

FRIENDS of *Great Salt Lake*

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www.fogsl.org

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A Stone in Bear River Ice

Kelly Hannah

The mission of FRIENDS of Great Salt Lake is to preserve and protect the Great Salt Lake ecosystem and to increase public awareness and appreciation of the Lake through education, research, advocacy, and the arts.

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EXECUTIVE DIRECTOR'S MESSAGE

YES! IT'S A GREAT SNOW YEAR, BUT WHAT ARE WE WAITING FOR WHEN WE KNOW WHAT WE NEED TO DO? LET'S PULL SOME LEVERS

*It's been a long time comin'
It's goin' to be a long time gone
And it appears to be a long
Appears to be a long
Appears to be a long
Time, yes, a long, long, long, long time
Before the dawn.
Long Time Gone by David Crosby*

On Wednesday, February 1st, I attended the Senate Natural Resources, Agriculture, and Environment Committee hearing to speak in support of SCR-6: *Concurrent Resolution Regarding the Great Salt Lake Elevation Targets* sponsored by Sen. Nate Blouin.

Blouin's resolution offered a timely opportunity to translate promises into inflows by using a target elevation of 4,198' above sea level for the Lake. An elevation that simply wasn't pulled out of a hat, rather, it's what many of us would characterize as where the "sweet spot" begins. The sweet spot (4,198' - 4,205') is in the GSL Elevation Matrix, part of the 2013 GSL Comprehensive Management Plan that was developed by the Division of Forestry, Fire and State Lands. The Division has the jurisdictional management responsibility to sustain GSL "*in perpetuity*" as a Public Trust resource for the people of Utah.

In the Matrix (you can see for yourself www.fogsl.org/about/map), 4,198' is the elevation where almost all of the Lake's ecosystem services and its ecological viability are in "green." Green is definitely good and is categorized as "beneficial for the resource." Beneficial for the resource because it's here where salinity concentrations **and** Lake elevations work best for brine flies, brine shrimp, and microbialites, which constitute the food web for the millions of migratory birds that rely on the Lake. And it's here where the Lake's former islands become islands again; the volume of the Lake would be twice what it is today, and much of the currently exposed lakebed would be under water, helping to address the troubling dust issues we're concerned about.

It's here where boats can safely get out of the marinas, and economic assets like mineral extraction, brine shrimp harvesting, and recreation and tourism can thrive, contributing \$1.32B to Utah's annual GDP. And because the Lake fluctuates due to seasonal temperatures, variability in precipitation, evaporation, diversions and inflows, it's here where those values can be sustained as long as water finds its way into the system.

And that's where we all come in, right?

However, as you would expect, there are many people, including Utah legislators, who consider this goal to be too lofty...too far out of reach. I disagree; I could easily argue that it's not lofty enough. When it comes to Great Salt Lake, we can't be satisfied with short-term goals. It can't be just a one-hit wonder. We have to look beyond the crisis that's facing us today to where the Lake is healthy again, for the long-term, and for all of us. Setting 4,198' as a target elevation gives us a way forward to devise and implement policies, incentives, and funding sources to return Great Salt Lake to optimal levels—optimal levels found in the sweet spot of 4,198' - 4,205'.

This is a way forward that the Great Salt Lake Strike Team recommends in its February 8, 2023 report, *Great Salt Lake Policy Assessment, A synthesized resource document for the 2023 General Legislative Session*. The Strike Team is a partnership that includes researchers from the University of Utah and Utah State University working together with the Utah Dept. of Natural Resources, Utah Dept. of Environmental Quality, and Utah Dept. of Agriculture and Food. In the report, "Preliminary analysis suggests (4,198' - 4,205') to maximize benefits across many factors. Meeting this goal requires policymakers to focus on inflows that both **fill** and **maintain** targeted elevation ranges." The report also includes an extensive list of recommendations to help inform state actions that could occur in a relatively short period of time.

Unfortunately, but no surprise really, SCR-6 didn't pass out of committee. Why? Perhaps as a freshman senator, sponsoring a Senate Concurrent Resolution that by declaration and demonstration would be recognized as a historic water commitment to Great Salt Lake by our growing population, Blouin could be comparable with Chuck Yeager breaking the sound barrier in his X-15, and that would be unheard of. Perhaps, more groundwork needed to be laid in conversations with a broad legislative cohort about the merit of setting a target elevation before the bill was even drafted. Whatever the reason, certainly the persistent array of water concerns stemming from the megadrought

have begun to finally sink in and the realization that we simply can't continue with business as usual in our water practices has become more evident.

One of the committee members who claimed to be an advocate for the Lake and agreed in principle with the resolution, voted against it. His concern was that taking a position on an elevation was a "heavy lift" that could jeopardize other resources and economic values like farming. He also said that this winter's snowpack gives lawmakers the opportunity to focus on long-term solutions that will have an impact, instead of simply pulling emergency levers. And although I totally understand the concerns that are being expressed, pulling emergency levers is exactly what we need to do for Great Salt Lake.

In November 2022, the Lake hit a new historic record low elevation of 4,188.5'; an elevation that negatively impacted almost all of its ecosystem services and raised salinity concentrations to a level that continues to threaten its ecological viability. As long as there is the perception that *other resources and economic values* like farming or concerns about reservoir storage deficits could be "jeopardized" by committing inflows to the Lake, we are just pressing the pause button on an urgent matter that requires immediate and long-term action, even in a good snow year.

It's fair to say that since statehood 127 years ago, Great Salt Lake was a legislative afterthought until 2019, when Rep. Tim Hawkes sponsored HCR 10—*Concurrent Resolution to Address Declining Water Levels of the Great Salt Lake*. HCR-10 was a catalyst for recognizing the Lake as a responsibility that needed attention and legislative support. A recognition that was amplified by Speaker of the House Rep. Brad Wilson who hosted two Great Salt Lake Summits and sponsored HB410 *Great Salt Lake Watershed Enhancement Trust* that created a \$40m water trust to leverage water partnerships within the GSL watershed to bring water to the Lake and improve habitat. To date, Utah's legislature has appropriated nearly \$1 billion toward drought mitigation, agricultural optimization, secondary water metering, an integrated surface and groundwater assessment for the GSL watershed, water banking, water-wise landscaping, and a public education campaign through Utah Water Ways to help Utahns change their water behavior. But clearly, we need to work more effectively to find ways to improve communication, build partnerships, and recognize our collective future in this Great Salt Lake place.

Similar concerns prevented HB538 *Water Usage Amendments* sponsored by Rep. Doug Owens and Sen. Mike McKell from passing during the session. HB538 would prohibit the watering of lawn or turf in the Great Salt Lake basin during a restricted period known as the "shoulder season" between October and May. With some exceptions for trees and shrubs, cemeteries, golf courses, and agriculture, the

goal was to account for the conserved water saved during this period and translate it into inflows to the Lake. Penalties would be imposed by the retail water supplier to discourage watering during the shoulder season to ensure accountability. However, questions about the duration of the shoulder season, impacts on reservoir storage deficits, and how much water would actually become available for the Lake were reasons that the bill failed. Hopefully, further study during interim will confirm the merits of exercising this approach to sending conserved water to Great Salt Lake. Briny fingers crossed!

