

Chapter 2
WATER

Key issues facing Utah's water

- 2.A Bridging Science and Place in Utah's Water Future
- 2.B Dam Hazards in Utah
- 2.C The Future of Growing Water Smart
- 2.D Reducing Carp Biomass Initiates Beneficial Ecosystem Changes in Utah Lake
- 2.E Comparative Valuation of Water Rights to Restore Great Salt Lake Flows

Chapter Introduction

ANNA MCENTIRE

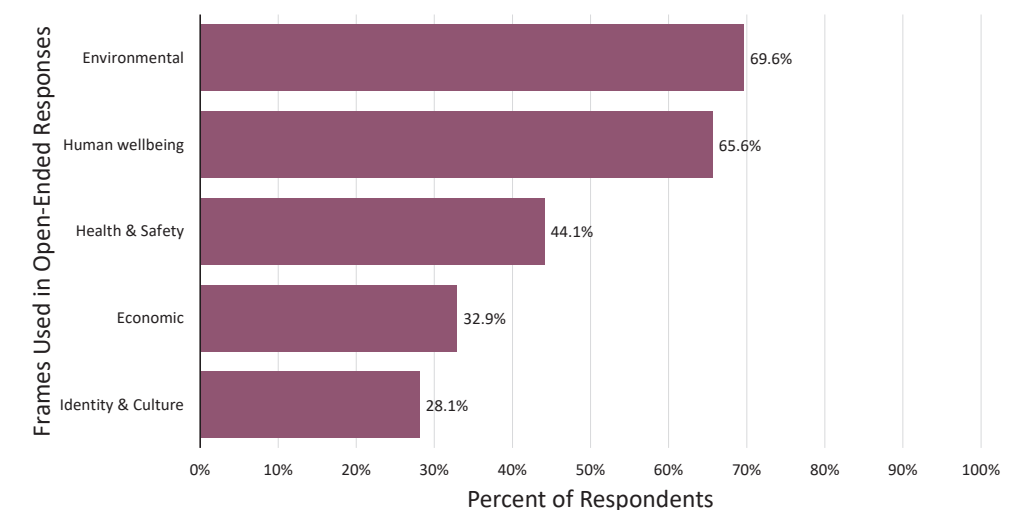
Water challenges in Utah are wide-ranging and deeply interconnected. They encompass concerns about quality, conservation, infrastructure, agricultural use, municipal growth, and new legal and policy tools. At the same time, water embodies an equally wide range of human values. Utahns view water through ecological, economic, and cultural lenses, and these perspectives shape expectations for policy.

Research on public opinion and engagement around Great Salt Lake demonstrates that people are highly concerned about the future of Utah's waters and want meaningful action taken. Importantly, these concerns do not coalesce around a single frame, but rather span multiple values—from protecting wildlife and ensuring future generations' wellbeing, to sustaining agriculture, industry, and recreation. This diversity of perspectives has created broad support for innovative legislation in recent years.

Equally critical are the ways people engage. Collaborative efforts across state agencies, universities, conservation groups, media, and communities—called boundary work—have created spaces where diverse voices can connect and reinforce action. The result is a more resilient system of decision-making that reflects both public concern and institutional leadership.

Utah's future water security will depend on harnessing this breadth of values and engagement. Doing so will enable the state to sustain reliable supplies, safeguard ecosystems, and maintain public trust.

Figure 2.1.1 Value Frames Utahns Associate With Great Salt Lake





PORCUPINE RESERVOIR | KORI ANN KURTZBORN

Bridging Science and Place in Utah's Water Future

ANNA MCENTIRE, MELISSA STAMP, LISA WELSH, JOANNA ENDTER-WADA, BURDETTE BARKER, BRIAN STEED, AND BETHANY NEILSON

Utah's diverse watersheds face unique water challenges, requiring regionally contextualized policies and community-specific tools.

