Feature Layer, Summer 2022; US Dept. of Interior Bureau of Land management (BLM) BLM UT Grazing Pastures Layer, Summer 2022.)

can continue to help producers optimize their water usage through the Water Optimization Program, and grow more produce with less water. It can also focus on strategies to continue developing programs and ideas like [Community Supported Agriculture \(CSA\)](#), [Farmers Feeding Utah](#), and UDAF's [Utah's Own](#) and [Pilot Food Security Processing Grant](#) programs, which help strengthen our state's local food security. Emphasizing the less quantifiable benefits of agriculture, such as open space, wildlife habitats, and protecting the state's culture and heritage, are important as well. Lastly, water markets created through water banks can help disincentivize the inefficient use of water. Fully realizing the benefits of the state's new water banking and leasing options will take time as producers become aware of and confident enough to utilize these programs. Broader adoption of these programs will hopefully reassure producers that fears of forfeiture of unused water are unwarranted.

Public Lands and Grazing

While irrigated cropland receives a majority of the attention in agricultural water discussions, two-thirds of the state's land area is managed by the federal government. These lands are typically unavailable for traditional cultivation or irrigation; however, they produce significant agricultural output with very little supplemental water. As of 2011, nearly 45 million acres were available for livestock grazing in Utah and 73 percent were on federal lands.³⁶ Grazing on public lands takes advantage of millions of acres of native, drought-adapted forage and higher elevation areas in our state that receive significantly more precipitation (see Figure 3). It also reduces the risk of wildfire by removing the fine fuels that easily ignite and provide an ignition source for heavier fuels. However, because these lands are only available during specific seasons to protect watersheds (typically the summer months), supplemental feed is often required to sustain livestock herds during the winter months.

Relatively small monetary and resource investments can enable significant amounts of available forage on public lands. For instance, installing stock watering tanks in areas with inadequate water supplies opens up new grazing opportunities, more efficiently distributes livestock, and protects riparian areas. Programs like the [Grazing Improvement Program \(GIP\)](#), the [Nonpoint Source Program](#) and the [Watershed Restoration Initiative \(WRI\)](#) can improve or develop water sources, install stock watering tanks, improve range conditions, and increase forage productivity to increase feed and improve water quality and quantity. These active management practices also benefit wildlife populations.

Despite historical resource degradation, rangeland health and riparian conditions continue to improve due to effective vegetation treatments, improved management practices, and implementation of the best available science. Additionally, the GIP, WRI, and Nonpoint Source programs have provided land managers and producers with additional tools and funding to improve watershed management on both private and public lands. The programs have shown that being active, not passive, is the quickest way to achieve measurable and sustainable watershed improvements and results. Because many of the state's rangelands (both private and public) are the primary water source for almost all of our communities, active and strategic rangeland management is critical to water supply resiliency, water yield, and water quality.

Action Plan

Previous water planning efforts have identified more than 200 unique recommendations to better secure Utah's water future. The implementation of many of these recommendations will require changes to state water law, other legislative actions, or partnerships with non-state entities. The intent of this report is to identify specific actions that Utah's executive branch can undertake immediately to help move some of these many recommendations forward.

Many of the water needs of the agricultural community are infrastructure related. The Investing in Infrastructure chapter of this report addresses these needs. As previously mentioned, the legislature has appropriated an unprecedented \$76 million to UDAF's Water Optimization Program, which will also help address infrastructure needs, such as piping canals to prevent seepage and evaporative loss, and updating antiquated on-farm irrigation systems to ensure more water-efficient irrigation methods. This chapter includes action plans for continuing to invest in water infrastructure and implementing strategies to protect water quantity and quality for all.

The state has identified five key priority actions, and associated implementation steps, to support productive agriculture.

ACTION

1

Continue to execute and invest in agricultural infrastructure, including water optimization program projects, irrigation system automation, metering, and data storage and dissemination.

ACTION

2

Deploy strategies such as water banking, split season leases, and in-stream flows to create water use flexibility and protect critical habitats.

ACTION

3

Continue to invest in water quality programs related to agriculture.

ACTION

4

Educate and engage producers and the public to improve understanding of water rights, and their role in maintaining water quality and conservation.

ACTION

5

Invest in agricultural research and data collection to ensure decisions and investments are based on the most accurate information and best practices.

ACTION

1

Continue to execute and invest in agricultural infrastructure, including water optimization program projects, irrigation system automation, metering, and data collection and dissemination.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Identify agricultural water measurement data collection and dissemination needs, and determine if the state's existing water data platforms could be expanded to include additional agricultural water data.	DNR Executive Director, UDAF Commissioner, DEQ Executive Director	DWRe	2023	Existing staff time	Completed
If determined feasible, expand current water data platforms to include additional agricultural data. If not, develop a proposal for the development of a new open-data platform to collect and disseminate agricultural water data.	DNR Executive Director, UDAF Commissioner, DEQ Executive Director	DWRe	2025	Existing staff time, potential DTS/contractor assistance	Completed
Successfully execute agricultural water optimization projects.	UDAF Commissioner	DWRe	All funding obligated by 2024, all projects completed by 2026	Existing staff time	Projects completed, being monitored, and outcomes demonstrated
Expand education efforts to help the public and producers understand the value of agricultural water optimization projects.	UDAF Commissioner	DWRe	2023	Existing staff time	Campaign visibility metric (impressions, website hits, etc)

ACTION 2 Deploy strategies such as water banking, split season leases, and in-stream flows to create water use flexibility and protect critical habitats.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Evaluate the process to develop water banks to determine if there are procedural changes necessary to streamline approvals and address concerns.	DNR Executive Director	DWR, DWRi, DWRe	2023	Existing staff time	Evaluation completed
Provide technical assistance to support producers and irrigation companies in the development and utilization of water banks in new basins.	DNR Executive Director	Private water users, DWR, DWRi, DWRe	Ongoing	Existing staff time	Number of producers and irrigation companies helped
Evaluate existing water banks to determine if they are working as intended.	DNR Executive Director	DWR, DWRi, DWRe	Initiate one year following the establishment of the first water bank	Existing staff time	Evaluation completed
Identify stakeholders that have interest in maximizing in-stream flows and actively work to facilitate partnerships between stakeholders.	DNR Executive Director, UDAF Commissioner, DEQ Executive Director	Producers, Irrigation companies, Environmental groups, DWR, DWRi, DWRe, DWQ	2022	Existing staff time	List of stakeholders interested in in-stream flows
Collaborate across state agencies to ensure in-stream flow rights are being monitored and that banked water is remaining within the stream as intended.	DNR Executive Director	DWR, DWRi	Initiate as soon as in-stream flow rights are approved	Existing staff time	List of monitored in-stream slow rights with distribution accounting on the quantity of water

ACTION Continue to invest in water quality programs related to agriculture.

3

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Assess current programs (AgVIP, Soil Health, GIP, Nonpoint Source, Ag Water Optimization) addressing agricultural water quality to determine their capacity, demand, and effectiveness.	UDAF Commissioner and DEQ Executive Director	DWQ	2023	Existing staff time	Inventory of state programs, funding levels, number of applications received v. funded
Report on the outcomes and water quality benefits achieved through the implementation of these programs.	UDAF Commissioner and DEQ Executive Director	DWQ	Ongoing	Existing staff time	Number of acres enrolled each year (AgVIP), Total water savings realized, acres treated, total load reductions (Agricultural Water Optimization), animal unit/month (AUM) reported by the program (GIP), number of acres implementing soil health practices (Soil Health)
As resources allow, continue to invest in programs that benefit agricultural producers while improving water quality/quantity, and recruit additional partners to leverage state and federal funding.	UDAF Commissioner and DEQ Executive Director		Ongoing	Existing staff time, potential program specific funding requests	Expansion of program reach and outcome

ACTION

4

Educate and engage producers and the public to improve understanding of water rights, and their role in maintaining water quality and conservation.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Design and resource a broad stakeholder engagement process to identify, sustain, and advance the multiple values associated with agricultural water use.	UDAF Commissioner	Ag Optimization Task Force, State Watershed Councils, Utah Conservation Commission, USU Extension, DWQ	2022	Existing staff time	Completed stakeholder engagement process, presentations to all agricultural producer industry groups, such as the Dairy Commission, UACD, Woolgrowers Association, and Cattlemen's Association
Explore the feasibility of establishing an education center dedicated to providing information on agriculture, water, and food production.	UDAF Commissioner, DNR Executive Director		2023	Existing staff time	Completed feasibility study
Update the Utah Water Quality Partners website. Improve the connectivity of this site with other educational resources regarding agriculture's role in protecting and improving water quality.	DEQ Executive Director	Utah State University, DWQ	2023	Existing staff time	Website updated

ACTION 5

Invest in agricultural research and data collection to ensure decisions and investments are based on the most accurate information and best practices.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Build a partnership with Utah's Land Grant Universities, such as USU Center for Land Water and Air, to identify potential research projects.	UDAF Commissioner	Ag Water Optimization Task Force, USU Extension, DWRe	2023	Existing staff time	Coordination meetings with partners held quarterly to begin the partnership, and less often thereafter
Develop and implement a research proposal to obtain more recent and credible information regarding the type and quantity (acreage and tonnage) of crops produced in Utah.	UDAF Commissioner	USU Extension, other Universities	Initiate in 2023	Existing staff time	Report on research findings
Collaboratively develop and implement research proposals looking into quantifying the markets for different types and quantities of crops produced in Utah.	UDAF Commissioner, DNR Executive Director, DEQ Executive Director	USU Extension, and other Universities, Ag Water Optimization Task Force	Initiate in 2023	Existing staff time, potential funding requests	Reports on research findings
Collaboratively develop and implement research proposals looking into identifying the water needs of specific crops produced in Utah.	UDAF Commissioner, DNR Executive Director, DEQ Executive Director	USU Extension, and other Universities, Ag Water Optimization Task Force, DWRe	Initiate in 2023	Existing staff time, potential funding requests	Reports on research findings
Collaboratively develop and implement research proposals looking into identifying the economic value of agriculture and agriculture water use in Utah.	UDAF Commissioner, DNR Executive Director, DEQ Executive Director	USU Extension, and other Universities, Ag Water Optimization Task Force, DWRe	Initiate in 2023	Existing staff time, potential funding requests	Reports on research findings
Collaboratively develop and implement research proposals looking into identifying the impact of agricultural water optimization projects on the in-stream water budget.	UDAF Commissioner, DNR Executive Director, DEQ Executive Director	USU Extension, and other Universities, Ag Water Optimization Task Force, DWRe, DWQ	Initiate in 2023	Existing staff time, potential funding requests	Reports on research findings

Healthy Waters & Watersheds

Released November 2022





4 Healthy Waters & Watersheds

Utah is committed to maintaining and improving the health of our waters and watersheds throughout the state to support their function, importance, and uses.

Introduction

The name Utah is thought to be derived from the Native American word for Ute, meaning “the people of the mountains”.³⁷ Utah’s defining topography provides stunning vistas, diverse recreation opportunities, and significant economic and cultural advantages. Utah’s topography is also ideally suited to provide life-sustaining water to support our communities, agriculture, and wildlife. The state’s geographically limited, mountainous areas capture the bulk of Utah’s annual precipitation—stored in the form of snow. The mountain streams and rivers fill reservoirs, which store runoff for use throughout the year—allowing for abundant life in an otherwise arid climate. The areas that catch, collect, and hold our water supplies are known collectively as watersheds—defined by DWQ as the land area over which water flows or travels and then drains into a stream and its tributaries.³⁸

Utah is broken up into twelve different watersheds as defined by [Utah Code 73-10g-303, Watershed Councils Act](#). Most of the watersheds ultimately drain into the

Colorado River, Sevier River, or the Great Salt Lake.³⁹ According to DWQ, watersheds contain more than 16,000 miles of rivers, streams, and their associated floodplains, 3,000 lakes and reservoirs, and around 510,000 acres of wetlands.⁴⁰ The health of our watersheds has an immense impact on the lives of Utah residents. It affects the quantity and quality of water supplies, the productivity of rangelands, the health of wildlife, resilience to wildfire, and the quality of outdoor recreation.

For purposes of this chapter, a healthy watershed is one where the land cover supports hydrologic processes within their natural range of variability and provides water filtration, natural storage, nutrient cycling, carbon storage, sedimentation control, wildlife habitat and movement corridors, timber, and forage. A healthy watershed is resilient to drought, fire, and invasive species. It should sustain a variety of environments and forms of life.

Effective and efficient management of our waters and watersheds is a vital part of keeping

our drinking water clean, supporting healthy ecosystems, and providing sufficient quality and quantities of water for drinking, agriculture, fishing and recreation, and commercial uses in Utah. Management should encompass the entire water cycle—from ridgeline to shoreline, including our aquifers.

The Role of the State

Maintaining and improving the health of our waters and the vast geographic areas that comprise Utah’s watersheds requires significant expertise, resources, and coordination. Ensuring the health of our waters and watersheds will require a concerted effort from landowners, a range of professional disciplines, and often multiple levels of government. Additionally, restoration of some watersheds will require many years or even decades. Management will require strong leadership and committed partnerships.

The state of Utah has three primary roles in supporting healthy waters and watersheds in Utah.