Had Blouin's SCR-6 carried the day through the 2023 session, it's probable that a working group would have been established to begin developing a strategic plan to focus on inflows to **fill** and **maintain** the "sweet spot." Reaping the benefit of the extra credit inflows from the spring runoff as a metric to work with, ideally a draft plan could have been integrated into the strategic plan of the newly appointed GSL Commissioner (HB491) and presented to the legislature by mid-November. But right now, everything is on hold.

But wait!!! On March 15th, Great Salt Lake received a revelation from the Church of Jesus Christ of Latter-day Saints. A donation of 5,700 water shares, equivalent to over 20,000 acre-feet of water, roughly the size of the Little Dell Reservoir, will be donated to the Lake "in perpetuity." The largest ever permanent donation to Great Salt Lake is a welcome example of believing in the Lake's future. In his talk at the 28th Annual Wallace Stegner Center Symposium, *The Future of Great Salt Lake* (March 16-17th), Bishop W. Christopher Waddell referenced Brigham Young, who saw beneficial use of water as responsible use of water. Isn't this exactly what bringing water to the Lake is all about?

Oftentimes when we look for solutions, we tend to seek "new and improved" answers. The irony here is that in many ways we have had the answers all along. During the last 10 years, the Great Salt Lake Elevation Matrix has told us exactly what we need to know about managing the Lake to achieve conditions that are beneficial to the resource. The commitment and the process to set the goal are every bit as important as the actual goal we set.

"This water year is a crucial opportunity to mitigate ongoing damage to the Great Salt Lake ecosystem. There is still time to turn this around, but we need the next steps to be decisive and well-coordinated."

—Dr. Patrick Belmont, Professor, Watershed Sciences/Utah Agricultural Experiment Station, USU

What are we waiting for?

In saline and solidarity,
Lynn



FRIENDS' ORGANIZATIONAL STATEMENT

Founded in 1994, FRIENDS of Great Salt Lake is a membership-based nonprofit 501c3 with the mission to preserve and protect Great Salt Lake ecosystems and increase public awareness and appreciation of the Lake through education, research, advocacy, and the arts. The long-term vision of FRIENDS is to achieve comprehensive watershed-based restoration and protection for the Great Salt Lake ecosystem.

FRIENDS of Great Salt Lake sponsors programs related to our mission statement: Lakeside Learning, the Doyle W. Stephens Scholarship, the Great Salt Lake Issues Forum, and the Alfred Lambourne Prize.

Lakeside Learning Field facilitates 2.5 hour inquiry-based educational field trips for 4th grade students. The trips combine informal environmental education strategies while incorporating science, technology, engineering, art and math (STEAM) to reinforce the Utah Common Core State Science Standards. Lakeside Learning emphasizes learning through participation.

Within the research component of our mission, we sponsor the Doyle W. Stephens Scholarship for undergraduate or graduate research on Great Salt Lake ecosystems. Established in 2002, the scholarship supports students in new or on-going research focused within the Great Salt Lake watershed. Recent project winners span the effects of changing salinity on microbialites

to the impacts low water levels in Great Salt Lake have on Utah's air quality.

FRIENDS is actively involved in advocating for Great Salt Lake. Every two years, FRIENDS hosts the Great Salt Lake Issues Forum to provide focused discussions about the Lake for a variety of stakeholders including policy makers, researchers, and industry leaders. Each Forum engages the community in constructive dialogue regarding the future of Great Salt Lake.

In 2014, FRIENDS established the annual Alfred Lambourne Prize for creative expressions of our Inland Sea in the categories of visual art, literary art, sound, and movement. FRIENDS celebrates the relationship between local artists and one of Utah's most precious natural resources, Great Salt Lake. Through artistic expressions, we enhance our capacity to build awareness about the Lake and our need to preserve and protect it for the future.

FRIENDS maintains a Board of Directors and Advisory Board composed of professionals within the scientific, academic, planning, legal, arts, and education communities. Staff members include, Lynn de Freitas, Executive Director; Rob Dubuc, General Counsel; Holly Simonsen, Membership & Programs Director; Katie Newburn, Education & Outreach Director; and Alyssa Garrett, Education Coordinator.

On The Cover:

A Stone in Bear River Ice, photograph
Kelly Hannah

Last year during an overflight of our Great Salt Lake, I found myself astounded by the bird's eye view of the end of the Bear River. I could see the river winding down from the northeast and just after its final turn south toward Great Salt Lake, it stopped—its end a definitive line, a curved meniscus, like the lipped edge of a water puddle on a dry sidewalk memory from my childhood.

Ever more curious, on the winter solstice I adventured out to the Bear River Bay in search of this end from the ground. It's harder to see from down here, it's not as defined as it was from the sky. I found this simple scene near the end of the river, where it begins to dissipate into sparse puddles on the playa. The frozen stone struck me, looking like a mountain anchored in place and immovable. Yet, I know the glacial movements of ice and water and earth and stone are true, and in this truth I find hope that our diligent and vigilant watershed work can move mountains.





Great Salt Lake and the Miracle of the Seagulls
acrylic & mixed media on canvas, 18 x 24
by Gisele DaSilva
2022 Alfred Lambourne Arts Program Submission

WHERE ARE YOU? REVERSING THE ROLE OF MAPS IN THE GREAT SALT LAKE WATERSHED

In November 2021, a Nomadic Information Kiosk similar to those you might find at trailheads and visitor centers embarked on a journey around the Great Salt Lake and Upper Colorado River Watersheds. Rather than presenting those who encounter it with didactic information about where they are, the Kiosk poses the question, “Where are you?” along with art-making supplies, blank map sheets, and a chalkboard.



Kiosk at the Utah State Capitol, photograph courtesy of Douglas Tolman

Countermapping:

When using maps, we see the world through the lens of government agencies and software companies that create them. The intricate stories and nuanced histories that make a place important are often overlooked to meet the mapmaker’s agenda. Through inquiry, the Kiosk attempts to return mapmaking to the people, sharing methods with the broader research area of Countermapping and Countercartography.

“The naturalization of maps—the myth that maps show the world the way it really is—veils the fact that maps are cultural and even individual creations that embody points of view. They map only what the authors or their employers want to show.”
-Lucy Lippard, *On and Off The Map*

Project Boundaries:

The Great Salt Lake and Colorado River Watersheds serve as the boundary for this project. These Watersheds are the traditional, unceded land of many Indigenous Tribes, including The Western Shoshone, Goshute, Paiute, Ute, and Diné Peoples. The state lines traced over mountains, canyons, biological communities, and inhabited territories seem ill-equipped to serve as the boundaries for a project that hopes to facilitate a deeper sense of place.

