

The Water Report

Water Rights, Water Quality & Water Solutions in the West

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❧ WATER BANKRUPTCY IN THE SOUTHWEST USA ❧

SATELLITE OBSERVATIONS REVEAL DROUGHT IMPACTS

HIDDEN UNDERGROUND

by Mohammad Khorrami, Susanna Werth, Esther O. Oyedele, and Manoochehr Shirzaei
(Virginia Tech and United Nations University Institute for Water, Environment, and Health)

Introduction

Lake Mead, formed by the impoundment of the Colorado River behind Hoover Dam, is the largest human-made reservoir in the United States. It supplies water to more than 25 million people and supports agricultural production and hydropower generation for communities across the southwestern United States. During the past two decades, prolonged drought, declining snowpack, climate variability, and sustained water demand have placed increasing pressure on the Colorado River system. Its condition is closely monitored as an indicator of water availability across the region, where demand frequently approaches or exceeds available water supply, especially during drought periods. The dropping water level of Lake Mead has provided one of the most visible signs of that stress. Upstream, Lake Powell has experienced similarly severe declines, underscoring the fact that the water-storage challenges extend across the broader Colorado River Basin.

Reservoir levels at Lake Mead have repeatedly fallen during the major drought periods since 1999, and they have not fully recovered between them. The recent 2020–2022 drought was particularly severe. During this period, Lake Mead's water-surface elevation dropped to its lowest level since the lake was first filled in the 1930s, declining about 17 meters (approximately 56 feet) between April 2020 and July 2022. The decline represented a loss of about 4 cubic kilometers of stored surface water, nearly one-third of the lake's April 2020 volume (*see* Figure 1).

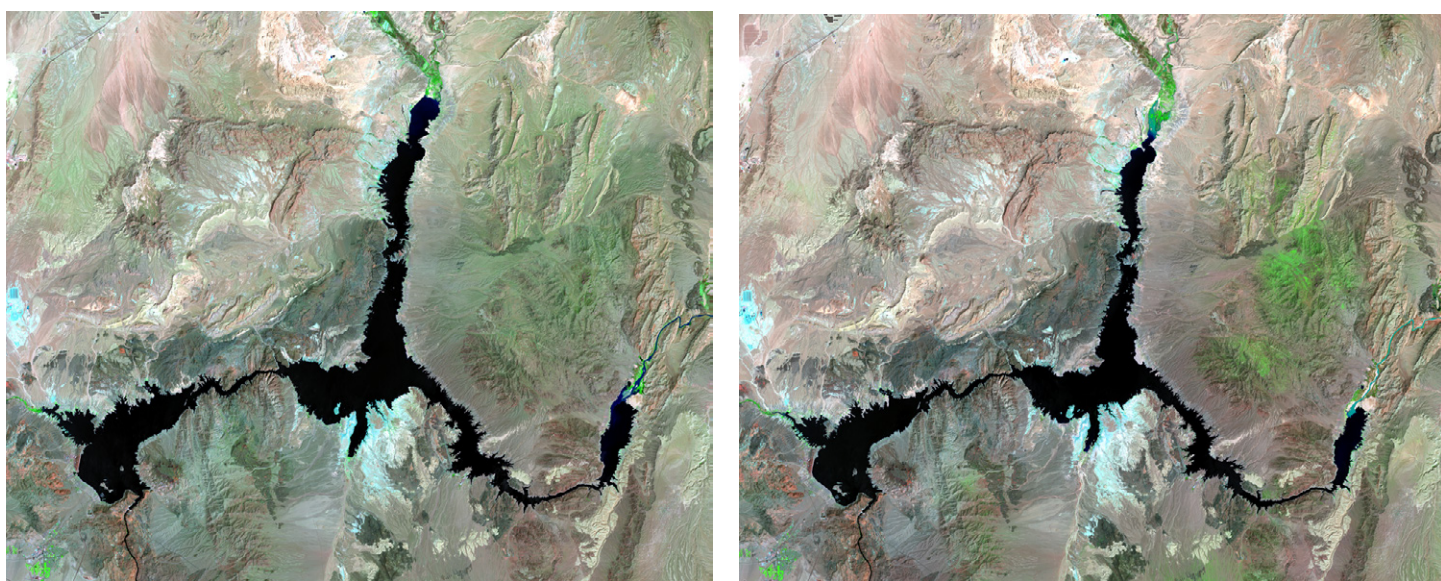


Figure 1. Lake Mead's surface water shrinkage from 2020 (left) to 2022 (right) (Source: Landsat-7 image courtesy of the U.S. Geological Survey).