1. Preparing the State for Growth

Access to adequate quantities of high-quality water is foundational to Utah’s economic and social success. As Utah continues to experience rapid population growth, greater demands will be placed on watersheds to provide adequate water supply, maintain water quality, and meet recreational demands. State agencies will continue to play a pivotal role in planning ahead to ensure waters and watersheds remain resilient and able to provide vital benefits.

Watershed studies have shown that approximately 95 percent of the state’s water supply is generated from winter snowpack in the mountains.⁴¹ Watersheds play a crucial role in providing our water supply through both surface runoff and groundwater infiltration. The state will continue to be an active partner in implementing strategies to maximize and protect our water

supply. These include permitting processes that reduce impacts on waters, ecosystem restoration projects, wildfire management, preservation of aquifer recharge areas, and protection of both surface and groundwater sources for drinking water.

Utah is a mecca for outdoor recreation. For many residents, Utah’s waters and watersheds and the outdoor recreation opportunities they provide are key aspects of Utah’s quality of life. As our population grows, demand for recreation and visitation to watersheds will increase as well. Planning for growth must include appropriate recreation services and public education to minimize impacts such as human waste, erosion, and human-caused wildfire. Utah agencies play a critical role both in directly managing outdoor recreation and coordinating with federal agencies and private landowners to ensure responsible recreation.

While we often think of a watershed as being limited to the forests and mountains, we all live within a watershed. As our population continues to increase, more of our watershed will be developed. Hardening the landscape through construction of roads and buildings prevents water from being absorbed and naturally filtered by soil. Instead, water flows into storm drains, often picking up pollutants along the way. Preparing communities for growth and protecting water quality will involve improved stormwater management.

Local governments, as the land use authority, should be cognizant of how development decisions affect the watershed. However, watersheds are geographically larger scale than cities, and watershed management usually requires skills and resources beyond the scope of most city governments. State resources, expertise, and technical assistance will likely be required to achieve watershed objectives. State-led cooperation, coordination, and education will be necessary to maintain

watershed health along with water quality and quantity in the face of urban development.

State agencies can work with local governments to develop resilient infrastructure and design communities in such a way that contemplates the natural water cycle. State agencies can provide technical assistance as communities implement stream buffers, protect floodplains and wetlands, and design flood control systems for their communities.

Approximately 63 percent of Utah's land mass is under the ownership and administration of the federal government.⁴² Most of these public lands are within the jurisdictions of the Bureau of Land Management (BLM) and the US Forest Service (USFS). The state recognizes that federal agencies are mandated to manage public lands according to federal laws, policies, and regulations, including, but not limited to, the Federal Land Policy and Management Act (FLPMA), the National Forest Management Act (NFMA), and the National Environmental Policy Act (NEPA). State and local agencies should become cooperating agencies during land use and NEPA planning processes. Working with federal agencies to establish a role for the state as a cooperating agency is the best way to participate in the federal planning process and articulate and implement the interests of state, local and tribal governments.

2. Protecting and enhancing resources that are of importance to the public.

Few public resources are as important as water. In addition to providing drinking water, Utah's watersheds provide outdoor recreation, wildlife habitat, grazing lands, irrigation water for feed and food production, and wastewater management. To protect and enhance these uses and ensure the quality and quantity of Utah's water resources, state agencies perform a vital role in monitoring and managing the health of our watersheds and aquatic ecosystems.

Currently, DEQ reports that 43 percent of Utah's waters are considered impaired—including 57 impaired drinking water sources.⁴³ The state operates several programs aimed at protecting and improving water quality and watershed health.

Division of Water Quality

DWQ's mission is to safeguard and improve Utah's water quality through balanced regulation. DWQ works to protect Utah's water quality for drinking, recreation, aquatic wildlife, and agricultural beneficial uses. DWQ regularly monitors and assesses the state's streams and lakes to ensure these beneficial uses are supported. Water quality data are used to identify impaired waterbodies and establish water quality goals for implementing projects to restore or protect water quality. For point source discharges such as wastewater, stormwater, and groundwater, DWQ issues and enforces permits for any entity that discharges to waters of the state. The DWQ also oversees the [Section 401 Water Quality Certification program](#). The purpose of the 401 Water Quality Certification program is to ensure that federally permitted or licensed activities (such as 404 permits issued by the U.S. Army Corps of Engineers (USACE)) will be conducted in a manner that will comply with applicable Utah discharge and water quality requirements in order to maintain the chemical, physical, and biological integrity of waters affected by the project. For nonpoint sources or diffuse sources of water quality pollution, Utah's [Nonpoint Source \(NPS\)](#) program is focused on improving the water quality of impaired waterbodies through a nonregulatory, voluntary, and incentive-based approach. The incentive offered to cooperators is financial assistance to offset the cost of implementing projects that protect and improve water quality. These projects employ a suite of Best Management Practices (BMPs) and follow the watershed-based planning strategy contained within the Statewide NPS Management Plan.

Division of Drinking Water

The Division of Drinking Water (DDW) safeguards the quality and quantity of Utah's drinking water through balanced regulation and public assistance. DDW works with water systems to approve drinking water source protection plans. These plans determine what areas must be protected and the extent of necessary protection. Within these protection zones, various activities or facilities may be restricted if they have the ability to contaminate the drinking water source.

Division of Wildlife Resources

The DWR has the primary responsibility for managing wildlife in Utah. This includes species that are hunted and fished as well as those species that are not and are managed under Utah's Wildlife Action Plan (UWAP). UWAP identifies species and their habitats in need of conservation attention and is an Endangered Species Act (ESA) listing prevention tool. By maintaining healthy populations, the DWR and partners have prevented more than 20 ESA species listings over the past 25 years (The Power of Proactive Conservation 2018), which has kept management of these species under state control. Adequate water and healthy watersheds are necessary components to sustaining wildlife populations. DWR biologists track wildlife populations and, along with partners, implement on-the-ground habitat projects that improve watershed health. Some of these projects protect wildlife values through conservation easements, provide wildlife with necessary water, control invasive species, maintain and restore aquatic and terrestrial wildlife migration corridors, restore and enhance key wildlife habitats, and reduce or mitigate wildfires. These projects are implemented and funded by a myriad of partners through wildlife funding sources such as the Watershed Restoration Initiative, Habitat Council, Endangered Species Mitigation Fund, and the Utah Blue Ribbon Fisheries Program.

Division of Forestry, Fire and State Lands

The Division of Forestry, Fire and State Lands (FFSL) is responsible for forest health, responding to wildland fires, and managing sovereign lands in Utah. Sovereign land consists of the beds of Utah's navigable rivers and lakes—including the Jordan and Bear Rivers, as well as portions of the Colorado and Green Rivers. The beds of Great Salt Lake, Utah Lake, and Bear Lake are managed by FFSL under the "Public Trust" doctrine. Programs managed by FFSL include:

In 2012, the Catastrophic Wildfire Reduction Strategy (CatFire) created a process to protect the health and welfare of Utah's lands from the impacts of catastrophic wildfire. A key component of the process is identifying values at risk. In addition to homes and public infrastructure, regional work groups work to identify risks to watersheds as part of the prioritization process and fund projects to mitigate the risks.

The Utah Shared Stewardship agreement is a cooperative approach to managing Utah's forests. Through Shared Stewardship, FFSL, the Utah Public Lands Policy Coordinating Office (PLPCO), the USFS, and the Natural Resources Conservation Service (NRCS) cooperate to identify shared forest health priorities and combine resources to restore forests at the landscape scale and work with a variety of stakeholders, such as water conservation districts, private landowners, and counties to protect at-risk communities and watersheds.

Division of Water Resources

The DWRe's mission is to plan, conserve, develop, and protect Utah's water resources. DWRe fulfills this mission by overseeing the State Water Resources Plan, which includes planning at the river basin level; coordinating various water conservation programs with regional and local water providers; providing funding for mutual irrigation companies and other water providers to develop and conserve available water resources; and helping to ensure that all activities minimize

negative impacts to the states waters and related environments. Programs related to healthy waters and watersheds managed by DWRe include:

- The [Utah Watershed Councils Act](#) directs DWRe to facilitate the organization of twelve local watershed councils, including a council for the Great Salt Lake watershed council, and a statewide council. 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 that are not vested with regulatory, infrastructure financing, or enforcement powers or responsibilities.”
- The legislature directed DWRe to develop a Great Salt Lake Watershed Integrated Water Assessment. This assessment will look at the surface and groundwater hydrology of the lake and assess the water quantity and quality necessary to preserve the lake at various lake levels and under various future climate scenarios. The Assessment will help identify and fill critical data gaps and provide resources managers with the information and tools necessary to manage and preserve the lake for future generations.
- DWRe oversees the state’s [Weather Modification Program](#), which currently uses ground-based generators to seed clouds and enhance snowfall obtained from winter storms. This program has produced a 5-12 percent increase in snowpack in seeded areas, thus enhancing the water available for those watersheds.⁴⁴ Opportunities to expand existing cloud seeding operations to additional areas of the state, and using aircraft-based seeding could further enhance available snowpack and resulting runoff.

Department of Agriculture and Food

UDAF is one of the state’s oldest agencies. It oversees dozens of legislatively mandated programs that promote the healthy growth of Utah agriculture, the conservation of our natural resources, and the protection of our food supply. UDAF manages several programs focused on improving the health of our rangelands and watersheds.

The [Agricultural Voluntary Incentives Program](#) (AgVIP) incentivizes farming operations to develop Comprehensive Nutrient Management Plans that will allow them to implement practices that can increase crop yields, improve soil health, and add value to operations while improving water quality.

The [Grazing Improvement Program \(GIP\)](#) seeks to improve the productivity, health, and sustainability of our rangelands and watersheds. It’s believed that well-planned and managed livestock grazing is the most important landscape-scale tool for maintaining healthy rangelands, watersheds, and wildlife habitats. The goal of the GIP program is to strengthen Utah’s livestock industry, improve rural economies, and enhance the environment.

The [Agricultural Water Optimization Program](#) helps optimize water used by agricultural producers throughout the state through the installation of more efficient irrigation systems and water conveyance structures. This has the potential to reduce the amount of water being diverted from streams, rivers, and reservoirs, while maintaining crop production. Increased in-stream flow can help improve water quality and habitat for wildlife. It also opens up the discussion for water banking, which would allow other entities within the watershed to lease water from agricultural producers, while protecting that producer’s water rights.

The [Soil Health Program](#) is a voluntary effort focused on using education, outreach, on-farm

demonstration, and implementation to improve the health of Utah soils. Healthy soils resist water and wind erosion, properly store and cycle nutrients, resist drought and flooding, and play a critical part of the water cycle. The program advocates the adoption of soil health practices including no-till, cover crops, soil amendments, and livestock integration to build soil health and improve overall agricultural production.

Public Lands Policy Coordination Office

PLPCO coordinates, promotes, and implements Utah's public land priorities through coordination and cooperation with federal, state, local, and tribal governments. PLPCO legal counsel represents the public land-related legal interests of the state in coordination with the Utah Attorney General's Office. In order to clearly articulate local public land management priorities, the state of Utah and all 29 counties have adopted Resource Management Plans containing topic-specific goals, objectives, and policies that are utilized to elevate coordination and cooperation efforts statewide.

The [Resource Development Coordinating Committee](#) (RDCC) is staffed by a PLPCO employee and includes representatives from state agencies involved in public lands and natural resources management. Committee members communicate through the RDCC platform by submitting projects for review or by commenting on federal, state, or local proposed actions. The RDCC staff member coordinates state agency comments in order to publish unified state comments for specific federal actions impacting the state. This process allows the state to speak with "one voice" on the majority of federal actions occurring on Utah's public lands.