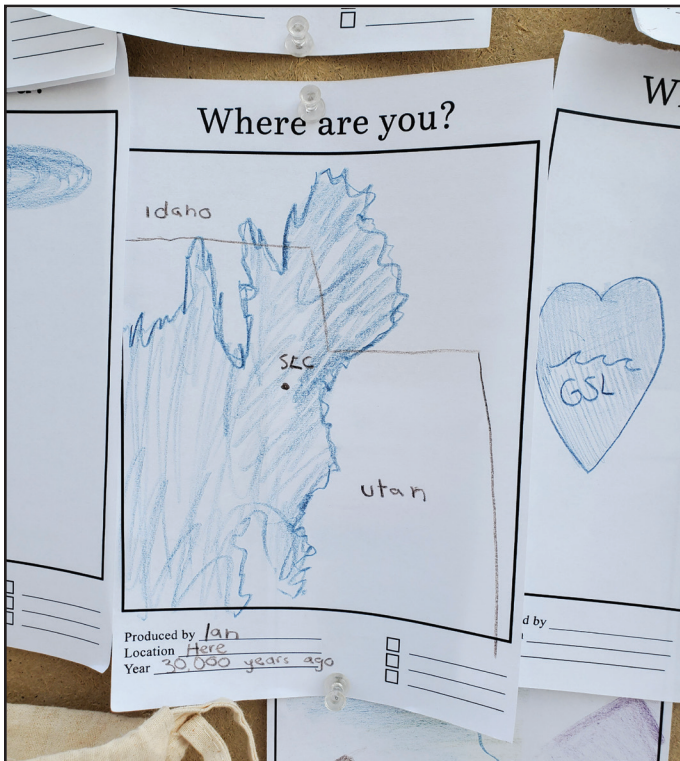
A Collaboration:

This project is a collaboration between myself, a project facilitator, the Kiosk, and the many people who took time to creatively consider their relationship to place. As the facilitator, my role is to form community partnerships, transport the Kiosk to temporary homes, and lead workshops with participants. Aside from this, the Kiosk is an autonomous being, the sum of all who engage with it. Though it sometimes visits trailheads and parks by itself, the Kiosk primarily engages with the public through partnerships with nonprofit organizations such as FRIENDS of Great Salt Lake, Tracy Aviary, and Moab Arts. Funding for materials, transportation, planning, documentation, and construction was provided through a University of Utah Fellowship, with the intention of transferring academic resources to programming for under-funded arts and conservation organizations.

Personal Narratives of Place:

As new generations of engaged citizens face climate anxiety fueled by news stories of impending global climate collapse, education research trends are suggesting that a collaborative outlook on local solutions can combat climate anxiety for active change. By facilitating a space for inquiry into place, the Kiosk hopes that participants will be more likely to engage in solutions to local climate, water and land-use issues, especially those surrounding Great Salt Lake and Colorado River.





Examples of Kiosk engagement, photograph courtesy of Douglas Tolman

As of February 2023, the Kiosk has engaged with over 1,000 people at parks, visitor centers, a natural history museum, an art festival, a farmer’s market, a nature center, and a trailhead. It has led mapping lessons at FRIENDS of Great Salt Lake summer camps, spent

3 weeks in-residence at Antelope Island State Park, conversed with scientists at the Great Salt Lake Issues Forum, and learned from Great Salt Lake advocates during the Save Our Great Salt Lake legislative session rally. Maps contributed range from drawings of the Milky Way Galaxy to topo-style maps of Great Salt Lake, poems, comics, and far more. Mountain ranges, migratory birds, smokestacks, grid systems, rivers, and islands are some of the most frequent inclusions.

As maps compile, a non-linear understanding of these places has begun to emerge. Nuanced perspectives, sometimes disagreeing with each other share the same visual space, becoming a collage of our community’s understanding of where we are. As participants continue to spend time engaging with personal narratives of place, the Kiosk hopes they allow these narratives to seep into action and dialogue around the issues closest to them.

“The narrative wants to move from point to point through time, while topics that have arisen now and again across someone’s life cry out to be collected. They want to draw themselves together in a single body, in the way that salt does underground. But chronology usually dominates.”
-John McPhee, *Draft No. 4*

Douglas Tolman
University of Utah MFA Candidate, Spring 2023



Kiosk overlooking the Salt Lake Valley, photograph courtesy of Douglas Tolman



HOW METALS MOVE THROUGH GREAT SALT LAKE WETLANDS

The wetlands of the Great Salt Lake are an internationally significant ecosystem. Over seven million migratory birds visit the wetlands yearly on their journeys through the central and Pacific flyways. However, the proximity of the wetlands to urban and industrial areas means they have become contaminated with pollutants. Metals such as lead, mercury, arsenic, and selenium are considered important pollutants due

to remove them through harvesting, removing, and disposing of contaminated tissue. On the other hand, if plants transport metals from their roots to their above-ground tissues (shoots, leaves, and seeds), they may be consumed by herbivorous insects and enter above-ground ecosystems. Some toxic metals are difficult for insects to excrete, meaning they build up inside insects' bodies, leading to high concentrations (a process called bioaccumulation). Any animal that eats these insects receives a high dose of toxic metals, meaning metal concentrations increase the higher we go in a food chain ("biomagnification"). The processes of bioaccumulation and biomagnification can lead to concentrations of toxins being tens of times higher at the top of the food web than in soils [Figure 1].



[Image 2]. Collecting flying insects in the Nature Conservancy Great Salt Lake Shorelands Preserve. Photograph courtesy of Maya Pendleton.

to their high toxicity levels, the difficulties associated with their removal, and their ability to move through natural food webs. The high toxicity of heavy metals has even led to consumption advisories being issued for several waterfowl in the Great Salt Lake wetlands, the first time such advisories have been issued in the USA for non-fish species [Image 1]. The importance of the wetlands makes it critical to understand how metals move through natural food webs to identify where toxins are concentrated.

For the last several years, my team and I have been looking at metal concentrations in wetland plant tissues and insects in the same area. We are interested in whether metals taken up from the soil by plants remain in belowground tissues (e.g., roots and rhizomes) or if the plant transports metals to above-ground tissues (shoots, leaves, and seeds). If metals absorbed by the plant remain in the belowground parts, it is harder for them to be consumed by herbivorous insects and move through food webs. However, when toxic metals stay below ground, it is harder

My team and I collected samples from plants, insects, and spiders from wetland ecosystems in the Great Salt Lake to understand how toxic metals move through food webs. We separated the plant tissues by type and used a mixture of insect traps and hand nets to capture flying insects from the same locations as we collected the plant tissues [Image 2]. We then processed these samples to measure the actual concentrations of different metals. We selected four common plant species