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Bankruptcy**Drought Response****Results**

However, the visible decline in the reservoir tells only part of the regional water-storage story. Here, water storage refers to the amount of water held within different parts of the hydrologic system, including reservoirs, groundwater, soil moisture, and snow. Lake Mead is hydraulically connected, to varying degrees, with portions of the surrounding groundwater system. As reservoir levels rise or fall, hydraulic pressure can propagate into adjacent aquifers and influence groundwater storage. Conversely, groundwater conditions can also influence connected surface-water systems.

Understanding this connection is important for water resources management because groundwater often serves as a buffer during drought. When surface-water supplies decline, communities, agriculture, and other users may rely more heavily on groundwater supply. However, if groundwater itself is simultaneously affected by declining surface-water levels, this backup supply may be less independent, and potentially less resilient, than assumed.

The Water Management Challenge

Management of the Colorado River Basin has historically focused heavily on surface-water allocations. Deliveries from Lake Mead and other major reservoirs such as Lake Powell are governed by an extensive body of laws, interstate agreements, operating guidelines, and treaties. Groundwater, in contrast, is managed through a more fragmented set of state and local frameworks and is not integrated to the same extent into basin-wide Colorado River operations.

This distinction has become increasingly important as the Colorado River system has entered a period of unprecedented management pressure. In August 2026, the US Department of the Interior issued new operating guidelines for 2027–2028 that require reductions of 1.25 million acre-feet per year in Lower Basin deliveries and establish a broader framework for managing Lake Mead and Lake Powell under continued drought and exceptionally low reservoir storage. The federal action reflects the increasing difficulty of balancing available water among cities, agriculture, Tribes, ecosystems, and other users as the basin adjusts to a more constrained water supply.

These decisions depend on estimates of how much water is available now and how the system is likely to respond in the future. Yet one important source of uncertainty is the degree to which groundwater and surface-water resources are hydrologically connected. Although groundwater can provide an important buffer when surface-water supplies decline, the magnitude, timing, and spatial extent of groundwater responses to changes in reservoirs and rivers are not fully characterized. This uncertainty makes it more difficult to determine how much groundwater represents an independent reserve, to predict how groundwater use may affect future surface-water availability, and to assess the resilience of the overall water system during prolonged drought.

Determining the magnitude and timing of these interactions is difficult because groundwater observations are spatially limited. Monitoring wells provide valuable information at individual locations but they cannot directly reveal the complete distribution of water-storage changes across thousands of square kilometers.

Weighing Water by Watching the Land Move

A 2025 study conducted by researchers at Virginia Tech and published in the *Journal of Hydrology: Regional Studies* examined this problem using an unconventional method of observation: monitoring movement of the Earth's surface as measured by satellites. The study combined groundwater and surface water level observations, soil moisture, and snowpack records with satellite-based measurements and physical models to investigate how Lake Mead and the surrounding groundwater system responded to the 2020–2022 drought.

The results showed that drought-related water loss can leave a measurable fingerprint in the form of land surface deformation, and that this signal can be used to provide independent estimates of regional water-storage changes. More importantly for water managers, the findings indicate that groundwater and surface water around Lake Mead should not necessarily be considered separate resources.

Water has mass, and that mass exerts a load on its surroundings. When large quantities of water accumulate in a reservoir or within the subsurface, the effect of the added mass is to slightly depress the Earth's crust. A useful analogy is the way a trampoline responds to a weight being placed onto it: added water mass pushes the Earth's surface downward. Conversely, water loss reduces that load, allowing the surface to rebound. The Earth's crust, however, is far less flexible than a trampoline, so the resulting deformation is typically only millimeters in magnitude. Modern geodetic observations can nevertheless detect these small movements.