Utah Geological Survey

Utah Geological Survey's (UGS) mission is to provide timely scientific information about Utah's geologic environment, resources, and hazards, which includes groundwater and wetland resources. Hydrogeologists at UGS evaluate

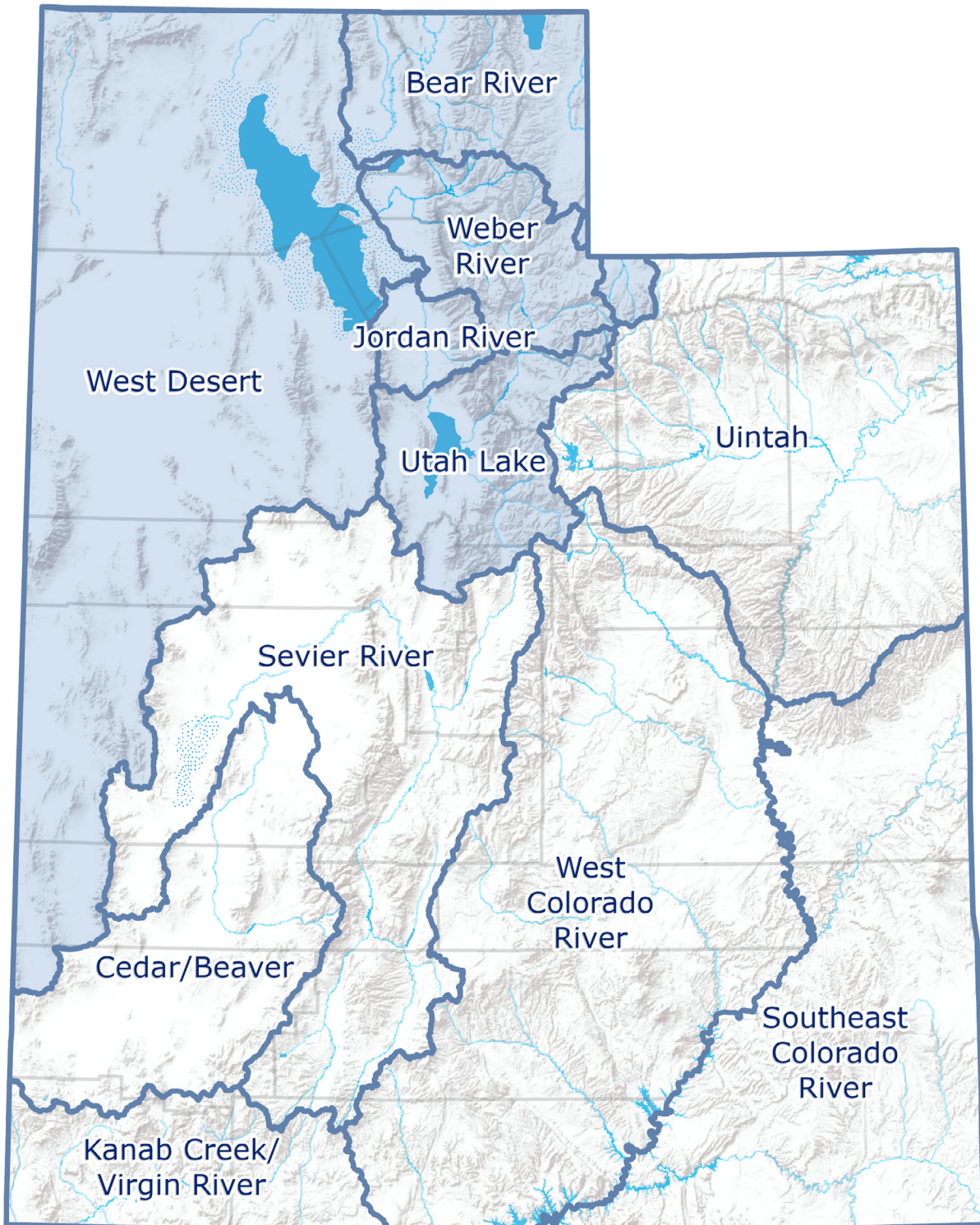
the effects of environmental restoration on water yield, estimate water budgets of groundwater basins to help determine sustainable yield, collect data to petition for aquifer classification, and determine appropriate septic tank density for growing communities while protecting groundwater quality. UGS also runs the state's wetland program, which is focused on wetland mapping, conducting wetland field assessments, and hydrologic monitoring of important wetland resources, as well as serving as a resource for wetland information for state and federal partners and the public.

Division of Water Rights

In addition to administering water rights throughout the state, the DWRi also manages the state's Stream Alteration Program. In the state of Utah, any alteration to the bed or banks of a stream or river requires the authorization of the state engineer. Additionally, DWRi maintains a joint permit with the US Army Corps of Engineers which allows many applicants to obtain both state and federal approval under Section 404 of the Clean Water Act. Through the stream alteration permitting process, the state engineer provides a balanced review of proposed modifications by considering existing water rights, public recreational use, aquatic wildlife and flood control.

3. Assisting in the development of projects that require the convening and facilitation power of the state.

Utah's watersheds cover vast geographic areas that cross political and jurisdictional boundaries and contain myriad uses, management authorities, and land ownership. A holistic approach to managing our watershed requires purposeful coordination and cooperation with many partners and across many programs. State leadership is critical to convene these diverse stakeholders and coordinate between programs. Utah thrives on cooperation and has created



□ 11 Utah Watershed Councils

■ Great Salt Lake Watershed Council

Source: DWRe, 2022

strategic programs and frameworks to bring together stakeholders and resources to improve watershed health.

Watershed Councils

In 2020, the legislature passed [HB 166, Watershed Councils Act. \(T. Hawkes\)](#), which authorized and directed the DWR to create the statewide Utah Watersheds 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 that are not vested with regulatory, infrastructure financing, or enforcement powers or responsibilities.” The statewide Utah Watersheds Council has been formed and several local watershed councils are on track to be established by early 2023. Local watershed councils are not required, but if established, will provide local stakeholders with meaningful opportunities to coordinate and collaborate on important watershed issues and projects.

Shared Stewardship

[Shared Stewardship](#) is a cooperative approach to managing Utah’s forests. Utah’s Shared Stewardship agreement provides a framework for the state (FFSL and PLPCO), the USFS, and the NRCS to work together to identify forest health priorities that focus on restoration projects. The seven pillars of Utah’s Shared Stewardship action plan are shared decision-making, fire communications, increased treatments, cross-boundary coordination, focus on economic development, prevention of human-caused fires, and convening and involving partners.

Watershed Restoration Initiative

[Watershed Restoration Initiative](#) (WRI) is a partnership-based program in Utah to improve high-priority watersheds throughout the state. To date, WRI has leveraged nearly \$350 million from over 700 unique partners to complete over 2,500 projects across more than 2.3 million acres of land.⁴⁵ Since 2006, WRI has used

local partnerships to identify and complete priority projects focused on improving three key ecosystem values. These are watershed health and biological diversity, water quality and yield, and opportunities for sustainable uses of natural resources.

Federal Resources and Interstate Streams

Due to the scale of Utah’s watersheds, interstate streams, and challenges such as the Great Salt Lake and the Colorado River, it is imperative that Utah coordinate with federal agencies and leverage federal funding opportunities. Because many of watersheds cross state boundaries, state agencies must coordinate with other states on cross-jurisdictional issues such as interstate streams and water quality.

The recently formed Colorado River Authority of Utah works with federal agencies and other states within the Colorado River Basin on Colorado River issues. DWR supports the work of the Authority and is also actively engaged with the Bear River Commission to help ensure Utah’s interests in the Bear River are protected. DWR and the Attorney General’s Office provide significant input and guidance for both these important efforts.

The state is also working closely with federal agencies to coordinate the many efforts related to the Great Salt Lake and leverage available federal resources to fund data collection, improve groundwater modeling, and study various other aspects of the lake. As part of this effort, DWR has applied for funding through the U.S. Bureau of Reclamation (USBR) to conduct a comprehensive basin study of the Great Salt Lake Basin. This funding would help to directly leverage \$5 million in state funds made available by the legislature for a Great Salt Lake Watershed Integrated Water Assessment. In addition, the federal Inflation Reduction Act (IRA) specifically allocated \$4 billion to western state drought mitigation. Utah has the opportunity to work with federal agencies to ensure that a fair

share of the total funds are directed to addressing the Great Salt Lake, agriculture optimization, water conservation, and other efforts to protect Utah waters.

Tribal Reserved Water Rights

Utah is home to eight sovereign tribal nations, several of which reside on federally established reservations. Utah recognizes reserved rights associated with these reservations and is working to quantify these rights. The state of Utah and the Navajo Nation signed a water right agreement in 2022 securing 81,500 acre-feet plus financial funding for water development projects within the Nation. The Ute Tribe and the state of Utah are working toward an agreement building upon a previously decreed 144,000 acre-feet of water. In 2002, the reserved right of the Shivwits Band of the Paiute Tribe was finalized, recognizing 1,900 acre-feet. Utah is working to ensure that it is a good neighbor and partner to all tribes and nations and is committed to continuing reserved right negotiations.

Key Policy Issues

Interconnectedness of the Water System

Few things connect the entire state to the same extent as water. Through the network of streams carrying surface water and the invisible flow of groundwater beneath our feet, our water flows in an interconnected system. Water flowing from faucets in Utah's cities started its journey as precipitation in the mountains. This same water continues through the sewer system until it is ultimately discharged back into natural water bodies. There, water evaporating from lakes and reservoirs influences the weather, often through winter storms that drop snow on the state's mountain ranges, starting the cycle again. Impacts such as water withdrawals, forest management, catastrophic fire, mining, nutrient loading, pollution, or invasive species in one part of the watershed can impact a significant geographic region and miles of connected waterways.

Interbasin transfers have further connected waters and watersheds of the state. The Wasatch Front, for instance, is primarily served by three natural watersheds: the Bear River, Weber River, and Provo/Jordan River. Through the Central Utah Project, the Wasatch Front also receives significant quantities of water from the Upper Colorado River Basin from the South Slope of the Uinta Mountains. Adding all watersheds, the Wasatch Front's water supply comes from an area that is roughly 17,600 square miles—larger than the state of Maryland.⁴⁶

Water Quality And Harmful Algal Blooms

Harmful Algal Blooms (HABs) are one of the most visible impacts to our water quality. HABs form when naturally occurring cyanobacteria in the water multiply quickly to form green or blue-green water, scum, or mats. These algal blooms commonly occur in the late summer and fall when the combination of abundant sunlight, warm water temperatures, high nutrient levels, and stagnant or slow-moving waters allows blooms to proliferate. While not all blooms are toxic, some can produce potent cyanotoxins that pose serious health risks to humans and animals. When HABs do occur, water-based recreation is often shut down, and pets, livestock, and wildlife become at risk. DWQ notes that increases to temperatures, reductions in water quantity, and augmenting nutrients all increase the likelihood of these occurrences.⁴⁷

Given the negative impacts of HABs, and the other negative impacts of an overabundance of nutrients in our water bodies, managing watersheds to reduce the likelihood of blooms must remain a high priority. Preventative actions often focus on nutrient reduction. For example, state agencies can work with agricultural producers to develop nutrient management plans and ensure the proper use of fertilizers in both agricultural and municipal landscapes. Additionally, efforts to improve forest health and riparian vegetation can help filter nutrients, cool water temperatures, and augment water

supplies to reduce the triggers of harmful algal blooms. Implementing soil health practices such as no-till and cover crops can reduce the amount of soil sediment loss through protecting the soil surface from raindrop impact, and reducing the movement of nutrients by extracting and holding excess nutrients in an organic form outside the growing season.

Wetlands, Waters of the U.S., and Permitting

A wetland is land that is flooded or has a high water table during the growing season on a permanent or seasonal basis. Wetland hydrology is highly variable—wetlands may only be wet some years during all or part of the growing season, including spring flooding from snowmelt or late summer flooding from monsoonal rains. In general, wetlands are wet long enough to have distinct soils and vegetation and include habitats such as wet meadows, marshes, playas, fens, and willow thickets. Wetlands provide habitat for many plants and animals in Utah, perform important functions to help keep our water clean and lessen the impact of floods, and support recreational activities such as bird watching and waterfowl hunting. Because of their importance, wetlands are protected by federal regulations, and many agencies and individuals are interested in conserving and restoring wetlands in Utah.

The federal government regulates impacts to waters of the United States (WOTUS), including streams, lakes, wetlands and their floodplains, under Section 404 of the Clean Water Act. Typical actions that require permits include discharging dredge or fill material into wetlands, constructing residential, commercial, or recreational developments, building levees, dams and dikes, and installing underground utility lines. Some activities are exempt from permitting requirements, including many routine farming practices. To obtain a permit, applicants must show how they are avoiding or minimizing impacts to wetlands and other WOTUS to the extent that they can and, in many cases, come up with a plan to mitigate any loss of aquatic

features. The U.S. Army Corps of Engineers (USACE) runs the Section 404 program, though small impacts to stream beds or banks are permitted through the DWR's Stream Alteration Program under an agreement with USACE and do not require any mitigation.

The state plays a role in wetland permitting in several ways. First, the state can coordinate with the USACE and other federal agencies on larger permitting decisions, providing input on the effects of proposed activities on endangered species, water quality, and other environmental issues and making recommendations for appropriate mitigation. DWR Impact Analysis Biologists are often a lead stakeholder for the state in these conversations.

Second, DWQ administers the Water Quality Certification program. Under Section 401 of the Clean Water Act, a federal agency may not issue a permit or license that may result in a discharge into waters of the United States unless there is a certification issued, or certification is waived, indicating that the permit will comply with applicable state water quality regulations. Section 404 permits are one common permit type subject to Section 401 certification. Last, the state can play a role in carrying out any aspect of required mitigation, from recommending mitigation projects to designing and carrying out restoration to holding fee title or easements for property that has been mitigated.

UGS recently received funding from the legislature to explore the value and feasibility of creating a wetland in-lieu-fee (ILF) program. Under such a program, applicants who applied for a permit to impact wetlands and streams could pay a fee to the program rather than designing and carrying out their own mitigation. The ILF program would then combine funds from multiple small impacts to design larger and higher-value projects that would align with state goals, such as preventing species listing and improving water quality. An ILF program would also provide more

regulatory certainty and faster processing times for permittees, including, notably, UDOT, which accounts for a larger percent of aquatic impacts that require mitigation.