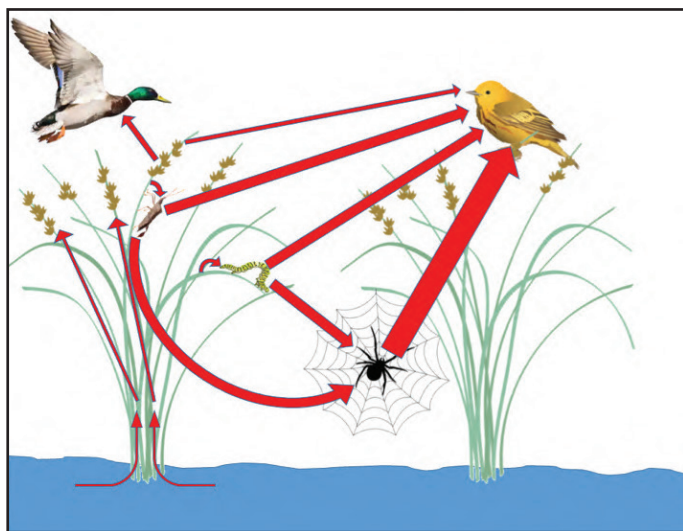


Figure 1. How metals move through ecosystems, red arrows show movement pathways and illustrate how metals accumulate through food webs. Metals taken up from soils may move through plants to above-ground tissues (illustrated through red arrows). Here they are eaten by herbivores, which predators then eat. As we move up the food chain, metal concentrations (shown by arrow thickness) increase.



in the wetlands (Hardstem bulrush, three-square bulrush, alkali bulrush, and phragmites) and collected samples from nine different locations for each species. We measured arsenic, lead, copper, cadmium, selenium, and mercury concentrations for each species. We found that regardless of which plant species were studied, concentrations of arsenic and selenium were higher in the belowground tissues than in the aboveground tissues, indicating plants did not transport these metals to their stems, leaves, or seeds. For mercury, we found higher concentrations in the aboveground tissues, with the highest in alkali bulrush and three-square bulrush seeds. These high concentrations are worrying as seeds are a major food source for ducks. We also found evidence of bioaccumulation in hardstem bulrush for copper and cadmium [Figure 2]. Dragonflies from hardstem-dominated locations contained concentrations of cadmium and copper three times higher than we saw in the plant's roots. In comparison, for spiders, concentrations of these metals were over ten times higher. These high levels of metals in dragonflies and spiders indicate that metal concentrations are increasing higher up in food webs. Dragonflies and spiders are also an important food source for birds in the GSL wetlands, meaning that the high levels of metals present may be transferred further up the food web.

The proximity of the Great Salt Lake, and the rivers that feed it, to urban and industrial areas presents issues due to the potential for contamination by metals. In the case of metal pollutants, these toxins can be challenging to remove when they enter and may persist for long periods. Our results show how pollutants that enter the Great Salt Lake ecosystems can then be transported through food webs. The difficulties associated with removing metal pollutants due to their persistent nature and their potential to be transported through food webs highlights that preventing these toxins from entering the wetlands is critical. While remediation of polluted environments may be possible by removing contaminated plants, the difficulties associated with the collection, remov-

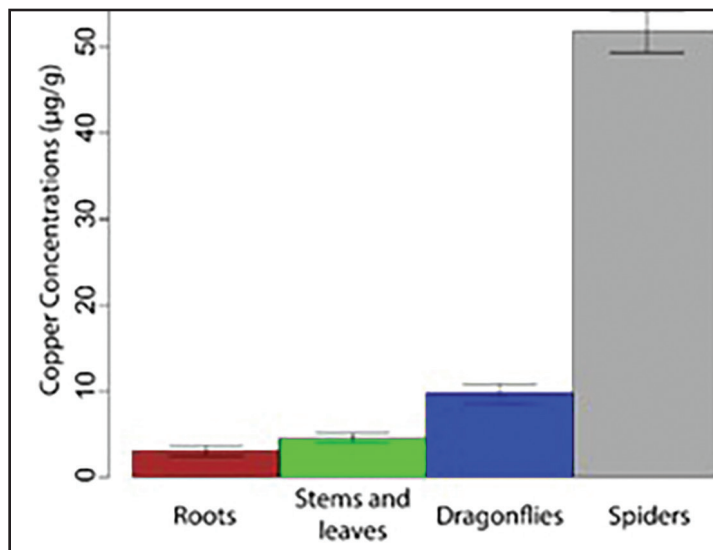


Figure 2. Evidence for biomagnification of copper in Hardstem Bulrush habitats. Concentrations in the predators (Dragonflies and spiders) were 3 – 10 times higher than in the roots of the plants.

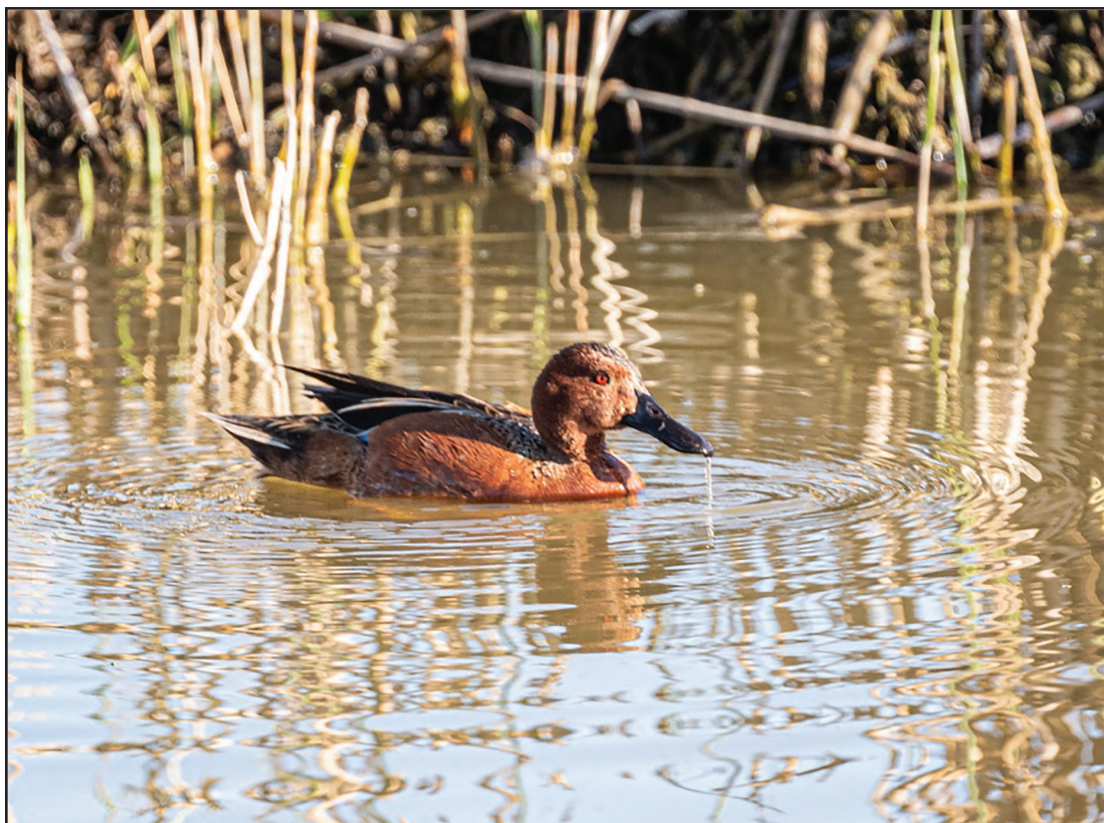


Image 1. A Cinnamon Teal, one of the Great Salt Lake waterfowl species for which a consumption advisory has been issued. Photo courtesy of Wayne Wurtsbaugh.

al, and disposal of contaminated plants make removing contaminants logistically difficult. Therefore, we must make every effort to limit metal pollutants from entering the Great Salt Lake wetlands.