Bankruptcy
Method
Water Mass & Deformation
Water Loss Estimates
Monitoring Wells

The study used space-based Interferometric Synthetic Aperture Radar (InSAR) to measure this displacement. InSAR compares radar images acquired at different times. Changes in the radar signal can be used to measure variations in the distance between the satellite and the ground, allowing researchers to map land-surface motion over broad areas at high spatial resolution. For the Lake Mead analysis, 111 radar images from the European Space Agency’s Sentinel-1 satellites were processed between April 2020 and July 2022.

The satellite observations showed widespread upward land motion around the reservoir. Maximum uplift reached approximately 8 millimeters per year near Lake Mead. Independent high-precision Global Positioning System (GPS) measurements were used to validate the InSAR results. The close agreement between the InSAR and GPS observations supported the interpretation that much of the broad uplift pattern reflected elastic rebound of the Earth’s surface as water mass declined.

This method of monitoring presented an opportunity to approach the water-budget problem from a different direction. Instead of relying on measurements of lake levels, groundwater levels, precipitation, and soil moisture, the analysis asked a physical question: How much water-storage loss would be required to produce the land uplift measured from space?

From Millimeters of Displacement to Water Storage Loss

The relationship between water mass and crustal deformation can be represented using a physical model of elastic loading. In simplified terms, the model calculates how the ground should deform when a known amount of mass is added or removed. The process can also be reversed. If the deformation is measured, the distribution of mass change that most likely produced that deformation can be estimated. The Lake Mead study used this inverse approach.

The approximately 3,150-square-kilometer study area surrounding Lake Mead was divided into smaller elements. Satellite-derived vertical land-motion observations were then used to estimate the amount of total water-storage change required to produce the observed uplift. In this analysis, total water storage included surface water in Lake Mead, groundwater, soil moisture, and snow water.

A critical uncertainty in this calculation is the elastic properties of the near-surface geological material. Different geological materials deform by different amounts under the same change in load; softer materials move more, and more rigid materials move less. Because geological and mechanical properties vary around Lake Mead, rather than relying on a single value, several plausible elastic-property assumptions were evaluated. Across the range tested, the deformation analysis indicated total water-storage losses of approximately 2.0 to 3.0 cubic kilometers per year within the study area during the drought.

This result demonstrates an important application of satellite geodesy. Earth surface deformation is not only a measure of land motion; under appropriate conditions, it can also provide quantitative information about changes in water storage.

Separating the Water Budget

Total water-storage loss alone does not indicate how much water was lost from Lake Mead versus the loss of groundwater. To address this distinction, the next step was to separate the individual components of the regional water budget. During the 2020–2022 study period, Lake Mead’s surface-water storage declined at approximately 1.97 cubic kilometers per year. Soil-moisture estimates from three North American Land Data Assimilation System models indicated an additional decline of approximately 0.12 cubic kilometers per year, while changes in snow-water storage within the study area were comparatively small.

Once these contributions were accounted for in the total water-storage change inferred from the satellite-derived measurement of land deformation, the remaining portion represented an estimate of the change in groundwater storage. The magnitude of the estimate depends partly on assumptions about the elastic properties of the subsurface. Using the most rigid endmember tested in the analysis yielded an estimated groundwater storage decline of approximately 0.94 ± 0.32 cubic kilometers per year. A midrange elastic modulus yielded a groundwater storage estimate of about 0.43 cubic kilometers per year.

Groundwater monitoring wells operated by the US Geological Survey and Arizona Department of Water Resources provided an independent line of evidence. Groundwater-level responses to the drought varied considerably across the region, with some wells changing relatively little and others declining by centimeters to meters per year. That variability is to be expected because the Lake Mead region contains a complex mix of basin-fill sediments, fractured rocks, faults, and other geological units with different hydraulic properties. However, when considered in combination with plausible aquifer storage properties, the changes observed in the monitoring wells yielded an estimate of groundwater storage consistent with

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Groundwater Decline

the result derived from land deformation. Importantly, it was consistent with the approximately 0.43 cubic kilometers per year inferred from the analysis using a midrange elastic modulus.

Thus, while the precise magnitude remains uncertain, two different lines of evidence from the study results pointed in the same direction: groundwater storage surrounding Lake Mead declined during the 2020–2022 drought. The reservoir’s visible decline, therefore, represented only part of the regional water loss; additional depletion occurred below ground.