One challenging aspect of wetland regulation occurring at the federal level is that the exact definition of waters protected by the Clean Water Act has been under flux due to both vastly different rules defining WOTUS published by the federal government under different administrations and a series of Supreme Court decisions. Isolated spring systems and other wetlands that are not connected to larger streams and lakes are not protected under most interpretations of the law, even though these systems can serve as critical habitat for native species like spring snails and amphibians and are often the only reliable water sources for wildlife in certain geographies. Furthermore, under some interpretations, very few wetlands and streams in the West Desert and Sevier Basin have any legal protections. Some local governments have enacted their own regulations to protect wetlands, streams, and other aquatic features to provide more regulatory certainty and ensure consistent protection. Statewide regulations could enhance these efforts to create a consistent framework across the state.

In Utah, existing federal regulations only protect wetlands from being filled and converted into uplands or development. One of the largest threats to wetlands in Utah is loss of water due to water diversions, groundwater pumping, artificial drainage, development, and impacts from drought. Some creative solutions for wetlands and aquatic systems are discussed below.

Instream Flows And Riparian Aquatic Ecosystems

Riparian zones are the lands adjacent to streams and lakes, including the floodplain, and contain vegetation types and densities that are shaped by the presence of water. Riparian zones provide critical habitat and ecosystem services such as

wildlife habitat, nutrient and sediment filtration, streambank stabilization, and recreation.⁴⁸ Unsurprisingly, these ecosystems depend on adequate supplies of water to perform their functions. While not all riparian zones in Utah are considered true wetlands, and thus are not regulated by the federal government under the Clean Water Act, riparian zones and wetlands provide many of the same ecosystem processes needed for healthy watersheds.

[HB 33, Instream Flow Amendments, \(J. Ferry\)](#) from the 2022 Legislative Session refined the state's instream flow statutes and expanded the state agencies (including FFSL) that may hold water rights for instream flows. This statutory change could provide unique opportunities to ensure adequate water supplies for wildlife and improve supplies to the Great Salt Lake. In addition, the bill removed the requirement that the state engineer distribute water for approved instream flow applications based on the priority of the change application. This creates greater flexibility within the system to ensure instream flows accomplish the desired outcome.

Having this legal framework in place is a groundbreaking step forward, but the work is not done. A second, and equally important, step is to identify thresholds for our aquatic ecosystems to maintain viable and thriving fish and wildlife populations. Third, acquiring the water rights to allow the water to remain instream will require functioning water markets and resources to purchase or lease the water from existing water rights holders. And finally, adequate measuring devices will be crucial to ensure that instream flows can be shepherded through the hydrologic system to their destination as intended.

An additional tool established through legislative action is the creation of water banks. In 2020, [SB 26, Water Banking Amendments, \(J. Iwamoto\)](#) established the statutory guidelines to allow a water rights holder to temporarily lease unneeded water for application toward another beneficial

use. This legislation enables the creation of water markets that could allow for more water to remain instream, and for the cost of water to more accurately reflect its value.

In addition to providing habitat, riparian zones also function as natural infrastructure that provide critical services such as reducing the impact of flooding, stabilizing streambanks and reducing erosion, and filtering nutrients and pollutants. Watershed management must include proactive planning for our floodways and riparian zones throughout the watershed—particularly in urban environments.

While riparian zones represent less than two percent of the land area in the United States, they hold the greatest abundance of plant and animal species²³ They also serve as focal points for Utah residents due to their recreation, scenic, and wildlife viewing values. Given their high value relative to their geographic area, riparian zones hold strategic value and should be prioritized for conservation and restoration efforts.

Forest Health, Fire, and Water Quality and Quantity

Healthy waters and watersheds require healthy forests. Healthy and resilient forests improve water quantity and quality by filtering pollutants, absorbing nutrients, and minimizing erosion. Forest canopy provides wildlife habitat and cools the temperature of streams. When managed properly, a healthy forest will allow greater amounts of snow to accumulate and improve runoff rates so that water can be captured and stored for later use.

In addition to providing significant benefits, healthy and resilient forests reduce the risk of catastrophic fire. With the increase in the 1900s of fire suppression efforts and fire management objectives to keep wildfires small, most of the state's forest ecosystems have departed from historic conditions. Fire has not been allowed to perform its natural role on the landscape and

consequently, fuels have not been routinely consumed. The high fuel loads coupled with persistent drought, insect infestations, invasive species, and reduced timber harvests have exacerbated the unhealthy conditions of the forests, significantly increasing the potential for catastrophic wildfires. Consequently, when wildfires do occur, they are often more damaging with catastrophic consequences to ecosystems and communities.⁴⁹

Catastrophic wildfires significantly impact our landscapes, economy, air and water quality, and infrastructure and are considered the most preventable natural disaster facing Utah. A catastrophic wildfire sterilizes soils, strips vegetation of all foliage, and leads to erosion and sedimentation that contaminates our drinking water sources and damages water treatment facilities. Damage can last for years and create conditions that reduce snowpack, runoff, and water quality and cost taxpayers millions of dollars in restoration, remediation, and repair work. Reducing large fires in Utah will protect life, property, water quality, communities, economies, and the environment.

In the absence of a naturally occurring fire regime, active management of the state's watershed and forest ecosystems must be undertaken. These watersheds and ecosystems span state, federal, tribal, and private landownership across the state. No one agency can face the challenge of reducing wildfire risk alone—it requires a cross-boundary and cooperative process. Programs that involve state agencies, federal land managers, tribal governments, and private landowners such as the CatFire, the Shared Stewardship Initiative, and WRI are successfully mimicking natural fire regimes by reducing excess woody biomass and fuels through mechanical treatments, timber harvests, and carefully managed prescribed fire. Additionally, well-managed livestock grazing can serve as a tool to thin vegetation and reduce fine fuel loads while benefiting ranchers and

consumers in an ecologically sustainable manner. Using all available resources and tools will reduce the risk of catastrophic fire and protect our watersheds and drinking water.

Properly managed timber harvest remains a viable tool to manage forest health while providing economic benefits and jobs in rural communities. While state programs remain necessary, private industry has a vital role to play in achieving forest health. FFSL, through Shared Stewardship funds and its Forest Products and Businesses Program Coordinator, is working with private industry stakeholders and counties to identify ways to support the timber industry.

Groundwater Aquifers

A holistic approach to watersheds includes the subsurface aquifers that many communities rely on for drinking water. As water infiltrates the aquifer, natural processes help to filter contaminants. Once stored in the aquifer, these water supplies are not subject to the evaporative losses that impact surface water. They are also less susceptible to seasonal fluctuations and more resilient to drought. They are often ideal sources for culinary water. Many aquifers are not closed or static systems. Many tend to have broadly distributed recharge zones. They also have discharge zones which are typically located along streams. This groundwater discharge usually contributes cold water to natural stream flows, which is necessary for some cold water fisheries. It is important for Utah stakeholders to ensure that these discharge areas are protected and not overdrawn by new water development

Groundwater presents unique management challenges. Additional research and monitoring is needed to ensure sustainable use. Current statute requires the state engineer to administer groundwater basins according to safe yield to prevent depleting aquifers. Where groundwater withdrawals exceed long-term recharge, groundwater protection plans must be implemented. Groundwater quality is protected

for its beneficial uses by DWQ under the [Utah Water Quality Act](#). DWQ regulates underground injection of fluids into aquifer for a variety of purposes through their underground injection control program. Surface activities with the potential to contaminate groundwater aquifers are also regulated through a ground water permit program. These permit systems regulate aquifer users and their discharges to ensure protection as measured by the state's ground water quality standards.

Where water supplies and geologic conditions allow, managed aquifer recharge (MAR) or ASR provide a water storage alternative that leverages the benefits of groundwater and avoids the footprint and evaporation associated with reservoir storage. MAR and ASR are forms of conjunctive management that seek to optimize the use of both surface water and groundwater resources. Conjunctive use of surface and groundwater means to harmoniously optimize the use of both sources of water in order to minimize the undesirable physical, environmental and economical effects of each solution and to optimize the water demand and supply balance. For example, conjunctive management encourages the use of surface water when it is available and the intentional storage of excess runoff in aquifers for use later on when surface water supplies are diminished. Where feasible, the state encourages conjunctive management approaches and has permitting safeguards in place to protect groundwater quality and other water users.

Urban Watersheds & Drinking Water Supply

Each of Utah's cities and towns falls within a watershed, and we rely on these watersheds to support our communities and livelihoods. How our communities grow directly impacts our watersheds. Development patterns alter hydrologic patterns; impervious surfaces such as roads and buildings collect and concentrate runoff; and human activities produce nutrients, waste, and a myriad of pollutants.

One tool Utah communities are considering is Low Impact Development (LID). LID is a land development tool that works to manage stormwater as close to its source as possible. It employs principles such as preserving and recreating natural landscape features and minimizing effective imperviousness to create functional and appealing site drainage that treat stormwater as a local resource rather than a waste product. Strategies such as bioretention facilities, rain gardens, vegetated rooftops, rain barrels, and permeable hard surfaces like pavements and other hard surfaces help water be managed in a way that reduces the impact of built areas and promotes the natural movement of water within an ecosystem or watershed. Applied on a broad scale, LID can maintain or restore a watershed's hydrologic and ecological functions.⁵⁰

Whether we rely on surface water supplies or groundwater aquifers, watershed management is critical to ensure high-quality drinking water supplies. The [Safe Drinking Water Act](#) requires that states develop source water assessment programs to assess the risk of contamination of drinking water sources.⁵¹ Drinking water source protection plans must be reviewed and approved by DDW. Proactively planning and protecting our drinking water sources can improve our water quality and prevent costly water treatment, remediation, or replacement of drinking water sources.

As demand for water outpaces our supply, wastewater reuse has become an attractive alternative to bolster water supplies. Removing wastewater from the hydrologic cycle impacts different watersheds in unique ways. In the Great Salt Lake watershed, for instance, wastewater reuse could have negative impacts on lake levels. On the other hand, reusing wastewater may prevent the need for other water diversions and result in leaving cleaner water within the natural system. In the Colorado River basin, wastewater reuse may enable communities to

more effectively use our share of the Colorado River before it leaves the state. This too must be considered in the context of a connected river system and potential impacts to ecosystems downstream.

Invasive Species

An invasive species is a non-native species whose introduction does or is likely to cause economic or environmental harm.⁵² Common carp are one of the most widespread and problematic invasive species globally and have become established in most of Utah's waterways. These fish are considered ecosystem modifiers because they stir up the bottom sediments while feeding, which alter the aquatic environment to their favor and to the disadvantage of native species. Common carp have been especially problematic in Utah Lake where in the early 2000s they comprised more than 95 percent of the fish biomass in the lake and had essentially eliminated native aquatic plant growth, which is essential for young June sucker survival. In addition, high common carp densities in Utah Lake have been correlated with elevated phosphorus levels and decreased water quality. The June Sucker Recovery Implementation Program and partners have been working with a commercial fisheries company since 2009 to mechanically remove invasive common carp from Utah Lake. This program has been successful in reducing common carp biomass by 75 percent, which has resulted in native aquatic vegetation growth. As of 2022, more than \$5 million dollars have been spent to remove more than 29 million pounds of common carp from Utah Lake.⁵³

Quagga and zebra mussels also are highly invasive species that cause economic and environmental harm. When they invade lakes and reservoirs, they remove plankton from the water, which reduces food that is available for the fishery. When they die in large numbers, they stink and their sharp shells litter beaches. These mussels can plug water lines and once in the water delivery systems, it will cost millions of

dollars annually to remove them and keep pipes free, ultimately leading to higher utility bills. DWR and State Parks have been working hard to keep these mussels out of Utah's waterways through public education and boat inspection stations. As of 2022, quagga mussels have been kept to just one Utah water, Lake Powell, and boats leaving must adhere to the state's decontamination protocols.⁵⁴

Three invasive plants that are impacting our Utah waterways are Phragmites (Common Reed), Tamarisk (Salt Cedar), and Russian Olive. All three are highly invasive, water loving plants that have become established along many of Utah's rivers and lakes. Phragmites have invaded many Utah wetlands that surround our waterways and large control efforts are underway at Utah Lake and the Great Salt Lake wetlands to remove phragmites and restore native plant communities. Phragmites disrupt hydrology and sediment transport, thereby reducing water availability within wetlands. Phragmites convert diverse native habitat of sparse, patchy, low-lying vegetation and open water to impenetrable, dense, homogenous, and fire-prone vegetation with no open water, essentially removing all waterfowl and migratory bird habitat within wetlands as well as impeding access for recreation. Tamarisk, commonly known as salt cedar, is a non-native shrub or tree that grows in dense stands along our rivers and streams and is especially problematic along the Colorado and Green rivers and their tributaries. Tamarisk is an aggressive competitor that often develops into a monoculture stand that lowers water tables, displaces native vegetation and wildlife, alters soil salinity, and increases fire frequency. Russian Olive, like tamarisk, is a fast-growing, resilient tree that quickly spreads and overcrowds native vegetation. Once these plants are established in an area, they typically spread and persist without aggressive control measures. Control of these three non-native invasives is difficult and costly, but necessary to maintain healthy watersheds and conserve water.