Edd Hammill, Associate Professor of Ecology,
USU Watershed Sciences



THE UTAH WATER BANKING ACT AND STATEWIDE WATER MARKETING STRATEGIES REPORT: PRESCIENT PLANNING FOR A MORE RESILIENT FUTURE

Utah is facing existential challenges requiring an “all hands-on deck” approach to water. Water leasing is one type of water marketing and represents a local, voluntary and temporary exchange of water between water users. Water leases are flexible win-win tools that can generate income for water right owners, bring stability and order to local water systems, and increase access to water.

Laying the Tracks:

In 2017, as a result of a bill I sponsored, [SB214 Public Water Supplier Amendment](#) on instream flows, a diverse stakeholder group began to meet to develop a Utah water banking concept and legislation. The stakeholder group, one of the first of its kind and told by many to be one of the most effective to date, ended up totaling over 70 people and including representatives from agriculture, public water suppliers, conservations groups and other interests. Open to anyone, this inclusive stakeholder group spent thousands of hours discussing marketing concepts, studying existing activities in the various basins in Utah, reviewing water banking programs in other western states, and receiving public feedback.

To support these efforts, in 2019, with Representative Stewart Barlow as the House/Floor sponsor, I sponsored [SJR 1](#) endorsing the continued study of water banking, authorizing a one-time \$400,000 appropriation, and promoting the effort to secure an additional \$400,000 in funding from the Bureau of Reclamation WaterSMART Water Marketing Grant program. The money funded a three-year project to pilot the Water Banking Act in three pilot areas, establish administrative processes and forms to facilitate water banking, create useful templates and tools for water users to explore water marketing, and produce a Statewide Water Marketing Strategies Report.

Utah Water Banking Act:

The final water banking concept authorizes local water users to apply to have qualifying leasing arrangements be approved by the Utah Board of Water Resources as a Utah Water Bank. Once approved, participants are extended certain benefits and protections. In particular, water rights deposited into a Water Bank are exempt from forfeiture, water rights can be leased for environmental purposes, and water banks are subject to a streamlined Change Application proceeding that provides participants greater flexibility.

In 2020, with near unanimous support, the Utah Legislature passed the [Utah Water Banking Act](#) (SB

26)—now Title 73 Chapter 31 of the Utah Code. The passage of the Water Banking Act was a bi-partisan effort spearheaded by myself and former Representative Tim Hawkes. The effort precipitated and exemplified the need for Utah Legislators to work across the aisle to find creative water solutions.

I enjoyed working with the stakeholder group, alongside so many long-time experts in water policy. I am grateful for the time and effort of the stakeholder group, together crafting innovative water policy, that is critical and timely for addressing the water needs of 2023. For more information on water banking, see utahwaterbank.org.

Through the procurement process a Project Manager was hired—Emily Lewis of Clyde Snow & Sessions. Below is her latest update!

2023: Water Marketing Milestones

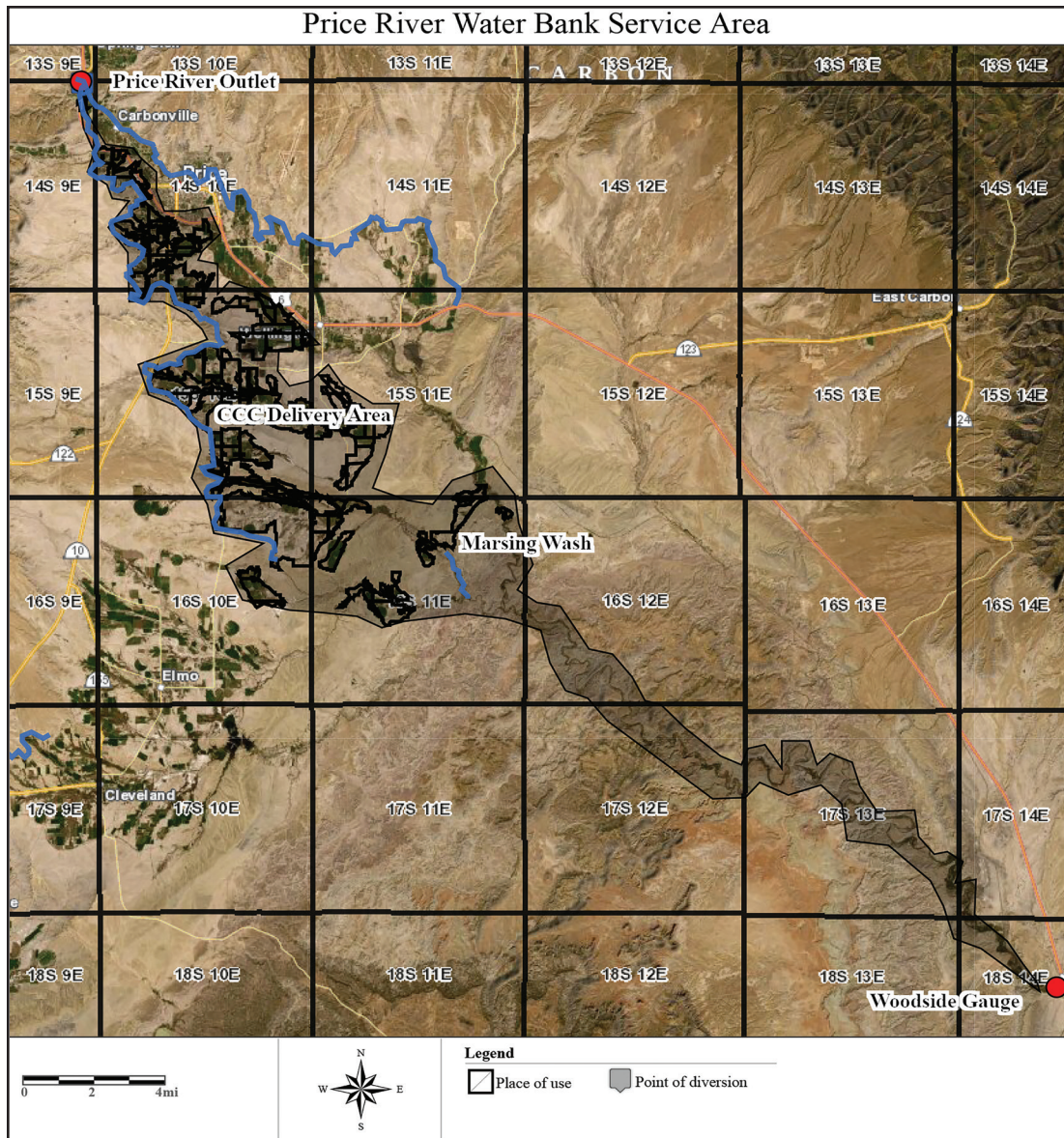
For the last three years, the Project Manager Emily Lewis and a Project Team of WestWater Research, HDR Engineering, and GovFriend have been working diligently with State agency staff, interested stakeholders, and local water users to pilot the Water Banking Act and complete a Statewide Water Marketing Strategy Report. Starting to explore water marketing activities can be overwhelming. Based on stakeholder experiences, the Project Team has identified five key milestones needed to navigate water marketing:

PEOPLE: To have a successful conversation about water marketing, participants needed to not only identify those who wanted water and those who had water, but also key supporting players like attorneys, Regional State Engineers, and key decision makers. It was also critical to identify who had the interest, resources, and capacity to participate in the discussion and to identify a champion of the effort.