The Delay Between the Lake and the Aquifer

The differences between wells also provided information about hydraulic connectivity. If Lake Mead and the surrounding groundwater were completely disconnected, variations in lake level would not be expected to produce systematic delayed responses in nearby groundwater records. Conversely, if the systems were hydraulically connected, pressure changes originating at the reservoir would be expected to propagate through the groundwater system over time. Therefore, the timing of groundwater responses relative to lake-level changes can help reveal the strength and variability of that connection.

Lake and groundwater levels fluctuate over multiple timescales. Seasonal cycles, longer drought trends, pumping, recharge, and local hydrologic conditions can occur simultaneously, making direct comparison difficult. To isolate the seasonal behavior, the study used a decomposition technique known as wavelet time-frequency analysis. This approach separates signals according to their characteristic timescales, allowing the annual variations in Lake Mead and groundwater levels to be examined separately from long-term trends and more frequent changes.

Observed Changes

Groundwater wells with sufficiently long, continuous records were compared with Lake Mead. The analysis found that annual groundwater-level variations consistently occurred after corresponding changes in surface-water levels. The observed delays ranged from approximately 6 to 98 days, depending on the monitoring location. For example, one well, located approximately 2.3 kilometers from connected surface water, showed a six-day delay, while another, approximately 5.4 kilometers away, showed a delay of about 27 days. Wells farther from the lake showed delays of several weeks to more than three months.

Hydraulic Connectivity

These observations were compared with a simplified physical model describing the lateral diffusion of fluid pressure through an aquifer and then used to estimate the hydraulic diffusivity of the subsurface. This parameter describes how efficiently a change in fluid pressure propagates through an aquifer. High values indicate relatively efficient pressure transmission, while lower values can reflect less permeable or more compartmentalized materials. The resulting estimates of hydraulic diffusivity ranged from approximately 3.2 to 86 square meters per second, highlighting substantial spatial variation across the region.

The analysis indicated that geological heterogeneity around Lake Mead strongly affects the timing of groundwater response. Importantly, these lag times describe the propagation of hydraulic pressure, not the travel time of individual water molecules from the lake to a monitoring well. Pressure signals can move through an aquifer much faster than groundwater itself. Therefore, the observed timings are best interpreted as evidence consistent with hydraulic connectivity between surface water and groundwater.

Drought as a Natural Experiment

Experiment Summary

The severity of the 2020–2022 drought effectively created the conditions for a large hydrologic study to be conducted. Lake Mead’s rapid decline imposed a strong and measurable change in surface-water conditions. The surrounding aquifer system responded over periods ranging from days to months. At the same time, the loss of water mass reduced the physical load on the Earth’s surface enough to produce millimeter-scale uplift detectable from space.

Together, these independent observations provide complementary views of the same hydrologic response: groundwater records reveal how hydraulic pressure changes propagate through the subsurface; deformations measured by satellite indicate the integrated effect of changing water mass across the landscape; and hydrological models help separate the contributions from lake water, soil moisture, snow, and groundwater. Taken together, the evidence indicates that Lake Mead and the neighboring groundwater system behave as components of a connected regional hydrologic system rather than as completely independent water supplies. This finding has important consequences for how drought resilience is evaluated.

GROUNDWATER AS A DROUGHT BUFFER: MANAGEMENT IMPLICATIONS

Groundwater is frequently relied upon as a source of water supply when surface water resources decline. Aquifers can store large volumes of water, and because they typically respond more slowly than surface-water systems to extreme climate events, groundwater resources provide some resilience with

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Compounding Depletion

Managing Interconnected Resources

respect to water supply during dry periods. However, the effectiveness of this buffer depends partly on the level of connectivity of a groundwater system to the stressed surface-water system.

The observed levels of hydraulic connectivity around Lake Mead indicate that declining reservoir levels may affect groundwater storage. Therefore, shortages of surface water in Lake Mead may increase the demand for groundwater at the same time that the connected aquifer systems respond to the changes in the lake with declines of their own. Thus, demand amidst decline can compound groundwater depletion. If these processes are evaluated separately, managers may overestimate the amount of water available to meet water demand and, thus, the system’s ability to offset the impacts of drought. Groundwater can still serve as an important drought reserve, but the size and reliability of that reserve will depend on the hydraulic relationship between groundwater and surface water.