Native species have, at times, become problematic. In the absence of disturbance, conifers have encroached into hundreds of thousands of acres of Utah's historical sagebrush and aspen habitats. Changes in land management, especially the changes in natural wildfire regimes, has allowed this conifer encroachment. The resulting loss of habitat reduces wildlife that depend on these important western ecosystems. For example, loss of sagebrush habitat by pinyon and juniper encroachment has negatively impacted sage grouse populations because of the crowding out of sagebrush, grasses, and forbs as well as increasing the frequency and severity of wildfires, which often leave landscapes vulnerable to non-native plant invasion. Conifer encroachment due to lack of appropriate management in both aspen and sagebrush systems has been shown to reduce overall water quantity and late season water availability. Utah firmly believes in actively managing our natural resources. Since 2006, Utah and its partners have completed active management projects improving over 700,000 acres of sagebrush habitat and over 100,000 acres of aspen habitat through Utah's Watershed Restoration Initiative.⁵⁵ This program leads the country in addressing habitat loss from conifer encroachment.

Multiple Use and Outdoor Recreation

Healthy waters and watersheds not only sustain life, they contribute immensely to the quality of life of all Utah residents and contribute substantially to Utah's image, economics, and visitation. In 2014, Southwick Associates estimated the value of wildlife-based recreation in Utah at \$2.9 billion per year.⁵⁶ Healthy waters and watersheds should be managed to provide multiple beneficial uses, including recreation access, fishing, swimming, drinking and irrigation water, and appropriately-managed commercial activities.

Utah's waters and watersheds attract millions of visitors annually. Over 60,000 boats are

registered in Utah and over 417,000 fishing licenses are sold each year to water-based recreationists.⁵⁷ Many more enjoy human-powered watercraft, swimming, and wildlife watching. The Uinta-Wasatch-Cache National Forest, adjacent to one of the fastest growing metropolitan areas in the United States and also a key watershed,⁵⁸ receives more than 9 million visitors per year⁵⁹—nearly as many as every Utah National Park combined.⁶⁰

Visitation of this magnitude creates unique challenges to manage impacts to the watershed. However, it also creates a unique opportunity to educate the public about watershed health and responsible recreation. As residents recreate in the watershed, they develop a sense of ownership and will feel more compelled to protect it. Effective, place-based education can help garner support for appropriate management practices that enhance residents' recreation experience and improve the health of our state's waters and watersheds.

Great Salt Lake

Few signs have become as emblematic of persisting drought in Utah as the receding shorelines of Great Salt Lake. The Great Salt Lake has undergone a stark transformation from the highest recorded elevation of 4,211.6 feet above sea level and the associated flooding concerns in the 1980s to the current lowest recorded elevation of 4,188.9 feet in October 2022.⁶¹ At an elevation of 4,200 feet, Great Salt Lake has a surface area of 1,608 square miles making it the 4th largest terminal lake in the world.⁶² Today, at an elevation of 4,188.9 the lake covers approximately 950 square miles.⁶³

Once considered by many to be “wasted” water that needed to be consumed prior to making it to the lakebed, we now recognize the vast economic and environmental benefits the lake provides. Because of the interconnected nature of watersheds, upstream water management directly impacts the Great Salt Lake. The

Bear River and Bear Lake support significant agricultural production. Growing municipal demands along the Wasatch Front rely heavily on reservoirs along the Weber and Provo Rivers that capture and retain natural runoff. Utah Lake and Jordan River feed the Great Salt Lake from the South, which are both facing water quality problems and HABs.

As the lake elevation subsides, significant negative impacts emerge to community health, future precipitation and snowpack, and to industries and wildlife populations that can be traced across the western hemisphere.

Economy

A healthy Great Salt Lake contributes approximately \$1.3 billion annually to Utah's economy and provides over 7,770 jobs.⁶⁴ The revenue and jobs derived from Great Salt Lake come from mineral extraction, aquaculture and recreation. Mineral extraction, primarily from evaporation ponds on the lake bed, includes production of salts and other minerals and metals. Aquaculture includes the annual harvest of brine shrimp eggs from Great Salt Lake. Recreation activities on the lake include boating, direct contact recreation, birding and other wildlife observation.

Great Salt Lake resources are important on a national and international scale. The lake is one of the largest sources of sulfate of potash (a premium fertilizer) in the Western Hemisphere. Magnesium metal extracted from Great Salt Lake provides 14 percent of the world's supply.⁶⁵ Between 40 and 45 percent of the world's brine shrimp eggs are harvested from Great Salt Lake and used in farmed shrimp and fish production.⁶⁶

Ecology

Over 10 million migratory shorebirds, waterbirds and waterfowl depend on Great Salt Lake habitat each year.⁶⁷ More than 330 bird species rest and nest on Great Salt Lake shores and they depend on the brine shrimp and brine flies as an essential

food source in their journey.⁶⁸ Great Salt Lake is an oasis in an otherwise arid environment and birds depend on its wetlands and open waters as they travel from as far north the arctic and as far south as Argentina.⁶⁹ Great Salt Lake has been identified as a critical link in the Pacific Flyway and a Western Hemisphere Shorebird Reserve Network Site. As terminal saline lakes disappear in the western United States, Great Salt Lake and its wetlands become an even more vital resource to migratory birds. As bird habitat and food sources decline due to lower Great Salt Lake levels and associated increase in salinity, impacts to local, regional, and international bird populations could be impacted. Many birds will be impacted by lake level declines including: waterfowl, eared grebes, shorebirds and colonial nesters such as American White Pelicans, Ibis and California Gulls.⁷⁰

Lake Effect Snow

“Utah...the greatest snow on earth” has long been a slogan for our state. The phrase is even found on Utah license plates. Contributing to the greatest snow on earth is the lake effect snow that falls predominantly to the south and east of Great Salt Lake during the cold winter months. Lake effect precipitation is precipitation that is produced or enhanced when cold air passes over a relatively warm body of water.⁷¹ Approximately five to eight percent of the snow that falls in the Wasatch Mountains each year is attributed to lake effect snow.⁷² To put this in perspective, approximately 27 to 45 inches of the average annual snowfall (537.8 inches from 2004 to 2018) at the Alta Ski Resort is attributed to lake effect snow.⁷³ Ski resorts, snowmobilers, and other backcountry recreationists benefit from lake effect snow. As the lake level declines, benefits to these groups and the industries that support their recreation decline as well. Over time, a decrease in lake effect snow could result in a decrease in the overall amount of water that makes it to Great Salt Lake and contributes to lake effect snow in future years.

Lakebed Dust

As Great Salt Lake water levels decline, more of the lakebed becomes exposed. The increase in lakebed surface area could generate more dust resulting in higher levels of air pollution. Particulate air pollution, PM10 and PM2.5, are associated with a variety of adverse health effects. The potential adverse health and environmental effects on particulate matter pollution include: increased respiratory symptoms, decreased lung function, aggravated asthma, and premature death in people with heart or lung disease.⁷⁴

In addition to adverse impacts to public health, lakebed dust can have other negative effects on our communities. Increased lakebed dust could also lead to decrease in snowpack as dust on snow blowing into the Wasatch Mountains results in decreased albedo (the proportion of light or radiation that is reflected by a surface). Snowmelt could accelerate by approximately one week due to increased dust.⁷⁵

Additionally, increased dust can impact agriculture, aviation industries and property values. As evidenced by drying terminal lakes around the world, the more dust generated from the exposed lakebed could impact crops and other agricultural products. Airport operations could be impacted by increased dust events that could decrease visibility, disrupt operations and pose safety risks. Declines in lake levels could also lead to a slight reduction (0.2 to 1.1 percent) in property values due to increases in dust and decreases in lake-related recreational opportunities.⁷⁶

Colorado River

The following is an overview of the current status of the Colorado River. More detailed information can be found on the [Colorado River Authority of Utah \(the Authority\) website](#). Helpful resources include a Colorado River [fact sheet](#), the Authority's [Colorado River Management Plan](#) and [FY 23 Work Plan](#), and much more.

Overview

The Colorado River is approximately 1,400 miles long and the basin is approximately 250,000 square miles.⁷⁷ This watershed is the largest basin in Utah, covering nearly half the state's land area at over 40,600 square miles.⁷⁸ The river is a life-sustaining resource across the Southwest. It provides water to almost 40 million people in 2 countries, 7 states, 30 federally recognized tribal nations, and irrigates nearly 5.5 million acres of farmland.⁷⁹

The Colorado River Basin is divided into two sub-basins. The Upper Basin includes the states of Wyoming, Colorado, New Mexico and Utah, while the Lower Basin includes Arizona, Nevada, California, and the Republic of Mexico. Both Utah and New Mexico also have lands in the Lower Basin, and Arizona has lands in the Upper Basin. Nearly 90 percent of Colorado River water originates in the mountains of the Upper Basin.⁸⁰ Colorado River water is used in Utah for drinking, agriculture, power generation, recreation, and supporting wildlife populations.

Of the state's total water supply, 27 percent comes from the Colorado River.⁸¹ The river may seem geographically distant and disconnected from the population centers along the Wasatch Front, but the water of the Colorado River has played a significant role in the Wasatch Front's ability to grow. Transbasin water delivery projects like the Central Utah Project transport large volumes of water from the Colorado River for use by Wasatch Front cities.

Within Utah, the majority of Colorado River water goes towards agriculture, which has allowed rural Utah communities to produce a variety of crops and sustain their economies. For a more detailed discussion of agricultural water in Utah, please see Chapter 3, Productive Agriculture.

The Colorado River is also a critical resource for a variety of plants and animals, including 14 native fish species, four of which are now

classified as endangered or threatened.⁸² These four fish—the Colorado pike minnow, razorback sucker, bonytail, and humpback chub—evolved in the Colorado River basin and exist nowhere else on earth.

Management History

Management of water within the river is governed by the Colorado River Compact, which was signed in 1922. The primary purpose of the Compact is “to provide for the equitable division and apportionment of the use of the waters of the Colorado River System”.⁸³

The 1922 Compact provides that the “States of the Upper Division will not cause the flow of the river at Lee Ferry to be depleted below an aggregate of 75,000,000 acre-feet for any period of ten consecutive years.” This is sometimes referred to as the “non-depletion obligation”. The 1922 Compact also provides that “present perfected rights to the beneficial use of waters of the Colorado River system are unimpaired by this compact.”

This multi-state agreement allocated a share of Colorado River water to each of the Upper and Lower Basin States. Unfortunately, this occurred during a historically wet period of time. Decreasing flows since that time have meant that the Compact over-allocated available water. The Upper Basin States have historically supplied and received credit for Colorado River flows to the Lower Basin in excess of their 1922 Compact obligations.⁸⁴ Additional management plans, agreements among the various states and Mexico have been signed in the years since these early compacts, and which provide additional governance and management direction for the river.

In the event the Upper Basin cannot meet its non-depletion obligation under the 1922 Compact and curtailment of Upper Basin uses becomes necessary, the extent of curtailment shall be in the quantities and at the times determined

by the Upper Colorado River Commission in accordance with the 1948 Upper Colorado River Basin Compact. Each Upper Division State (Utah, Wyoming, Colorado and New Mexico) will then determine how water users subject to the jurisdiction of each individual state will be required to help meet the state's curtailment obligation. Utah will administer curtailment within the state in accordance with Utah law and under the regulation of the state engineer.

Prolonged drought and low runoff conditions accelerated by climate change have led to historically low reservoir elevations at Lakes Powell and Mead. In spring of 2022, due to the possibility that Lake Powell would fall to critically low levels, potentially jeopardizing critical infrastructure and electricity production at the reservoir, the Upper Division States and the Bureau of Reclamation (Reclamation) initiated a Drought Response Operation (DROA) Plan to send approximately 500,000 acre-feet of water from Flaming Gorge Reservoir in Utah and Wyoming to Lake Powell and to recover that amount at Flaming Gorge once the hydrology improves. This action, combined with Reclamation retaining approximately 480,000 acre-feet of water at Lake Powell rather than releasing it downstream, will result in approximately 20 feet of elevation gain at Lake Powell.

Unfortunately, this combined operation has not been sufficient to address declining reservoir elevations. In June 2022, Reclamation Commissioner Camille Touton announced the need to reduce use in the Colorado River Basin by 2-4 million acre-feet in 2023 and gave the basin states a 60 day deadline to develop a plan for the reductions. While the Lower Basin has yet to propose a plan, the Upper Basin States have recently implemented a [5 Point Plan](#) which consists of the development of a potential 2023 DROA Plan; reauthorization of a system conservation pilot program to fund temporary, voluntary and compensated

conservation of consumptive uses in the Upper Basin; consideration of an Upper Basin demand management program pursuant to the 2019 Drought Contingency Plan to shepherd and store temporarily, voluntarily and compensated conserved volumes of water at Lake Powell; to secure federal funding through the Infrastructure Investment and Jobs Act; and to continue aggressive water management in the Upper Basin.

Finally, the 2007 Interim Guidelines, the criteria governing the operation of the Colorado River, including the coordinated operations of Lakes Powell and Mead, will expire in 2026. Discussions are underway among the Basin States, the United States and key stakeholders, including the Colorado River Tribes, about how to begin the negotiation of the post-2026 operational criteria. At present, the focus of Basin States discussions has been on addressing critical reservoir elevations and rapidly declining hydrology in the immediate term.

Tribal Reserved Water Rights

In addition to the many states that rely on the Colorado River for water, 30 sovereign tribal nations also depend on the river to support their communities. Tribal water rights are assessed against the Colorado River apportionment of the state in which the Tribe's lands are situated. Four tribes in Utah have lands that sit within the Colorado River basin including the Navajo Nation, Ute Tribe, Ute Mountain Ute Tribe (White Mesa community) and the Shivwits band of the Paiute Tribe.