MARKETS: Essential to any water marketing activity is understanding whether there is a “there, there”—does a potential water market exist? Does the area have the right match of willing lessees and lessors and basic, but surprisingly overlooked, supply and demand. The Project Team has distilled a series of key questions for water users to ask to determine if a viable water market exists.

LOGISTICS: The next critical step in the process is to assess the ability and means of moving water between potential lessors and lessees. This analysis includes assessing the physical means of moving water,





the legal constraints of participating water rights, and governance issues that might impact the movement of water.

TRANSACTIONS: A market transaction is the formal recognition of the who, what, where when and how water is going to move between parties and can take many different forms. Most market transactions will contain several key elements such as the means of pricing, timing and availability of water, and governance issues. The Project Team has prepared a template lease that includes many of these terms that can be adapted for local uses.

APPROVALS: Even if the parties have agreed on their market transaction, often additional approvals are needed to realize their goals. The Project Team has worked with the Utah Board of Water Resources to have final approved Water Bank Application forms and to create and administrative process for Water bank Approvals. Most leasing transactions in Utah

will also require a Change Application be filed with and approved by the Utah State Engineer.

The Project Team is excited about the effort to date and will be presenting its findings in public meetings throughout the spring of 2023, releasing a DRAFT Statewide Water Marketing Strategies Report in summer 2023, and releasing a final report in early fall 2023. The utahwaterbank.org website will be updated continually s materials become ready for public use.

Dynamic Tools for a Resilient Future:

The concepts and investments made between 2017 and 2020 have proved to be incredibly prescient for the needs of 2023. The tools and lessons learned will help the State meet a variety of statewide water policy goals.

Jani Iwamoto, Former Utah State Senator
 Emily Lewis, Project Manager, Clyde Snow & Sessions



CHANGES

It is February 2023 and I am back out on the lake. The Great Salt Lake. My lake. What a journey we have been on. I can sense that we have both seen our brighter days. As I sit on my airboat and look out over the inland sea, I wonder how long it will be before we both cease to exist. Nothing lasts forever. I'm pretty sure my lake will be here longer than I will, but all things must end. I was kind of hoping that we wouldn't go out on the same timeline.

I first climbed onto an airboat in 1971 with a group of cub scouts and boy scouts led by our local scout leader. Mr. Thomas was a partner in ownership of the craft and I was lucky enough to have him as a scout leader. There was turmoil in the world at that time, but to a young boy on the Great Salt Lake, everything was a shimmering sea of wonderment. We launched on the west side of Willard Bay and set out into the Willard Spur. The Spur was a huge expanse of cattail islands, water channels, and big open bays. The skies seemed to blacken with the beating wings of waterfowl of all types. The area seemed to have no end and the lake was steadfast in its size and strength.

A few years into my youth, being old enough to drive but with no airboat, my buddy and I attempted to get out into the very same marsh. Borrowing his dad's small fishing boat with an old outboard motor, we headed out to sea. Vegetation choked the propeller and we ground to a stop, over and over again. After clearing the prop untold times, we ended up out in the spur and into the cattail islands where we promptly got lost. Airboats roared around us on their way to mysterious destinations as we reveled in our perceived success! The airboats and their captains continued on their way, the lake remained steadfast, and I yearned for a better way to explore the lake.

The GSL continued to best me repeatedly, including the time I decided to walk from west Layton (now the site of the Nature Conservancy's boardwalk) out to Antelope Island. My trek began with pushing through what seemed like miles of thick cattails, which eventually broke out into huge expanses of bulrush. After plodding through bulrush for what seemed like an eternity, the vegetation gave way to salicornia flats and then into muddy playas, and finally the waters of the GSL. The island didn't look too far away, and yet I just couldn't make discernable headway. The waters eventually got deeper and deeper while the island remained exactly as it had appeared at the start of my excursion. Eventually the water got too deep and I had to turn back...even the exuberance of youth has its limits. The lake remained steadfast.

In 1990 I met Bill Salt. Bill was an entrepreneur and an inventor of all sorts of machines intended to get out into the lake. He showed me pictures of a few tall-wheeled buggies and assorted other conveyances

that he had built to drive out into the lake from the marshes west of Salt Lake City. Bill also built airboats. I hung around in his shops as he showed me how he built the very crafts that started my interest in the lake, and soon I was operating my own airboat.

The GSL had seen major changes in the 80's and the landscape was significantly different than the marshes of my youth, but it was roaring back. With my newly acquired airboat, I was able to explore the resurgence of the marshes that were destroyed by the flooding of the 80's and witness the huge migrations of birds as they returned to the lake each year. I've spent every minute I possibly could exploring the shorelines of the GSL with my boat...we are a team. Me. My boat. My lake. The marsh had changed a bit and I had changed too. The lake was steadfast.

Soon, phragmites took hold and tried to destroy the marshes of the lake while my airboat and I struggled to navigate the new landscape. I was desperate to find a way to protect the wetlands and to keep phragmites from destroying what had taken the lake thousands of years to perfect. I watched as the water levels fluctuated as a result of heavy snow years and drought years. Overall though, the waters were receding and the phragmites invasion was expanding. The numerous creeks, ditches and flows that had always dumped water into the lake had mostly disappeared. The stoic, steadfast lake was getting a few chinks in its armor, but it still seemed invincible.

The last 15 years or so I have watched the changes. I've watched as our waters were diverted for other uses. Our lake's lifeblood was being sold for development instead of flowing into its arteries. I've witnessed these changes. It hurts. The lake edge keeps receding, and the marshes are mostly a sea of phragmites, while the few remaining patches of bird food struggle to grow and stay relevant between the phrag and the cracked mud of the dry lake bed. Each passing year I drive my boat on the lake and in its marshes...and I watch it change.

I see now that it is I that will need to be steadfast, to be strong while my lake struggles. Things do change I suppose.

It is February 2023 and I'm sitting on my airboat, on my lake and I mourn for the losses I've witnessed. I will remain steadfast in my love for the lake, as it was steadfast for me. Someday, hopefully, we will switch positions again. Everything dies I guess, but I hope I go first.

R. Jefre Hicks is a member of the Utah Waterfowl Association, waterfowler, former president of the Utah Airboaters Association, and Vice President of the Board of FRIENDS of Great Salt Lake



GREAT SALT LAKE MAP



Basemap: USGS. Water level shown depicts approx. 4189'. For reference only.

Great Salt Lake historic average elevation 4,200' (1847-1986).
 Approximate average elevation Fall, 2022 4,189'.

This map shows the contrast between the historic elevation average of 4,200' (1847-1986) and the current elevation of 4,189' (Fall 2022). It shows that islands, bays, habitat values, navigation and open water have been lost/compromised due to a declining elevation.