Utah's watersheds differ dramatically in their water sources, stressors, and management needs. Statewide water strategies and conservation goals provide an important foundation, but Utah also needs watershed- and community-specific solutions that reflect local conditions. From the snowmelt-fed Weber River to the terminal Great Salt Lake, and from the desert tributaries of the Virgin River to the aquifers of Cedar City Valley, each watershed presents distinct challenges that require tailored approaches.

The Cedar/Beaver watershed provides a clear example of this need. In Cedar City Valley, decades of monitoring have shown steady declines in groundwater levels as local communities grow. Managing this trend has required careful long-term planning, including conservation programs, aquifer recharge projects, and a groundwater management plan designed to gradually bring withdrawals in line with safe yield. Just to the north, Beaver County

is more rural but equally water-dependent. Agriculture and grazing in this area are sensitive to drought cycles and aquifer conditions, making reliable groundwater supplies critical to both livelihoods and the county's economy.

Recognizing these shared but distinct challenges, the state has supported scientific studies to provide a clearer picture of groundwater availability and water use to guide future policy. These studies bring together hydrologic data, conservation opportunities, and community input to inform decision-making at both the county and regional levels. By aligning science, planning, and local perspectives, the Cedar/Beaver watershed illustrates how Utah can support sustainable growth in both urban and rural communities through watershed-specific strategies.

Taken together, such efforts underscore a central lesson: by clarifying regional goals and tailoring tools to local conditions, Utah can build durable water strategies across all of its diverse watersheds.



PINE VALLEY, UT | ANNA MCENTIRE

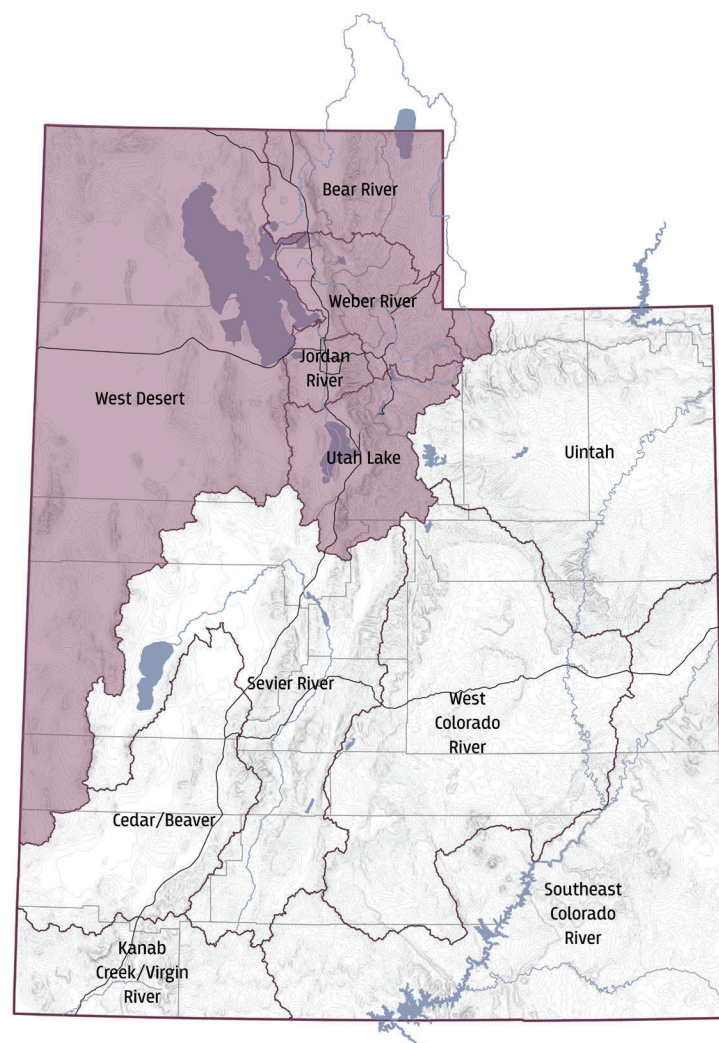


Figure 2.A.1 Watershed Councils of Utah

Watershed Councils
 [Dark Purple Box] Utah Watersheds Council
 [Light Purple Box] Local Watershed Councils
 [White Box] Great Salt Lake Watershed Council