The Colorado River Basin illustrates the challenge of managing interconnected resources through institutional frameworks that often treat them as separate. Reservoir operating rules and interstate allocations primarily address surface water, while groundwater regulation varies across jurisdictions and is generally less integrated into basin-wide Colorado River management. Hydrologically, however, these resources may function as parts of the same system. Where aquifers are connected to rivers and reservoirs, managing groundwater and surface water separately can obscure how withdrawals, reservoir operations, and conservation measures redistribute water stress across the system.

The results of the Lake Mead study support the evaluation of reservoir operations, groundwater pumping, water-conservation measures, and groundwater-recharge strategies within a common water-budget framework. Such an approach would help managers identify situations where apparent groundwater availability is partly dependent on surface-water conditions and where management actions in one part of the system may affect another.

Adaptive groundwater-management strategies may also become increasingly important. Instead of assuming a fixed sustainable pumping rate under all conditions, groundwater withdrawals could be adjusted based on hydrologic conditions, reservoir levels, aquifer responses, and other indicators. The objective is not to impose the same management system throughout the Colorado River Basin because aquifer conditions, legal structures, water rights, and local needs vary substantially from one location to another. The broader principle is that where physical connections between water resources are significant, the effects of such connections should be incorporated into water-budget assessments and management decisions.

A New Role for Satellite Observations

One of the broader outcomes of the Lake Mead study is methodological. Traditional groundwater monitoring depends heavily on wells. These observations remain essential because they directly measure groundwater levels and provide information that cannot be obtained by satellite observations. However, monitoring wells are unevenly distributed, leaving large regions in which there are relatively few long-term monitoring locations.

Monitoring Tool

Satellite geodesy can complement the information provided by these networks of wells by providing spatially extensive observations of land-surface deformation. Satellites such as Sentinel-1 and other SAR satellites such as the recently launched NASA satellite NISAR, repeatedly observe large areas of the Earth’s surface, and the measurements obtained can be used to produce spatially continuous maps of deformation, including in locations where ground observations are sparse.

Traditionally, large land-subsidence signals have been used to identify groundwater extraction and the compaction of aquifers. The Lake Mead analysis instead focuses on using subtle elastic deformation of the Earth’s crust to estimate changes in the amount of water mass stored below the ground and its connection with changes in surface water.

Capability

Where geological conditions are sufficiently well known, this elastic deformation can provide an additional non-invasive means of estimating regional changes in water storage volumes both on and below the surface. Remotely sensed vertical land motion can be combined with mechanical models to estimate changes in water mass. Groundwater observations, reservoir records, soil-moisture datasets, and other hydrologic measurements can then be used to separate the total storage signal into individual components. The approach is particularly valuable because it provides information over large areas rather than at a single monitoring point.

Extending Satellite-Based Water Monitoring

Lake Mead is not the only major Colorado River reservoir where prolonged drought has produced historically low water levels. Upstream, Lake Powell has experienced similarly severe declines, highlighting the reality that drought-related water-storage stress extends across both the Upper and Lower