In March 2022, [SB 160, Colorado River Authority of Utah Amendments](#), (S. Chew) was signed by Gov. Cox, adding a tribal seat to the Colorado River Authority of Utah Board. It also amends the Authority Act by allowing for appropriate government-to-government consultation and coordination with Utah's Colorado River Tribes on matters related to the Authority's mission. In September 2022, Gov. Cox appointed Paul

Tsosie, a member of the Navajo Nation to the Authority Board.

Dams, Reservoirs, and Hydroelectricity

The river is dammed in several locations, including Flaming Gorge and Glen Canyon within Utah. The Glen Canyon Dam that creates Lake Powell produces hydroelectric power that supports many communities. With a total capacity of 1,320 megawatts, Glen Canyon Powerplant produces around five billion kilowatt-hours of hydroelectric power annually which is distributed by the Western Area Power Administration to Wyoming, Utah, Colorado, New Mexico, Arizona, Nevada, and Nebraska.⁸⁵ In addition, revenues from production of hydropower help fund many important environmental programs associated with Glen and Grand canyons.

The ability to produce power relies on a sustained lake level elevation of 3,490 feet.⁸⁶ Levels below this cannot support the production of hydroelectric power and is referred to as “deadpool.” At the time of this writing, Lake Powell is approximately 45 feet away from deadpool.⁸⁷ Further downstream in Nevada, Hoover Dam that creates Lake Mead is in a similar situation.

To reduce the risk of Lake Powell and Lake Mead declining to critically low levels, the U.S. Department of the Interior called on the seven Colorado River Basin States of Wyoming, Colorado, Utah, New Mexico, Arizona, California, and Nevada to put drought contingency plans in place. The “Colorado River Drought Contingency Plan” was submitted to Congress on Mar. 19, 2019.

Drought, Conservation, and Future Water Development

The Colorado River system has experienced frequent cycles of drought and recovery throughout its history. Although Colorado River hydrology has been impacted by drought and climate change since 2000, over the past

century the river, together with storage, have provided sufficient water in both wet and dry cycles to meet established uses and compact requirements.

Both Lake Powell and Lake Mead have hit record low levels, which caused the federal government to take emergency action for the first time in 2022.⁸⁸ The U.S. Department of the Interior cut water use in the lower basin and sent more water downstream from reservoirs in the upper basin. As the drought continues, additional cuts are likely to occur.

Like the entire Colorado River community, Washington County faces ongoing shortages and a declining water supply. The state of Utah and Washington County are moving aggressively to develop all local water resources through conservation, water reuse, desalination, and agricultural optimization.

Washington County water providers are leading the way for aggressive water conservation in the state. Conservation efforts being undertaken include construction of new local storage facilities, investments in water reuse projects, updates to local landscaping regulations to require low water use plant choices. The state and water conservancy districts partners administer a turf buy-back program that provides homeowners with rebates for converting their landscaping from water intensive turf grass to low water use choices. This program has seen increasing demand every year.

After full implementation of these aggressive water conservation measures and projects, the state and Washington County remain committed to maintaining the Lake Powell Pipeline as a component of its long term water resource plan consistent with future hydrologic conditions on the Colorado River and future water agreements with the basin states.

Ecosystem Protection and Restoration Efforts

In addition to the important role of delivering life-sustaining water and electricity to thousands of people, the Colorado River supports a large ecosystem across the Southwestern United States.

There are 14 fish native to the Upper Basin, 4 of which are listed as endangered.⁸⁹ These native fish have evolved over millions of years to live in a flashy desert river system, withstanding both high and low flows. Many factors are impacting the health of the fishery including drought, invasive species, and human development including the construction of dams that have disrupted the seasonal water flow cycles of the river.

The Upper Colorado River Endangered Fish Recovery Program is a unique partnership of local, state, and federal agencies, water and power interests, and environmental groups working to recover endangered fish in the Upper Colorado River Basin while water development proceeds in accordance with federal and state laws and interstate compacts. The state of Utah has been a partner with the Upper Colorado River Program since 1999. DNR is directly contributing to the conservation of the Colorado, San Juan and Green rivers native fish populations. Representatives from DWR and DWR_e serve on committees, providing essential expertise and guidance to the Recovery Program.

The Recovery Program uses science-based, cooperative actions to assist in endangered fish recovery. These include: re-operating federal reservoirs to create and maintain habitat, working with irrigators to improve their water efficiency, constructing fish passages and fish screens, and removing invasive predatory fish. With its demonstrated successes, the Upper Colorado River Endangered Fish Recovery Program has become a national model for its cooperative conservation efforts to protect endangered species. In fact, similar, successful fish recovery

programs have been developed in the Utah Lake drainage to recover June sucker and in the Virgin River drainage to recover woundfin and Virgin River chub.

Rising salinity levels in the river are an additional threat to the health of the river system. The Colorado River Basin Salinity Control Act created the Colorado River Basin Salinity Control Program, and the Colorado River Basin Salinity Control Advisory Council. The Council consists of up to three members from each of the seven Colorado River Basin States. Governors of their respective states appoint the Council members. Since implementation of the Program, measures have been put in place which now reduce the annual salt load of the Colorado River by more than 1.2 million tons.⁹⁰

The challenges within the Colorado River basin are significant. The states and tribes that rely on the river are actively working to develop new strategies and solutions that can both meet the needs of a growing population as well as a thriving ecosystem for the many plants and animals that call the river home.

Utah must continue to cooperate with the river's many stakeholders to find common sense solutions that protect Utah's access to water and minimize impacts to downstream communities and ecosystems. Utah looks for multi-faceted solutions like conservation, efficiency, optimization, agriculture conversion and water development. This balanced approach will help meet water needs now and into the future.

Action Plan

Previous water planning efforts have identified over 200 unique recommendations to better secure Utah's water future. The implementation of many of these recommendations will require changes to state water law, other legislative actions, or partnerships with non-state entities. The intent of this report is to identify specific actions that Utah's executive branch can

undertake immediately to help move some of these many recommendations forward.

The state has identified five key priority actions, and associated implementation steps, to advance Utah's strategic goal to support healthy waters and watersheds.

ACTION
1 Maintain and improve efforts to cooperate with relevant agencies, policy makers, and land and water managers at the watershed scale to affect watershed health.

ACTION
2 Develop and enhance communications strategies and educational tools to assist the public in water conservation and help them understand their role in maintaining healthy watersheds.

ACTION
3 Improve our understanding of the critical thresholds impacting the Great Salt Lake and its tributaries, the Colorado River, and forest health, and develop management strategies to preserve and augment water supplies.

ACTION
4 Prioritize and target land conservation and restoration in riparian corridors, floodplains, and other areas with high values for watershed health, wildlife habitat, and public access and recreation.

ACTION
5 Control invasive plant and animal species to minimize water loss and restore natural ecosystems.

ACTION

1

Maintain and improve efforts to cooperate with relevant agencies, policy makers, and land and water managers at the watershed scale to affect watershed health.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Inventory state programs that could impact watershed health and determine how to align program goals with watershed health and education.	GOPB Executive Director, DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRe, DWQ, DDW, Div. of Recreation, local conservation districts, Utah Conservation Commission, NGOs involved in watershed restoration	2023	Existing staff time	Initial list completed
Implement Watershed Councils Act.	DNR Executive Director	DWRe, DWQ, representatives in equitable proportions for interests of water use	2022	Existing staff time, continuing support for Utah Watershed Council	Establish Utah Watershed Council at state level
Implement Watershed Councils Act.	DNR Executive Director	DWRe, DWQ, local landowners and water users	2025	Existing staff time, continuing support for each local council	Contact with representatives in all 12 local watershed areas

ACTION

2

Develop and enhance communications strategies and educational tools to assist the public in water conservation and help them understand their role in maintaining healthy watersheds.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Develop an incentive or certification system to recognize and award good stewardship efforts that benefit watershed health and/or the Great Salt Lake or other key water bodies.	DEQ Executive Director, DNR Executive Director, UDAF Commissioner	Watershed commissioners, Utah Watersheds Council, local watershed councils (when active), Division of Recreation, DWQ, DWR, FFSL, PLPCO	2023	Existing staff time, potential funding requests	Incentive program developed and being implemented
Coordinate with partners' efforts to deploy education materials in sensitive watersheds, riparian areas, and areas with high visitation across state programs.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	Cities, counties, NGOs, Division of Recreation, DWQ, DWR, FFSC, PLPCO	2024	Existing staff time	Educational program developed
Continue to develop tools and resources for cities and counties for considering water in land planning effort.	DNR Executive Director, GOPB Executive Director	DWRe, Cities, counties, NGOs, DWQ, DWR	2024	Existing staff time	Educational program developed
Develop tools and resources for cities, developers, and businesses for considering watershed impacts (timber harvest, ag, recreation guides, developers, etc.).	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWRe, DWQ, cities, counties, NGOs, federal partners	2025	Existing staff time, potential funding requests	Educational program developed
Coordinate messaging and branding across multiple efforts (e.g. Fire Sense, Gotta Go, Management Makes the Difference, OHV education, Hunters Ed, etc.).	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	PLPCO, DWQ, DWRe, FFSL, Div. of Recreation, Div. of State Parks, Utah Water Ways partnership, recreational users, NGOs, federal partners, cities and counties, outdoor promoters, businesses, agencies, equipment sales	2023	Existing staff time, Potential funding requests	Outreach resources and message content developed

ACTION

3

Improve our understanding of the critical thresholds impacting the Great Salt Lake and its tributaries, the Colorado River, and forest health, and develop management strategies to preserve and augment water supplies.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Identify critical knowledge gaps in our understanding of Utah’s lakes, rivers, wetlands and watersheds and identify research needs.	DNR Executive Director, DEQ Executive Director	FFSL, DWRe, DWR, DWQ, UGS, DWRI, CRAU	2023	Existing staff time	Prioritized list of research and data needs
Collaboratively develop and implement research proposals to address research needs and improve understanding of Utah’s water bodies.	DNR Executive Director, DEQ Executive Director	FFSL, DWRe, DWR, DWQ, UGS, DWRI, CRAU, Utah State University, University of Utah	2023	Existing staff time, Potential funding requests	Reports on research findings
Identify data needs to demonstrate the gains of holistic, watershed-scale, cross-jurisdictional approaches and wildlife connectivity, perhaps including a landscape level ecological departure remote sensing study.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner	DWR, PLPCO, WRI partnership, Shared Stewardship partnership	Ongoing	Potential funding request	Research proposal developed
Implement a pilot project to identify required flows to maintain ecosystem processes and identify year round flow needs for fish populations. Explore the California functional flow approach and consider how to tailor it for a Utah-specific watershed.	DNR Executive Director, DEQ Executive Director	DWR, UGS, DWQ, NGOs, universities, water conservancy districts, conservation districts	2024	Potential funding requests, Potential assistance from a university or consulting firm	Pilot project underway and being monitored
Explore Great Salt Lake lake level thresholds.	DNR Executive Director	FFSL, DWRe, DWR, DWQ	2026	Potential grant funding for assessment	Completed assessment
Complete the Great Salt Lake Comprehensive Management Plan.	DNR Executive Director, DEQ Executive Director	FFSL, DWQ, DWR, industries, NGOs, universities, federal partners	2026	Already funded	Completed plan

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Complete the Great Salt Lake watershed integrated water assessment.	DNR Executive Director	DWRe, DWRi, DWQ, water conservancy districts, water conservation districts, federal partners	2026	Already funded	Completed assessment
Explore forest health thresholds/ diagnostics as a means of prioritizing landscape-scale work. This could be similar to the Fire Risk and Values methodology created by the Shared Stewardship partnership.	DNR Executive Director	FFSL, WRI, Shared Stewardship, Federal partners	2024	Potential funding requests	Research proposal completed
Complete the Utah Lake Water Quality Study (ULWQS) and Implementation Plan with the goal of reducing excess nutrients/harmful algal blooms in order to protect the recreational, aquatic life and agricultural beneficial uses.	DEQ Executive Director	DWQ, Water Quality Board, Utah Lake Authority, ULWQS Steering Committee and Science Panel	2024	Already funded	Water Quality Standards are approved by the Water Quality Board and EPA. Plan is approved and supported by the Steering Committee, Utah Lake Authority and partners
Enhance and expand existing cloud seeding efforts.	DNR Executive Director	DWRe, Water Providers	Annually	Potential funding requests to enhance existing program	Existing program implemented and proposal for expansion or enhanced efforts developed.