ACTIVELY MANAGING GREAT SALT LAKE SALINITY

The challenges facing Great Salt Lake (GSL) have become increasingly familiar to the people of Utah. As lake managers have explored solutions, it became apparent that the adaptive management berm (the berm) situated between the North and South Arms of Great Salt Lake is an effective tool that could be implemented immediately to improve salinity levels in the South Arm. To understand the purpose of the berm, it is important to understand the history of the causeway, the present condition of the berm, and how management of the berm looks in the future.

History of the Causeway

During the 1860s, the construction of the Central Pacific Railroad, also known as the first intercontinental railroad, was halted when confronted with the obstacle of GSL. Railroad workers were initially forced to route tracks around the lake's north shore. By 1904, the railroad opted to construct the Lucin Cutoff, which spanned across GSL to reduce the distance of the railway by approximately 44 miles. The original crossing was constructed of wooden trestles and spanned over 12 miles of the lakebed. The trestles became increasingly difficult to manage and maintain, resulting in the railroad replacing the trestles with a rock causeway in the 1950s. The rock causeway effectively bisected the lake into two very different ecosystems.

The South Arm of GSL receives all inflows from the three major tributaries to GSL, the Bear, Weber, and Jordan Rivers, and hosts a biodiverse ecosystem of microbialites, brine shrimp, brine flies, hundreds of bird species, and many other plants and animals. Many species in the South Arm ecosystem rely on a specific salinity range that cannot be found in the North Arm. The hypersaline North Arm receives very few freshwater inputs aside from groundwater and direct precipitation. As such, the North Arm rests at salinity levels above 270 g/L, or at saturation.

Historically, the North and South Arms of the lake communicated through two culverts that began to sink and eventually became submerged. Union Pacific Railroad (the railroad) determined that the culverts should be closed during an inspection prior to 2011 that revealed the culverts were at risk of breaking and collapsing. The United States Army Corps of Engineers (the Corps) authorized the permanent closure of the culverts in 2012 and subsequently approved the railroad's compensatory mitigation proposal to create a 180-foot opening in the causeway that would function similarly to the original culverts.

The Need for a Berm

Through modeling and analysis, it was determined that an invert berm installed in the breach would effectively keep salinity levels within the historic ranges observed in the South Arm. Agreements executed between the railroad, the Division of Water Quality (DWQ), the Corps, and the Utah Division of Forestry, Fire and State Lands (FFSL) detailed the management of the berm and the 5-year monitoring plan that required salinity levels to stay within a historic range. The state inherited long-term management of the berm when it modified the berm in July 2022.

The Great Salt Lake Salinity Advisory Committee (Salinity Committee) was formed to better understand the salinity of GSL and make management recommendations to FFSL and DWQ. The Salinity Committee consists of experts from academia, industry, and government. Based on the December 2, 2021, recommendation from the Salinity Committee, FFSL increased the elevation of the berm to prevent the heavier brines of the North Arm from flowing into the South Arm. This action transferred the long-term management responsibilities of the berm to FFSL in July 2022.

The Berm Today

FFSL works with the Division of Water Resources on engineering, modeling and planning with regard to berm actions. The Salinity Committee plays a pertinent role in accessing additional modifications to the berm as lake levels fluctuate and salinity varies. Holding the water in the South Arm during runoff provides a salinity range that is more supportive of brine fly and brine shrimp reproduction, and provides better conditions for microbialites, which all play important roles in the ecology of GSL.

In November 2022, when GSL hit another historic low lake level elevation of 4,188.5 feet with salinity levels exceeding 180 g/L. The Salinity Committee began discussing a recommendation to make additional modifications to the berm and to improve conditions in the South Arm. Modeling suggested raising the berm to 4,192 feet would effectively act as a dam between the North and South Arms, with the majority of the freshwater coming into the South Arm; this action would allow for the dilution and better mixing of the South Arm brines during spring runoff. A formalized recommendation to FFSL and DWQ on January 19, 2023 reflected the findings of the modeling.

On February 3, 2023, Governor Cox recognized the urgency of this action and issued an Executive Or-



der that mandated the Division to raise the berm to 4,192 feet. The partnership and cooperation among all involved spoke to the immense sense of stewardship that exists in the GSL community, and those working around GSL. Future focus of the Salinity Committee includes an Interim Berm Protocol and the development of a Salinity Management guide.

Lowering the berm at the optimal time of year, post runoff, allows for exports of salt to the North Arm, providing the South Arm a greater opportunity to benefit from spring runoff. Developing methods that target the protective salinity range for when the berm will be lowered to export salt to the North Arm and conditions for which the berm will be raised to capture spring runoff are key in successful management of the delicate ecosystem

Conclusion

Great Salt Lake is a collaborative effort with several agencies monitoring conditions to learn more about the effects of the berm and any unaccounted-for impacts that may occur. The story of the adaptive management berm involves a long list of stakeholders, researchers, lake managers, private sector employees, time and data. Decision making with regard to Great Salt Lake is a complex process. We must continue planning for the future and adapting management decisions as we gather new information. Thank you to all of those who contributed to the data collection, brainstorming, modeling, and overall efforts.

Ben Stireman, Sovereign Lands Program Administrator, Division of Forestry, Fire & State Lands



Union Pacific Causeway berm, photograph courtesy of USGS.



WATER USE AND DROUGHT—IT'S TIME TO WORK TOGETHER TO SOLVE THIS UTAH PROBLEM

On the day the advance party of pioneers came to the Salt Lake Valley in July 1847, they plowed soil, planted seed, and diverted irrigation water from what became known as City Creek. In the decades that followed, groups settled along waterways throughout what is now the State of Utah and built community systems to divert irrigation water.

These pioneers, like the Fremont and other people before them, used irrigation to meet the basic need of growing food. They didn't have transportation networks, supply chains, and stores offering food sourced from near and far. They had to provide food for themselves. While our society has changed from those early years, the basic need for food has not. And while our food supply now comes from many sources, polls show Utah people understand why Utah needs the quality, security, and value of local food production.

Unfortunately, many recent articles, editorials, and other social commentaries seem to forget this basic need. To some extent, this is understandable, as most Utahns are three to four generations removed from having worked on a farm or ranch. This creates a greater need for farmers, ranchers, and other food suppliers to be part of the discussion.

Benefitting from Utah's Farmers & Ranchers

Over the years, farmers and ranchers have learned to be efficient and productive while producing food for us all. As most of our population has turned to other occupations, we all come to rely on those few who still produce food. Farmers and ranchers have risen to the occasion, becoming so efficient that each farmer in America now feeds approximately 165 people. While doctors, teachers, hair stylists, newspaper writers, mechanics, finance workers, and even college professors pursue their trades without the fear of going hungry, less than one percent of the Utah population produces food for the rest of us. What a miracle!

We cannot forget everything that goes into producing food. Renowned conservationist Aldo Leopold once said, "There are two spiritual dangers in not owning a farm. One is the danger of supposing that breakfast comes from the grocery, and the other that heat comes from the furnace."