Figure 2.A.2 Watershed Challenges

| Watershed | Selected Challenges |
|--------------------------|--|
| Bear River | Balancing agricultural demand with flows to Great Salt Lake |
| Cedar/Beaver | Groundwater declines; population growth in Iron County; sustaining agricultural communities in Beaver County |
| Great Salt Lake | Declining lake elevations with ecosystem and air quality risks |
| Jordan River | Water quality, aging infrastructure, and urban growth pressures |
| Kanab Creek/Virgin River | Rapid population growth; limited local water supply and urgent conservation needs |
| Sevier River | Water over-appropriation, limited supplies |
| Southeastern Utah | Drought vulnerability, interstate Colorado River challenges |
| Uintah | Energy development and water demands; maintaining surface flows for agriculture. |
| Utah Lake | Nutrient pollution; transbasin diversions; rapid population growth |
| Weber River | Urban growth pressures; maintaining streamflows and Great Salt Lake |
| West Colorado River | Colorado River allocation uncertainty; declining storage |
| West Desert | Sparse and variable supplies |

Dam Hazards in Utah

BRIAN CROOKSTON

Many of Utah's aging dams provide essential water storage but pose growing safety risks, with over 100 high-hazard structures needing costly rehabilitation to protect lives and critical infrastructure.

Terms to Know:

High-hazard dam: Dam where failure would likely cause loss of human life.

Significant-hazard dam: Dam where failure could damage property or infrastructure but not likely kill people.

Dams are a critical part of Utah's water system, capturing snowmelt and runoff for household, agricultural, and industrial use. Yet many of these structures are aging, raising safety concerns that extend beyond water supply. The American Society of Civil Engineers' 2025 Report Card for Utah Infrastructure gave dams a C+, citing the need for rehabilitation and additional storage.

Utah has 277 high-hazard dams, where failure would likely result in loss of life. More than 100 of these do not meet current safety standards. An additional 315 dams are classified as significant hazard, meaning failure could damage property or infrastructure. With Utah's growing population, hazard creep—where potential consequences of failure increase over time—is a growing concern. The average age of Utah's dams is 64 years, underscoring the importance of ongoing safety evaluations.

Primary risks stem from undersized spillways, inadequate outlet works, and stability issues within earthen

embankments. According to Utah Hazard Mitigation (2025), a large-scale failure could flood 775 critical facilities, including schools, hospitals, police and fire stations, power plants, and airports. Hazards also exist at smaller structures, where recreational users have occasionally been trapped in strong currents below dams and have drowned.

Rehabilitation projects at Millsite (Emery County), Panguitch Lake (Garfield County), and Hyrum (Cache County) dams demonstrate Utah's engineering expertise and capacity to reduce risks. However, funding remains a challenge. The estimated cost to repair existing high-hazard dams is \$470 million. Current rehabilitation funding of about \$3.8 million annually would require decades to address needs; an increase to \$10 million annually would significantly accelerate progress. Continued studies on hazard creep, risk-informed decisions, and emergency planning are also needed to safeguard communities while ensuring water reliability.



DAM FAILURE DUE TO INADEQUATE SPILLWAY CAPACITY AND POOR EMBANKMENT INTEGRITY | BRIAN CROOKSTON



TIBBLE FORK RESERVOIR, PROVO, UT | AARON FORTIN



PHYSICAL MODEL AT UTAH WATER RESEARCH LAB OF PRADO DAM, WHICH IS USED FOR FLOOD PROTECTION & WATER STORAGE | BRIAN CROOKSTON



PANGUITCH LAKE DAM, UT | AARON FORTIN

The Future of Growing Water Smart

KORI ANN KURTZEBORN, ANNA MCENTIRE, KIRSTEN KEENER BUSBY,
JOANNA ENDTER-WADA, KELLY KOPP, LISA WELSH

The Utah Growing Water Smart program helps communities build resilience by **integrating land use and water planning** through collaborative workshops, preparing them for sustainable growth and future water challenges.