ACTION

4

Prioritize and target land conservation and restoration in riparian corridors, floodplains, and other areas with high values for watershed health, wildlife habitat, and public access and recreation.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Inventory, support and expand programs and plans that could improve riparian corridors, floodplains, and other high-value areas, and determine which could incorporate watershed health into funding criteria and project prioritization.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner, GOPB Executive Director	DWR, DWQ, WRI, PLPCO, shared Stewardship, cities and counties, watershed groups, NGOs	2023	Existing staff time	Initial list completed
Explore opportunities for coordination and collaboration in riparian corridors to implement mutually identified goals and objectives.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner, GOPB Executive Director	DWQ, DWR, Division of Recreation, cities and counties, watershed groups, NGOs, private landowners, future watershed councils	2024	Existing staff time	Project-specific partnerships established
Invest state and federal funds, and encourage public-private partnerships to purchase conservation easements or compensate producers for development rights restrictions in key watersheds and riparian areas with multiple benefits.	DNR Executive Director, DEQ Executive Director, UDAF Commissioner, and GOPB	DWQ, DWR, Division of Recreation, cities and counties, watershed groups, NGOs, private landowners, grant providers	Initiate partnerships in 2024	Existing staff time, Federal grants, Potential state grants	Discussions underway to preserve critical riparian and watershed lands.
Determine how to include riparian and watershed health into County Resources Management Plans and community land use plans and ordinances. Work with local governments to incorporate.	DNR Executive Director, DEQ Executive Director, GOPB Executive Director	PLPCO, DWRe, cities and counties	2025	Existing staff time	County RMPs and City Master Plans include discussions about watershed health
Explore opportunity to create an in-lieu fee wetland mitigation program to improve mitigation and increase funding for stream and wetland restoration.	DNR Executive Director	UGS, WRI, DWR, FFSL, UDAF, DWQ	2023	Initial study already funded; potential funding request for project development	Initial study underway

ACTION 5 Control invasive plant and animal species to minimize water loss and restore natural ecosystems.

Task	Champion	Participants	Completion (CY)	Resources Needed	Benchmark
Support and expand the existing aquatic invasive species (AIS) program - mussels and additional species.	DNR Executive Director	DWR, recreation and sporting groups and users, federal partners, local river commission, water districts, NGOs	Ongoing	Potential future funding requests	No additional spread of invasive species
Support and expand the existing riparian vegetation restoration programs (e.g. tamarisk, russian olives, phragmites, etc.).	DNR Executive Director, DEQ Executive Director	FFSL, DWR, PLPCO, city and county weed management agencies, NGOs, watershed groups, water conservancy districts	Ongoing	Potential future funding requests	Demonstration of partnerships for effective management of forests and watersheds
Continue to strengthen partnerships to prevent the spread of noxious weeds in the watershed.	UDAF Commissioner	DWR, UDAF, FFSL, PLPCO, private homeowners and landowners, cities and counties, agricultural users, NGOs, watershed groups, water conservancy districts	Ongoing	Potential future funding requests	Demonstration of partnerships for effective management of forests and watersheds
Continue to strengthen partnerships to manage the encroachment of conifers into aspen and sagebrush systems.	DNR Executive Director	UDAF, DWR, FFSL, WRI, federal partners, private landowners, NGOs, water conservancy districts, coordinated resource management partnerships	Ongoing	Potential future funding requests	Demonstration of partnerships to properly managed forests and watersheds

Glossary & References



Glossary of Acronyms

AF	Acre-feet
AgVIP	Agricultural Voluntary Incentives Program
ARDL	Agriculture Resource Development Program
ARPA	American Rescue Plan Act
ASR	Aquifer Storage and Recovery
AUM	Animal Unit/Month
BLM	Bureau of Land Management
BMPs	Best Management Practices
CFS	Cubic feet per second
CIB	Permanent Community Impact Board
CNMPs	Comprehensive Nutrient Management Plans
CRAU	Colorado River Authority of Utah
CSA	Community Supported Agriculture
DDW	Division of Drinking Water
DEQ	Department of Environmental Quality
DNR	Department of Natural Resources
DROA	Drought Response Operation Plan
DWQ	Division of Water Quality
DWR	Division of Wildlife Resources
DWR _e	Division of Water Resources
DWR _i	Division of Water Rights
ESA	Endangered Species Act
FFSL	Division of Forestry Fire and State Lands
FLPMA	Federal Land Policy Management Act
FY	Fiscal Year
GIP	Grazing Improvement Program
Go Utah	Governor's Office of Economic Opportunity
GOPB	Governor's Office of Planning and Budget
HABs	Harmful Algal Blooms
HB	House Bill
HCR	House Continuing Resolution
ILF	In-Lieu Fee
IJA	Infrastructure Investment and Jobs Act
IRA	Inflation Reduction Act
LID	Low Impact Development
M&I	Municipal and Industrial
MAR	Managed aquifer recharge
NEPA	National Environmental Policy Act
NFMA	National Forest Management Act
NGOs	Non-governmental Organizations (non-profits)
NPS	Nonpoint Source
NRCS	Natural Resources Conservation Service

PLPCO	Public Lands Policy Coordinating Office
RDCC	Resource Development Coordinating Council
SB	Senate Bill
SWE	Snow Water Equivalent
SPI	Standardized Precipitation Index
UACD	Utah Association of Conservation Districts
UDAF	Utah Department of Agriculture and Food
UDOT	Utah Department of Transportation
UGS	Utah Geologic Survey
USACE	U.S. Army Corps of Engineers
USBR	U.S. Bureau of Reclamation
USEPA	U.S. Environmental Protection Agency
USFS	United States Forest Service
UWAP	Utah's Wildlife Action Plan
USU	Utah State University
WOTUS	Waters of the United States
WRI	Watershed Restoration Initiative

Endnotes

- 1 University of Nebraska-Lincoln. (n.d.). U.S. Drought Monitor. National Drought Mitigation Center. Retrieved October 3, 2022, from <https://droughtmonitor.unl.edu/>
- 2 U.S. Census Bureau. (2021, October 8). Utah Was Fastest-Growing State From 2010 to 2020. Census.gov. Retrieved October 3, 2022, from <https://www.census.gov/library/stories/state-by-state/utah-population-change-between-census-decade.html>
- 3 Kem C. Gardner Policy Institute. (2022). Population Projections. Retrieved October 7, 2022, from <https://gardner.utah.edu/demographics/population-projections/>
- 4 Utah Mapping Portal. (n.d.). Utah GIS Portal. Retrieved October 31, 2022, from <https://gis.utah.gov/data/cadastre/land-ownership/>
- 5 Ward, R. (2016, October). The Economic Contribution of Agriculture to the Utah Economy in 2014. Utah Department of Agriculture and Food. Retrieved October 3, 2022, from <https://ag.utah.gov/documents/Economic%20Contribution%20of%20Agriculture%20to%20the%20Utah%20Economy%202014.pdf>
- 6 Utah Division of Water Resources. (2021, December). 2021 Water Resources Plan. Retrieved October 3, 2022, from <https://water.utah.gov/2021waterplan/>
- 7 Governor's Water Strategy Advisory Team. (2017). Recommended State Water Strategy. Retrieved October 3, 2022, from <https://static1.squarespace.com/static/5c059ead36099b1445c1d246/t/5d0175481376fd00017313c4/1560376658209/Water+Strategy+PDF.pdf>
- 8 University of Nebraska-Lincoln. (n.d.). U.S. Drought Monitor. National Drought Mitigation Center. Retrieved October 3, 2022, from <https://droughtmonitor.unl.edu/>
- 9 Utah Division of Water Resources. (n.d.). Bear River Development. Retrieved October 31, 2022, from <https://water.utah.gov/bear-river-dev/>
- 10 Governor's Office of Planning and Budget. (2021, November). Gov. Cox FY 23 Budget Recommendations. Retrieved October 3, 2022, from <https://gopb.utah.gov/current-recommended-budget/>
- 11 Utah Foundation. (2019, October 2). Paying for Water: A Summary of the Series. Retrieved October 3, 2022, from <https://www.utahfoundation.org/reports/paying-for-water-a-summary-of-the-series/>
- 12 Governor's Water Strategy Advisory Team. (2017). Recommended State Water Strategy. Retrieved October 3, 2022, from <https://static1.squarespace.com/static/5c059ead36099b1445c1d246/t/5d0175481376fd00017313c4/1560376658209/Water+Strategy+PDF.pdf>
- 13 Utah Division of Water Quality. (2022). Final 2022 Integrated Report on Water Quality. Retrieved October 3, 2022, from <https://documents.deq.utah.gov/water-quality/monitoring-reporting/integrated-report/DWQ-2022-002386.pdf>

- 14 Utah Division of Water Resources. (2021, December). 2021 Water Resources Plan. Retrieved October 3, 2022, from <https://water.utah.gov/2021waterplan/>
- 15 Governor's Water Strategy Advisory Team. (2017). Recommended State Water Strategy. Retrieved October 3, 2022, from <https://static1.squarespace.com/static/5c059ead36099b1445c1d246/t/5d0175481376fd00017313c4/1560376658209/Water+Strategy+PDF.pdf>
- 16 Utah Legislature. (2017, September). Distribution of Sales Tax for Water, UCA 59-12-103. Retrieved October 6, 2022, from <https://le.utah.gov/interim/2017/pdf/00004085.pdf>
- 17 Governor's Office of Planning and Budget. (2021, November). Gov. Cox FY 23 Budget Recommendations. Retrieved October 3, 2022, from <https://gopb.utah.gov/current-recommended-budget/>
- 18 U.S. Department of Agriculture. (n.d.) National Agricultural Statistics Service - 2017 Census of Agriculture - Volume 1, Chapter 1: State Level Data. Retrieved October 3, 2022, from https://www.nass.usda.gov/Publications/AgCensus/2017/Full_Report/Volume_1,_Chapter_1_State_Level/Utah/
- 19 U.S. Census Bureau. (2021, October 8). Utah Was Fastest-Growing State From 2010 to 2020. Census.gov. Retrieved October 3, 2022, from <https://www.census.gov/library/stories/state-by-state/utah-population-change-between-census-decade.html>
- 20 Kem C. Gardner Policy Institute. (2022). Population Projections. Retrieved October 7, 2022, from <https://gardner.utah.edu/demographics/population-projections/>
- 21 Utah Division of Water Resources. (n.d.). Regional Water Conservation Goals Report Final. Conservewater.utah.gov. Retrieved October 3, 2022, from <https://conservewater.utah.gov/wp-content/uploads/2021/05/Regional-Water-Conservation-Goals-Report-Final.pdf>
- 22 Hansen, Allen, & Luce, Inc., & Bowen Collins & Associates, Inc. (2019). Utah's regional M&I Water Conservation Goals. <https://conservewater.utah.gov/wp-content/uploads/2021/05/Regional-Water-Conservation-Goals-Report-Final.pdf>
- 23 Ogden City. (n.d.). Adopt a River. Ogden, UT. Retrieved October 3, 2022, from <https://www.ogdencity.com/469/Adopt-a-River>
- 24 Utah Water Savers. (2022, December 26). Flip Your Strip. Retrieved October 3, 2022, from <https://utahwatersavers.com/Program/2/flip-your-strip#program-overview>
- 25 Western Resource Advocates. (2020, October 29). Accelerating the Implementation of Secondary Water Metering in Utah. Retrieved October 3, 2022, from <https://westernresourceadvocates.org/publications/accelerating-the-implementation-of-secondary-water-metering-in-utah/>
- 26 Langston, L. P. (n.d.). Who is number one: The department of workforce services releases its largest employer list for 2020. Utah Division of Workforce Services. Retrieved October 3, 2022, from <https://jobs.utah.gov/blog/post/2021/07/06/who-is-number-one-the-department-of-workforce-services-releases-its-largest-employer-list-for-2020>

- 27 City of Santaquin. (n.d.). Santaquin Wastewater Treatment Facility Information. Santaquin City. Retrieved October 31, 2022, from <https://www.santaquin.org/utilities/page/santaquin-wastewater-treatment-facility-information>
- 28 National Ready Mixed Concrete Association. (n.d.). Pervious Concrete for Green, Sustainable Porous and Permeable Stormwater Drainage :: Retrieved October 3, 2022, from <https://www.perviouspavement.org/>
- 29 Harvey, C., E&E News. (2022, February 15). Western 'Megadrought' Is the Worst in 1,200 Years. Scientific American. Retrieved October 3, 2022, from <https://www.scientificamerican.com/article/western-megadrought-is-the-worst-in-1-200-years/>
- 30 Utah Division of Water Resources. (2021, December). 2021 Water Resources Plan. Retrieved October 3, 2022, from <https://water.utah.gov/2021waterplan/>
- 31 Sun, T. (2016, January 8). Your Utah, your future - agriculture survey results. Your Utah, Your Future - Home. Retrieved July 14, 2022, from <https://yourutahyourfuture.org/topics/agriculture/item/31-your-utah-your-future-survey-results>
- 32 Utah Division of Water Resources. (2021, December). 2021 Water Resources Plan. Retrieved October 3, 2022, from <https://water.utah.gov/2021waterplan/>
- 33 Agricultural Water Optimization Task Force. (n.d.). 2021 Utah Agricultural Water Optimization Task Force. Utah Department of Agriculture and Food. Retrieved October 3, 2022, from <https://water.utah.gov/wp-content/uploads/2021/12/2021AgWaterOptTF-AnnualReport.pdf>
- 34 Agricultural Water Optimization Task Force. (n.d.). 2021 Utah Agricultural Water Optimization Task Force. Utah Department of Agriculture and Food. Retrieved October 3, 2022, from <https://water.utah.gov/wp-content/uploads/2021/12/2021AgWaterOptTF-AnnualReport.pdf>
- 35 United States Department of Agriculture National Agricultural Statistics Service Mountain Region, Utah Field Office. (2019). 2019 Utah Agricultural Statistics and Annual Summary. In Utah Department of Agriculture and Food. Retrieved October 6, 2022, from <https://ag.utah.gov/wp-content/uploads/2019/09/2019-Utah-Agricultural-Statistics-and-Annual-Summary.pdf>
- 36 Utah Agriculture Sustainability Task Force. (n.d.). Planning for Agriculture. Utah Department of Agriculture and Food. Retrieved October 3, 2022, from <https://ag.utah.gov/documents/Agtaskforce.pdf>
- 37 State of Utah. (n.d.). Utah Quick Facts. Utah.gov. Retrieved October 3, 2022, from <https://www.utah.gov/about/quick-facts.html>
- 38 Utah Department of Environmental Quality. (2019, July 18). Protecting Utah's Watersheds. Retrieved October 3, 2022, from <https://deq.utah.gov/public-interest/protecting-utahs-watersheds>