Bankruptcy	Colorado River Basin. Per USGS, in August 2026, Lake Powell reached record lows not seen since Glen Canyon Dam began filling in 1963. These large changes in reservoir storage represent substantial changes in the mass loading on the Earth’s surface, providing an opportunity to examine how the surrounding landscape responds to major changes in water storage.
Lake Powell Research	The research team that conducted the 2025 Lake Mead study is now examining satellite-derived measurements of surface deformation in the vicinity of Lake Powell, in combination with hydrological data. A key challenge of the Lake Powell study is that several processes can contribute to the observed land motion, including elastic loading, landslides, aquifer compaction, and shoreline erosion. Whereas the Lake Mead observations were dominated by the elastic-loading response, separating the overlapping signals at Lake Powell requires additional analysis. Machine-learning methods are being used to identify deformation patterns with distinct spatial and temporal characteristics and to highlight areas that warrant more detailed hydrologic or geologic investigation. The Lake Mead and Lake Powell examples illustrate how this satellite-based framework can be extended beyond a single reservoir. Across the western United States, and potentially in similar settings worldwide, the approach could be applied to investigate other reservoir–aquifer systems. Applying satellite-based deformation observations across these systems could help identify where changes in surface-water storage are accompanied by measurable responses in the surrounding landscape and where groundwater may be changing at the same time.
Value	The broader value lies in combining complementary observations rather than relying on any one of them alone. Together, satellite deformation, groundwater monitoring, reservoir records, and hydrologic models can provide a more complete picture of the changes occurring in regional water-storage systems and help identify where additional observations or modeling are most needed. This type of integrated monitoring will become increasingly important as droughts, population growth, changing snowmelt patterns, and competing water demands place additional pressure on western water resources.
Subsurface Elasticity	Uncertainties and Limitations There are several limitations to interpreting the Lake Mead results. First, estimates of groundwater storage loss depend on the assumed elastic properties of the subsurface. Geological materials around Lake Mead are spatially heterogeneous, and their elastic properties cannot be known precisely everywhere. Testing several plausible values yielded a range of total and groundwater storage estimates rather than a single estimated figure. The analysis therefore constrains groundwater loss, but it does not provide a uniquely determined regional groundwater budget.
Modeling	Second, the model used to evaluate the lag between lake and groundwater levels represented pressure propagation as a one-dimensional process. Actual groundwater systems are three-dimensional, and they include layering, faults, variations in permeability, and other complexities. The diffusion model should therefore be interpreted as a first-order representation of hydraulic connectivity.
Pumping	Third, groundwater pumping can influence groundwater-level observations. In areas where extraction records are incomplete, separating the effects of pumping from reservoir-driven pressure changes can be difficult.
Multiple Observations	These uncertainties emphasize the value of combining multiple observation systems. Agreement among satellite deformation, groundwater measurements, reservoir records, and physical models provides greater confidence than relying on any single source of information. Future work can build on this framework using denser groundwater observations, improved estimates of subsurface elastic properties, and by applying detailed two- or three-dimensional groundwater models. Conclusion Drought in the Colorado River Basin is generally evident in declining reservoir levels, reduced streamflow, diminishing snowpack, and increasingly constrained water deliveries. Some of its effects, however, occur below ground and are more difficult to observe. A reservoir’s shoreline reveals only the visible evidence of drought; the Lake Mead results show that the hydrologic consequences of declining surface-water levels can extend well into the subsurface. The Lake Mead study demonstrates that satellite measurements of vertical movements of the Earth’s surface can help reveal these hidden changes. During the 2020–2022 drought, measurements derived from observations by Sentinel-1 identified broad uplift around Lake Mead consistent with elastic unloading as water mass declined. Modeling of this deformation indicated total water-storage losses of approximately 2 to 3 cubic kilometers per year across the study region, depending on assumptions about subsurface elastic properties.

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Connectivity

Satellite Geodesy
Tool

Groundwater represented a meaningful component of that loss. Independent groundwater observations supported the conclusion that the aquifer system was being depleted. In addition, changes in groundwater levels lagged behind seasonal Lake Mead fluctuations by approximately 6 to 98 days, consistent with pressure diffusion through a hydraulically connected and spatially heterogeneous groundwater system. Together, these findings illustrate the limitations of considering groundwater and surface water separately in a connected basin.

As western water managers confront increasingly variable water supplies and growing competition for available resources, monitoring and management approaches that account for the entire hydrologic system will become increasingly valuable. Satellite geodesy adds another tool to that effort by allowing changes in water mass to be inferred from the detection and measurement of millimeter-scale movements of the land itself.

Lake Powell shows that the challenges observed at Lake Mead are part of a broader basin-wide problem. Together, the studies of these reservoirs illustrate why drought assessment must look beyond visible changes in surface water to the coupled response of groundwater and the surrounding landscape. A whole-system perspective can provide a stronger basis for evaluating water availability and drought resilience across the West.

SOURCE STUDY

Khorrami, M., Werth, S., Zehsaz, S., and Shirzaei, M. 2025. “Drought-Induced Changes in Groundwater-Surface Water Exchange at Lake Mead Area.” *Journal of Hydrology: Regional Studies*, 62, 102996. <https://doi.org/10.1016/j.ejrh.2025.102996>.