Terms to Know:

Integrated land use and water planning: Coordinating growth and water supply decisions to avoid shortages.

Utah Growing Water Smart brings together teams from local communities in collaborative, retreat-style workshops that link land use decisions with water resource planning to meet the water demands of tomorrow while protecting Utah's natural systems.

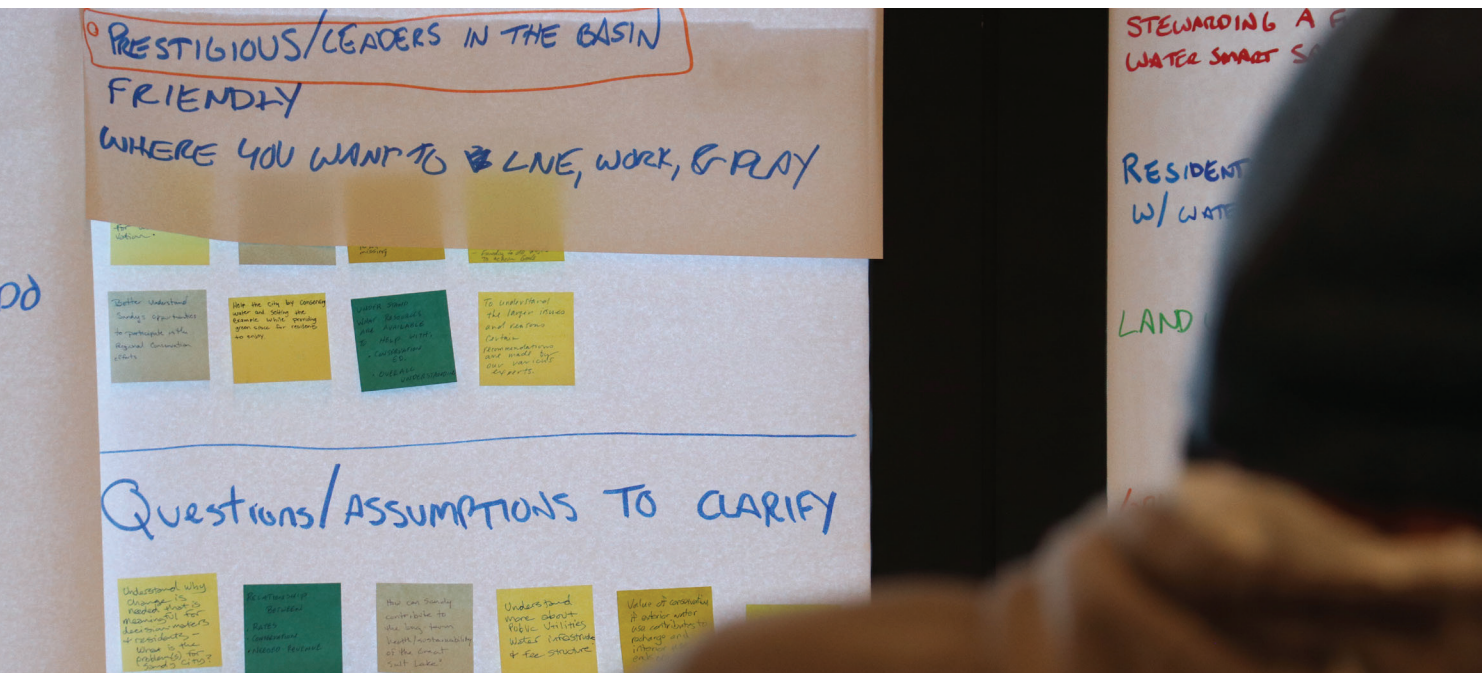
During workshops, a range of public engagement, planning, communication, and policy implementation tools are used to help community teams realize their water efficiency, smart growth, watershed health, and water resiliency goals. Each community begins with a self-assessment to define challenges and priorities and finishes with a customized action plan to guide integration of land and water planning. Follow-up reunions ensure continued momentum, peer learning, and shared celebration of progress. To date, four planning workshops have been completed, shaping strategies in 20 communities and counties. Guidebooks, toolboxes, case studies, and resources developed for the workshops are already helping

leaders make water smart choices about growth and water management.