We need to remember that food has to be produced before it is available in the grocery store. Sadly, we've

paved over many of the best growing regions in Utah for crops, forcing fresh fruit and produce to be grown elsewhere, and local dairies to either consolidate or go out of business. According to an Envision Utah study in 2015, Utah only produces 3% of its fruit needs, 2% of its vegetable needs, and around 25% of its dairy needs. This same group found that 98% of Utahns want to significantly improve our self-sufficiency and food security by growing more food locally.

We have also seen during the pandemic, the vulnerability of the food chain and conversely the value of improving the local ability to grow and process local food. Even as we faced these challenges, drought across much of the United States, Mexico, and elsewhere has hammered food production and already stressed farm businesses.

Working Together to Solve this Utah Problem

The people who grow our food stand on the front lines of water concerns. They are the first who suffer the effects of drought and feel it more severely. When farmers cut their water use in 2022 – some by as much as 75% - their business suffered. Imagine any business surviving such extreme cuts! On top of these challenges, farmers face constant criticism for using water to grow food.

The Division of Water Resources calculates that Utah's watersheds received, on average, just more than 61 million acre-feet of water per year in the 30-year period ending in 2018. (An "acre-foot" of water is equal to 325,851 gallons.) During that time, humans diverted about 7.74% of the total precipitation. That means roughly 92% of all the precipitation that falls in Utah remains in the natural environment. About 79% of the 7.74% taken for human purposes was used for crop irrigation. A substantial portion of the 79% taken for irrigation use, however, returns to the natural environment through return flows. Farmers continue to work with university researchers to calculate how much of the water used for irrigation returns to and benefits the environment.

Utah farmers and ranchers want to be wise water users in the future as they have been for the past 178 years. For decades, farmers and irrigation companies throughout the state have worked to pipe canals and convert to irrigation methods better suited to local conditions. Currently, they are working with the Utah Department of Agriculture and Food through





From the Kitchen Window, photograph courtesy of Linda L’Ai

water optimization grants to complete projects that are producing real results. Thankfully, this past legislative session saw an additional \$200 million dollars allocated to ag water optimization programs.

Additionally, the legislature this year passed Senate Bill 277, which provides clarity to account for “saved” water, and provides assurances to Utah farmers and ranchers that their water rights will be protected should they participate in projects that provide water for conservation purposes.

Working together to support agriculture and water improvements contributes greatly to Utah’s \$15.1 billion agricultural economy (\$5.5 billion in the 11 counties within the Great Salt Lake basin). But there are many other benefits beyond food production that society receives from a vibrant, agricultural economy. These include wildlife habitat, thriving wetland areas, riparian area diversity, watershed management and restoration, groundwater recharge, open space, carbon sequestration, and incalculable cultural benefits. I don’t think anyone wants Utah to be filled with houses from the mountains down to the lake bed.

As a society, we use water in many ways and we will

all need to work together to improve our water use. Since the Great Salt Lake’s high water levels of 1985, irrigation withdrawals have gone down 23% in the 11 counties that drain into the Great Salt Lake. Data from the U.S. Geological Survey indicate that agricultural withdrawals have decreased by more than 15% since 1985. USDA Census of Agriculture shows irrigated land has decreased by 27%, and irrigated hay by 12% in those same counties. These numbers can be hard to visualize, so consider this: the amount of water no longer going to agriculture is enough to fill Jordanelle, Pineview, East Canyon, and Echo reservoirs to capacity—or roughly 262,000 Olympic-sized swimming pools. At the same time, population numbers in those same counties have increased by 86%. Agricultural producers realize that they must continue to be part of the solution, but know that our society will be at great risk unless we all work together.

The time has come to expand the narrative to bring everyone together to solve this Utah problem. Together, we can make it happen.

Ron Gibson, President,
Utah Farm Bureau Federation





HOW TO REACH US
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Salt Lake City, UT 84102
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Submit articles and
images for consideration
to Lynn de Freitas at
ldfreitas@xmission.com

LAKE FACT:
Q: What is the largest contributing factor for Great Salt Lake's decline?

A: Human water use (67-73%)

THANKS FOR MAKING A DIFFERENCE

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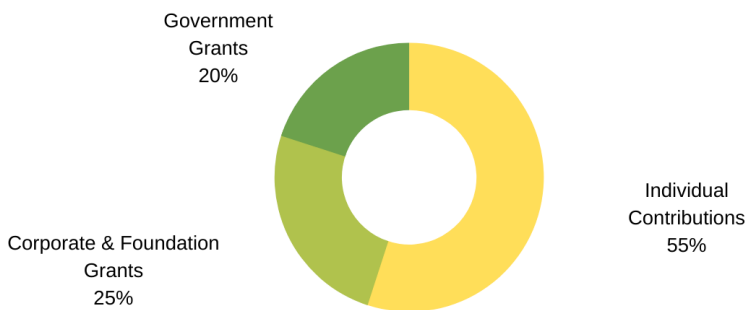
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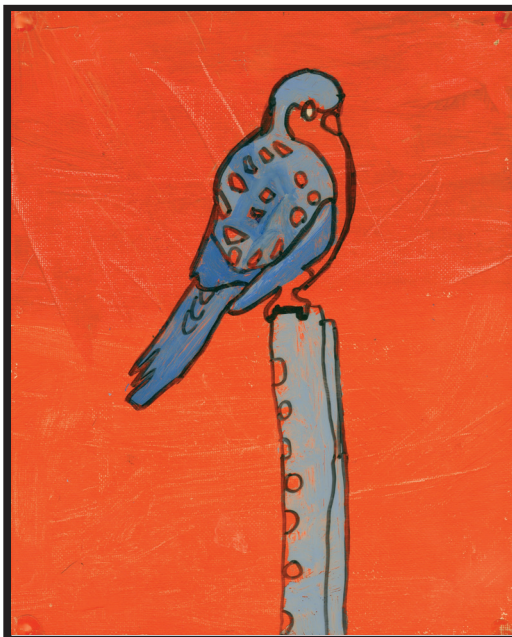
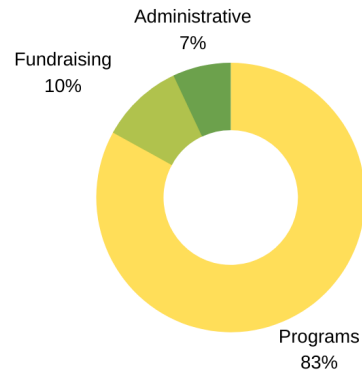
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Kestrel by Tommy Shurtleff,
6th grade art student at
Wasatch Elementary

“I wanted to make this art piece showing a kestrel at the Great Salt Lake. It is one of the birds that lives at the Lake. It is a part of the food chain. If Great Salt Lake dries up, the kestrels won't have anything to eat. Then the kestrels would have to find a new home.”





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Do You Know?

Great Blue Heron eggs are
incubated by both sexes
and both parents feed
young by regurgitation.
Chicks are capable of flight
at about 60 days, and de-
part the nest at 65-90 days.

Great Blue Heron and chicks, photograph courtesy of Leslie Scopes