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Esther O. Oyedele is a doctoral researcher and hydrogeodesist specializing in satellite remote sensing, groundwater and surface-water interactions, drought, and water-storage dynamics. Her research interests include the integration of satellite observations, hydroclimate datasets, physical modeling, and data-driven approaches to understand groundwater response to climate variability and human-induced water stress. She is also engaged in science communication and policy outreach.

Dr. Manoochehr Shirzaei is a geophysicist specializing in space-borne synthetic aperture radar technology and in using satellite remote sensing to inform groundwater resource management, green energy system development, and the development of equitable adaptation strategies to address natural and anthropogenic land subsidence, sea-level rise, and coastal hazards in the context of a changing climate.

GSL Assessment

~~~~~ **GREAT SALT LAKE BIRDS & HABITAT ASSESSMENT** ~~~~~  
**NATIONAL AUDUBON SOCIETY’S ANALYSIS OF CURRENT AND FUTURE HABITAT  
CONSERVATION PRIORITIES, NEEDS, AND OPPORTUNITIES FOR GREAT SALT LAKE  
AND ITS WETLANDS**

by Emily Hamel, Saline Lakes Program Ecologist (National Audubon Society)

**Introduction**

The Great Salt Lake Birds and Habitat Assessment (Assessment) is a science-based analysis designed to inform conservation strategies in the Great Salt Lake watershed. Its primary goal focuses on protecting the 10 to 12 million waterbirds that depend on the lake and the habitat they need, today and in the future. Developed by National Audubon Society’s (Audubon) team of scientists and habitat and water experts, this effort integrates data analyses from habitat, hydrology, and climate models into a unified spatial framework.

The Assessment offers a habitat prioritization model based on a suite of indicator waterbird species across all seasons. By evaluating habitat importance under current and projected climate conditions, it provides site-level management guidance that can inform adaptive management and conservation strategies. Additionally, as part of this Assessment, Audubon utilized a hydrologic model that could capture contributions to Great Salt Lake from upstream wetlands and flood-irrigated agricultural lands to identify opportunities to enhance the delivery of water to the lake and its wetlands. The Assessment illustrates how Great Salt Lake’s mosaic of interconnected habitats across the watershed is essential for maintaining the region’s exceptional waterbird diversity and abundance.