Utah Growing Water Smart is part of a western U.S. program established by the Babbitt Center for Land and Water Policy and the Sonoran Institute to strengthen the alignment of water management and land use planning. Utah State University leads this state's program, benefitting from strong collaboration with and investment by the state's Division of Water Resources.

As the program enters its third phase, USU's Janet Quinney Lawson Institute for Land, Water, and Air will facilitate five more planning workshops focused on 25 rural and transitioning communities across Utah. Workshop cohorts from towns, cities, and counties will collaborate on innovative solutions that link development with long-term water sustainability. By 2030, Utah Growing Water Smart will have built a network of communities better prepared to thrive in Utah's arid future—where growth, conservation, and resilience coincide.

PARTICIPANTS IN GROWING WATER SMART ACADEMY | AARON FORTIN



Reducing Carp Biomass Initiates Beneficial Ecosystem Response

TIMOTHY WALSWORTH & KEVIN LANDOM

Targeted removals of common carp have driven some positive responses in the ecosystem, but other desired changes remain unrealized.

Terms to Know:

Endemic: Species naturally found only in a specific region or location.

Invasive: Non-native species that spreads quickly and harms ecosystems or economies

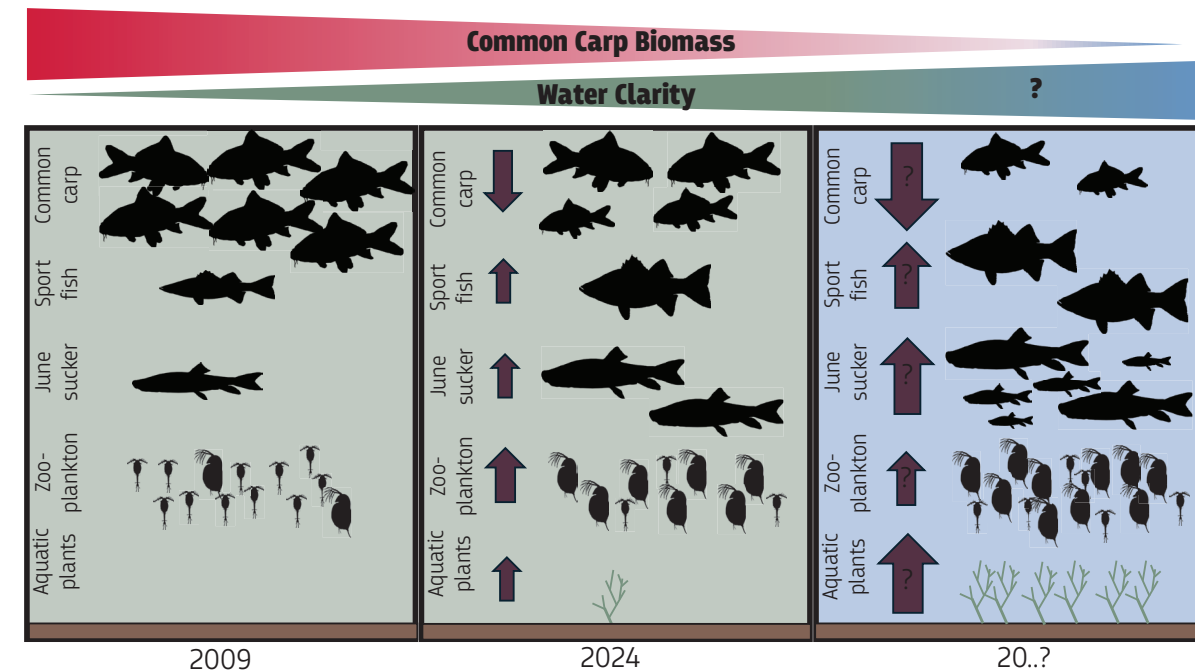
Common carp were introduced to Utah Lake in the 1870s to supplement overharvested native fish populations. However, as carp root through the lake bottom for food, they stir up sediment and cause substantial changes to the ecosystem. Carp behaviors have negatively impacted water quality, aquatic habitat, and native fishes, including the endemic and threatened June sucker. To improve ecosystem conditions and support June sucker recovery, the June Sucker Recovery Implementation Program (JSRIP) began targeted carp removal efforts in 2009, which have removed over 13,000 metric tons of invasive carp to date. In partnership with JSRIP, researchers at Utah State University have been monitoring the ecosystem response to these carp control efforts. As carp biomass was reduced, several positive ecosystem changes have been observed.