- 39 Utah State University. (n.d.). Utah Major Watersheds. Retrieved October 3, 2022, from <https://extension.usu.edu/waterquality/learnaboutsurfacewater/watersheds/utahmajorwatersheds#:~:text=UTAH%27S%20MAJOR%20WATERSHEDS,northwestern%20corner%20of%20the%20state>.
- 40 Utah Department of Environmental Quality. (2019, July 18). Protecting Utah's Watersheds. Retrieved October 3, 2022, from <https://deq.utah.gov/public-interest/protecting-utahs-watersheds>
- 41 Julander, R. P., & Clayton, J. A. (2018). Determining the proportion of streamflow that is generated by cold season processes versus summer rainfall in Utah, USA. *Journal of Hydrology: Regional Studies*, 17, 36–46. <https://doi.org/10.1016/j.ejrh.2018.04.005>
- 42 Utah Mapping Portal. (n.d.). Utah GIS Portal. Retrieved October 31, 2022, from <https://gis.utah.gov/data/cadastre/land-ownership/>
- 43 Utah Division of Water Quality. (2022). Final 2022 Integrated Report on Water Quality. Retrieved October 3, 2022, from <https://documents.deq.utah.gov/water-quality/monitoring-reporting/integrated-report/DWQ-2022-002386.pdf>
- 44 Utah Division of Water Resources. (2021, December). 2021 Water Resources Plan. Retrieved October 3, 2022, from <https://water.utah.gov/2021waterplan/>
- 45 Utah's Watershed Restoration Initiative. (n.d.). Utah's Watershed Restoration Initiative. Retrieved October 3, 2022, from <https://wri.utah.gov/wri/>
- 46 U.S. Census Bureau. (2010). State Area Measurements and Internal Point Coordinates. Retrieved October 3, 2022, from <https://www.census.gov/geographies/reference-files/2010/geo/state-area.html>
- 47 Utah Department of Environmental Quality. (2022, June 22). Learn About HABs. Retrieved October 3, 2022, from <https://deq.utah.gov/health-advisory-panel/about-habs>
- 48 U.S. National Park Service. (n.d.-b). Riparian Zones: Its all about the Water. Retrieved October 3, 2022, from https://www.nps.gov/articles/000/nrca_glca_2021_riparian.htm#:~:text=What%20are%20riparian%20zones%3F,by%20the%20presence%20of%20water
- 49 Utah Division of Forestry, Fire & State Lands. (2020). Utah Forest Action Plan. Utah Division of Forestry, Fire & State Lands. Retrieved October 11, 2022, from <https://ffsl.utah.gov/wp-content/uploads/FAP-2020-Final-12-30-2020-03.pdf>
- 50 U.S. Environmental Protection Agency. (2022, July 25). Urban Runoff: Low Impact Development. Retrieved October 3, 2022, from <https://www.epa.gov/nps/urban-runoff-low-impact-development>
- 51 Utah Division of Drinking Water. (2022, July 20). About the Drinking Water Source Protection Program. Retrieved October 3, 2022, from <https://deq.utah.gov/drinking-water/about-source-protection-program>

- 52 Invasive Species Advisory Council. (2006, April 27). Invasive Species Definition Clarification and Guidance. Department of the Interior. Retrieved October 3, 2022, from https://www.doi.gov/sites/doi.gov/files/uploads/isac_definitions_white_paper_rev.pdf
- 53 Walsworth, T. E., E. Wallace, and K. Landom. 2022. Common carp population response to ongoing control efforts in Utah Lake. Annual report submitted to the June Sucker Recovery Implementation Program. Utah State University, Logan.
- 54 Utah Division of Wildlife Resources. (2022, January 3). Invasive Mussels. Retrieved October 3, 2022, from <https://wildlife.utah.gov/fishing/invasive-mussels.html>
- 55 Utah's Watershed Restoration Initiative. (n.d.). Utah's Watershed Restoration Initiative. Retrieved October 3, 2022, from <https://wri.utah.gov/wri/>
- 56 Southwick Associates. (2014, January). January 2014 Newsletter. Retrieved October 3, 2022, from <https://www.southwickassociates.com/southwick-associates-january-2014-newsletter/>
- 57 Utah State Tax Commission. (n.d.). Vehicle Registrations - Recent Data. Retrieved October 31, 2022, from <https://tax.utah.gov/econstats/mv/registrations>
- 58 Statista. (2022, September 30). U.S. fastest growing metropolitan areas 2020-2021. Retrieved October 3, 2022, from <https://www.statista.com/statistics/431877/the-fastest-growing-metropolitan-areas-in-the-us/>
- 59 U.S. Forest Service. (n.d.). Welcome to the Uinta-Wasatch-Cache National Forest. Retrieved October 3, 2022, from <https://www.fs.usda.gov/uwcnf>
- 60 Leaver, J. (2022, February 10). Blog: Record Utah Park Visitation Spanned Seasons and Destinations in 2021. Kem C. Gardner Policy Institute. Retrieved October 3, 2022, from <https://gardner.utah.edu/blog-record-utah-park-visitation-spanned-seasons-and-destinations-in-2021/>
- 61 U.S. Geological Survey. (n.d.). Great Salt Lake Elevations. Retrieved October 3, 2022, from <https://www.usgs.gov/centers/utah-water-science-center/science/great-salt-lake-elevations>
- 62 Utah Division of Forestry, Fire & State Lands & SWCA. (2013, March). Final Great Salt Lake Comprehensive Management Plan and Record of Decision. Utah Division of Forestry, Fire & State Lands. Retrieved October 5, 2022, from <https://ffsl.utah.gov/wp-content/uploads/OnlineGSL-CMPandROD-March2013.pdf>
- 63 U.S. Geological Survey. (2022, October 3). USGS 10010100 GREAT SALT LAKE NEAR SALINE, UT. Retrieved October 3, 2022, from https://waterdata.usgs.gov/ut/nwis/uv?site_no=10010100
- 64 Bioeconomics, Inc. (2012, January 26). Economic Significance of the Great Salt Lake to the State of Utah. In Utah Department of Environmental Quality. Retrieved October 3, 2022, from <https://documents.deq.utah.gov/water-quality/standards-technical-services/great-salt-lake-advisory-council/Activities/DWQ-2012-006864.pdf>

- 65 Bioeconomics, Inc. (2012, January 26). Economic Significance of the Great Salt Lake to the State of Utah. In Utah Department of Environmental Quality. Retrieved October 3, 2022, from <https://documents.deq.utah.gov/water-quality/standards-technical-services/great-salt-lake-advisory-council/Activities/DWQ-2012-006864.pdf>
- 66 Hawkes, Tim. (2022, October 7). Personal communication.
- 67 Niell, John. (2022, October 6). Personal communication.
- 68 Sorensen, E.D., Hoven, H.M., Neill, J. (2020). Great Salt Lake Shorebirds, Their Habitats, and Food Base. In: Baxter, B., Butler, J. (eds) Great Salt Lake Biology. Springer, Cham. https://doi.org/10.1007/978-3-030-40352-2_9
- 69 Utah Division of Forestry, Fire & State Lands & SWCA. (2013, March). Final Great Salt Lake Comprehensive Management Plan and Record of Decision. Utah Division of Forestry, Fire & State Lands. Retrieved October 5, 2022, from <https://ffsl.utah.gov/wp-content/uploads/OnlineGSL-CMPandROD-March2013.pdf>
- 70 ECONorthwest. (2019, November). Assessment of Potential Costs of Declining Water Levels in Great Salt Lake. In Utah Department of Environmental Quality. Retrieved October 3, 2022, from <https://documents.deq.utah.gov/water-quality/standards-technical-services/great-salt-lake-advisory-council/activities/DWQ-2019-012913.pdf>
- 71 Yeager, K. N., Steenburgh, W. J., & Alcott, T. I. (2013, February). Contributions of Lake-Effect Periods to the Cool-Season Hydroclimate of the Great Salt Lake Basin. *Journal of Applied Meteorology and Climatology*, 52(2), 341–362. <https://doi.org/10.1175/jamc-d-12-077.1>
- 72 Yeager, K. N., Steenburgh, W. J., & Alcott, T. I. (2013, February). Contributions of Lake-Effect Periods to the Cool-Season Hydroclimate of the Great Salt Lake Basin. *Journal of Applied Meteorology and Climatology*, 52(2), 341–362. <https://doi.org/10.1175/jamc-d-12-077.1>
- 73 Alta Ski Area. (2019). Weather and Snow Report. Retrieved October 3, 2022, from <https://www.alta.com/weather#season-totals>
- 74 U.S. Environmental Protection Agency. (n.d.). Health and Environmental Effects of Particulate Matter (PM). Retrieved October 3, 2022, from <https://www.epa.gov/pm-pollution/health-and-environmental-effects-particulate-matter-pm>
- 75 ECONorthwest. (2019, November). Assessment of Potential Costs of Declining Water Levels in Great Salt Lake. In Utah Department of Environmental Quality. Retrieved October 3, 2022, from <https://documents.deq.utah.gov/water-quality/standards-technical-services/great-salt-lake-advisory-council/activities/DWQ-2019-012913.pdf>
- 76 ECONorthwest. (2019, November). Assessment of Potential Costs of Declining Water Levels in Great Salt Lake. In Utah Department of Environmental Quality. Retrieved October 3, 2022, from <https://documents.deq.utah.gov/water-quality/standards-technical-services/great-salt-lake-advisory-council/activities/DWQ-2019-012913.pdf>

- 77 Colorado River Authority of Utah. (n.d.). Colorado River Fact Sheet. Retrieved October 3, 2022, from <https://cra-utah.org/library/presentations/47-colorado-river-fact-sheet/file>
- 78 Utah State University. (n.d.). Utah Major Watersheds. Retrieved October 3, 2022, from <https://extension.usu.edu/waterquality/learnaboutsurfacewater/watersheds/utahmajorwatersheds#:~:text=UTAH%27S%20MAJOR%20WATERSHEDS,northwestern%20corner%20of%20the%20state>.
- 79 Colorado River Authority of Utah. (n.d.). Colorado River Fact Sheet. Retrieved October 3, 2022, from <https://cra-utah.org/library/presentations/47-colorado-river-fact-sheet/file>
- 80 Colorado River Authority of Utah. (n.d.). Colorado River Fact Sheet. Retrieved October 3, 2022, from <https://cra-utah.org/library/presentations/47-colorado-river-fact-sheet/file>
- 81 Colorado River Authority of Utah. (n.d.). Colorado River Fact Sheet. Retrieved October 3, 2022, from <https://cra-utah.org/library/presentations/47-colorado-river-fact-sheet/file>
- 82 U.S. National Park Service. (n.d.-a). Endangered Fish - Glen Canyon National Recreation Area. Retrieved October 3, 2022, from <https://www.nps.gov/glca/learn/nature/endangeredfish.htm>
- 83 U.S Bureau of Reclamation. (1922). Colorado River Compact.
- 84 Colorado River Authority of Utah. (n.d.). Colorado River Fact Sheet. Retrieved October 3, 2022, from <https://cra-utah.org/library/presentations/47-colorado-river-fact-sheet/file>
- 85 U.S. Bureau of Reclamation. (n.d.). Glen Canyon Unit. Retrieved October 3, 2022, from <https://www.usbr.gov/uc/rm/crsp/gc/>
- 86 U.S. Bureau of Reclamation. (n.d.-a). 5-Year Probabilistic Projections. Retrieved October 3, 2022, from <https://www.usbr.gov/lc/region/g4000/riverops/crss-5year-projections.html>
- 87 U.S. Bureau of Reclamation. (n.d.-a). 5-Year Probabilistic Projections. Retrieved October 3, 2022, from <https://www.usbr.gov/lc/region/g4000/riverops/crss-5year-projections.html>
- 88 U.S. Bureau of Reclamation. (n.d.). Glen Canyon Unit. Retrieved October 3, 2022, from <https://www.usbr.gov/uc/rm/crsp/gc/>
- 89 U.S. National Park Service. (n.d.-a). Endangered Fish - Glen Canyon National Recreation Area. Retrieved October 3, 2022, from <https://www.nps.gov/glca/learn/nature/endangeredfish.htm>
- 90 Colorado River Basin Salinity Control Forum - Home Page. (n.d.). Retrieved October 3, 2022, from <https://www.coloradoriversalinity.org/organization.php>