These changes include:

- Increased diversity of aquatic vegetation
- Increased availability of zooplankton and aquatic insects (preferred prey of June sucker and many sport fishes), and
- Improved body condition of these fishes.

Researchers have not yet seen improvements in overall water clarity, aquatic plants, or survival of young June sucker in Utah Lake, even with fewer carp. Achieving long-term ecosystem goals may require larger and sustained reductions in carp, along with other system improvements such as lowering nutrient inputs, stabilizing lake levels, and managing other non-native species. The JSRIP and partner agencies are now exploring additional methods to control carp and support further recovery of Utah Lake.

Figure 2.D.1 Observed and Predicted Changes to the Utah Lake Ecosystem Based on Common Carp Biomass.



Left panel shows conditions in 2009, with abundant carp, low body condition for sport fish and June sucker, limited June sucker recruitment, a zooplankton community dominated by small-bodied taxa, and extremely limited aquatic vegetation. The center panel shows conditions in 2024, with reduced carp biomass, increased body condition for sport fish and June sucker, a zooplankton community now dominated by large-bodied taxa and increased aquatic plant diversity. The right panel represents a potential future condition with increased water clarity, further reduced carp biomass, further improved condition of other fishes, increased recruitment of wild June sucker, increased abundance of zooplankton still dominated by large-bodied taxa, and increased abundance of aquatic plants. Exactly how low carp biomass would need to be and what other changes to the ecosystem (e.g., reduced nutrient loading, lake level management) would be necessary to achieve these future changes remain uncertain.



Partner Perspective

Comparative Valuation of Water Rights to Restore Great Salt Lake Flows

ERIC EDWARDS

Water leasing allows for innovative water savings by giving irrigators opportunity to profit from dedicating water to conservation. Ongoing collaboration seeks to increase awareness on the comparative value of different practices.

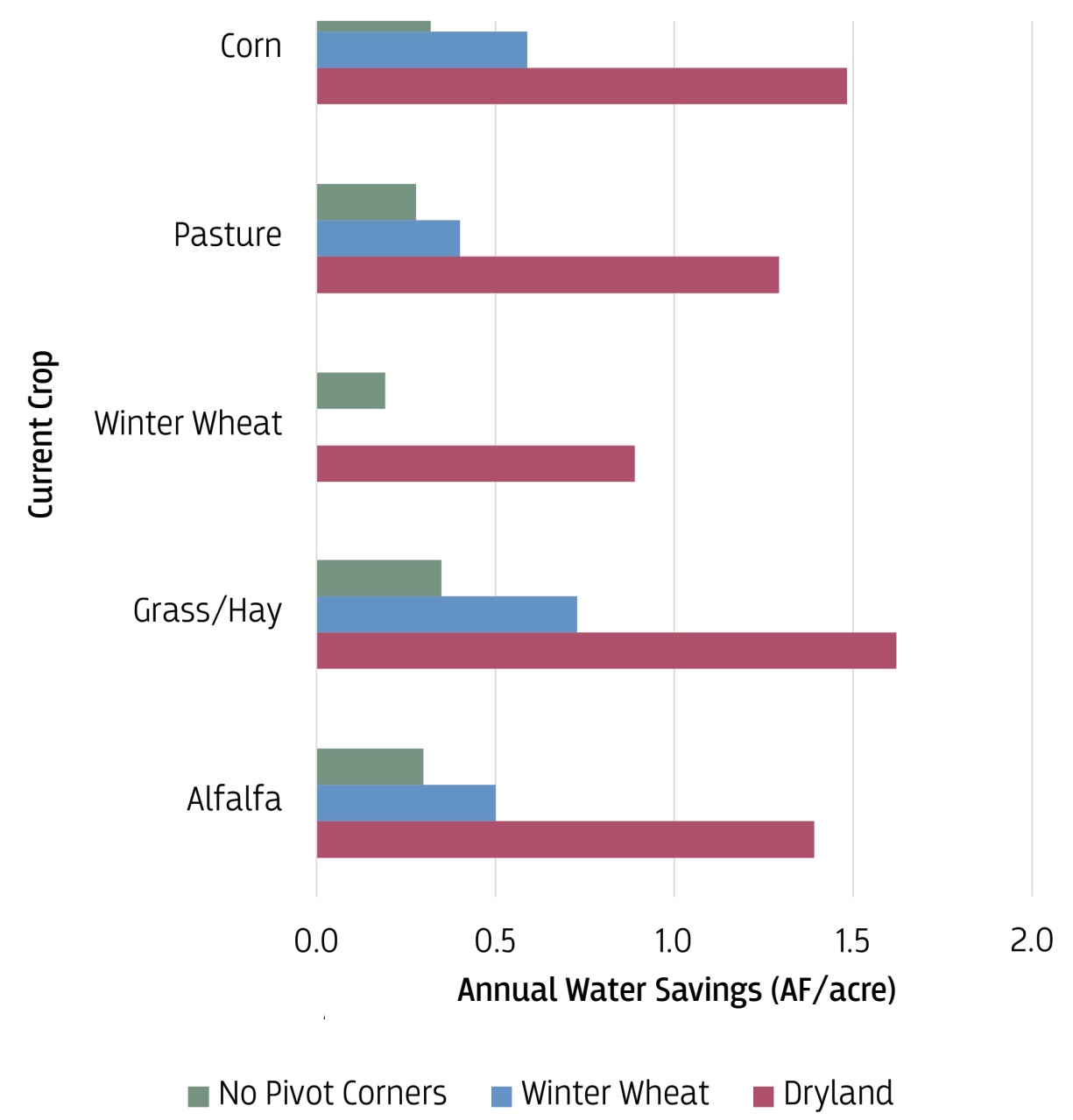
The Great Salt Lake is maintained by a delicate balance between evaporation and water inflows, primarily from the Bear, Weber, and Jordan Rivers. This balance has been disrupted by human water diversions, primarily for irrigated agriculture. Maintaining a healthy lake supports ecosystem services, including the prevention of air pollution from fine-grained lakebed sediments. The state has passed legislation to enable a voluntary, market-based approach to increase inflows and motivate water right holders to reduce diversions and encourage a healthy lake. Water right leases enable irrigators to receive financial compensation to temporarily allow their water to flow directly to the lake. The irrigators get to determine what price is fair, how much water to transfer, and for how long.

A key benefit of leases over government mandates is flexibility. One irrigator may want to stop watering the corners of her field where the center pivot doesn't reach; another may want to switch his operation entirely to dryland farming. Irrigators may also have more innovative ways to save water, like improving their canal system or installing precision irrigation. The purchaser of the

lease dedicates the saved water to the Lake and the State Engineer ensures it makes it. Because watering the Lake is a legally defined beneficial use, the irrigator retains the full use of their water right after the lease ends.

A key constraint facing buyers and sellers is a lack of information on the comparative value of different types of water saving practices at different locations. A collaboration between the Great Salt Lake Commissioners Office and the Property and Environment Research Center through the ILWA Fellows Program aims to create the tools required to facilitate leasing. The approach leverages satellite-based evapotranspiration estimates from satellite imagery to link changes in on-field water depletion to lease valuations. Preliminary results show the depletion savings in Cache County for some example crops and water saving practices. When complete, this transparent, publicly available data, and associated outreach material, will inform irrigators and water leasing organizations and agencies of the anticipated water savings and monetary value of adopting different optimization practices or leasing agreements.

Figure 2.E.1 Annual Water Savings After Irrigation Change



FARM NEAR BENSON, UTAH | AARON FORTIN

Utah's **WATER** *in the news*

During this past year, several stories in the news centered on major issues affecting one of Utah's scarcest resources: water. We followed the news cycle to find out which topics had the most coverage in Utah news outlets.

1. DROUGHT SPREADS STATEWIDE

Utah experienced one of the driest summers on record in 2025, with the entire state classified in drought by early summer. Reservoir storage dropped to about two-thirds of normal, with some smaller reservoirs falling to 35% of capacity. Lake Powell also neared record lows, underscoring growing risks to hydropower, recreation, and water supplies. State officials emphasized the need for conservation, while Governor Cox publicly urged Utahns to “pray for rain” as part of a broader drought response.

2. GREAT SALT LAKE AND STATEWIDE EFFORTS TO INCREASE LAKE ELEVATIONS

The Great Salt Lake returned to near-historic lows in 2025, falling just above 4,192 feet. State managers prepared to raise the railroad causeway berm if the lake dipped further. More efforts were made to build and expand water leasing programs. Governor Cox's Great Salt Lake Charter continued to bring together business leaders, policymakers, and conservation groups to coordinate long-term strategies to raise lake levels. Utah also received \$50 million from the Bureau of Reclamation to support the lake.

3. COLORADO RIVER NEGOTIATIONS CONTINUE

All seven basin states remained at the table to renegotiate the Colorado River Compact before the 2026 deadline. Lower Basin states proposed allocations based on a rolling three-year average of actual river flows, while Upper Basin states—including Utah—argued allocations should instead be tied to supply levels in Lake Powell and Lake Mead. If consensus is not reached, federal intervention is likely.

4. WATER INFRASTRUCTURE AND PLANNING

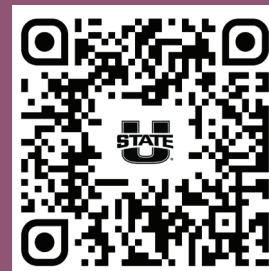
Utah launched the Unified Water Infrastructure Plan (UWIP) to prioritize and fund water projects statewide (H.B. 41). A \$9.7 billion strategy was unveiled to meet future demand while protecting ecosystems. At the same time, the USDA awarded funds to four rural Utah communities for drinking water and wastewater improvements. State leaders also began studying a new infrastructure fee to bolster long-term water funding.

5. WATER-RELATED HABITAT RESTORATION EFFORTS

Major restoration projects advanced across Utah in 2025. The Provo River Delta project restored wetlands near Utah Lake, improving habitat for the threatened June sucker and migratory birds. Communities along the Jordan River Parkway removed thousands of pounds of trash while upgrading trails and access. Additional efforts on the Great Salt Lake, Virgin River, Escalante, Weber, and Bear Rivers reflected growing statewide momentum for tying water management to ecosystem restoration.

What's going on in Utah's land, water and air?

We publish a weekly email newsletter containing a roundup of stories in the media related to Utah's land, water, and air. This year, we shared nearly 2,000 stories, primarily from local media, with additional coverage from national outlets. Subscribe to our weekly email news roundup at: usu.edu/ilwa/newsletter.



CHAPTER 2 REFERENCES

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