The Assessment aims to align several conservation priorities and guide coordinated action for Great Salt Lake’s unique landscape to protect birds and the habitats they need to survive. As indicators of overall habitat health and the organisms that are arguably most reliant on the persistence of Great Salt Lake, waterbirds provide a roadmap toward ecologically conscious management and conservation of a water-scarce system. Coordinating waterbird habitat conservation within the context of Great Salt Lake’s water needs, the Assessment’s findings can not only inform strategies for the protection of wildlife habitat but also lead to better outcomes for Great Salt Lake as a natural, economic, and cultural resource.

**Great Salt Lake: A Globally Important Ecosystem**

Great Salt Lake, situated in northern Utah, is one of the largest saline lakes in the Western Hemisphere—spanning more than 1,700 square miles on average—and it serves as vital natural water infrastructure for people and wildlife, including food and habitat for millions of waterbirds.

As a terminal lake, Great Salt Lake accumulates minerals and salts due to water exiting the system only through evaporation. This creates a hypersaline aquatic environment that is the foundation of a globally important food web. The expansive lake and its surrounding wetlands support a dynamic mosaic of habitats, which include natural and managed wetlands, salt marshes, wet meadows, deep and shallow water areas, islands, flooded mudflats, and playas with varying levels of salinity. Collectively, these ecosystems provide essential resources for birds across multiple phases of their life cycles, serving as breeding grounds, stopover sites for migratory staging, and overwintering refuges.

The ecological significance of Great Salt Lake is closely tied to the wetlands concentrated around the eastern perimeter of the lake, as well as along its north and south shores. The wetland complex surrounding the open waters of Great Salt Lake encompasses both managed and naturally occurring seasonal to perennial wetlands, totaling approximately 350,000 acres (Downard et al., 2017). Many of these wetlands and wetland complexes are protected, including the Bear River Migratory Bird Refuge managed by the US Fish and Wildlife Service, numerous Waterfowl Management Areas owned by the State of Utah, Antelope Island State Park, private refuges and conservation areas owned by Audubon and The Nature Conservancy, and multiple privately owned duck clubs (Figure 1). In addition to supporting important natural functions—for example, nutrient cycling, water filtration and purification, groundwater recharge, reliable shelter and forage for birds and other wildlife—these wetlands provide varied microhabitats with different water depths and availability, vegetation types, and salinity levels.

**Habitat  
Prioritization Model**

**Terminal Lake**

**Ecological  
Significance**

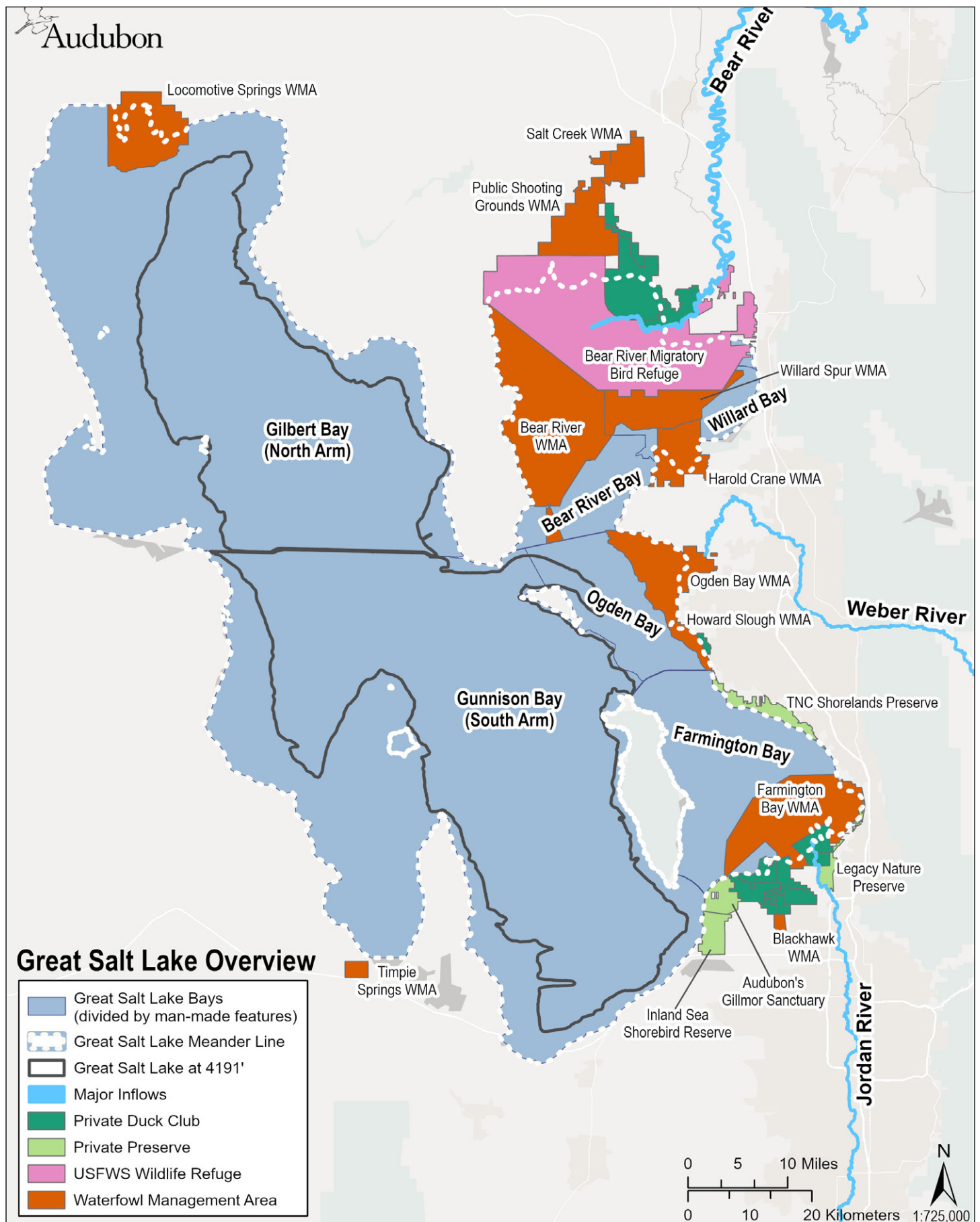


Figure 1. Great Salt Lake Features (including major inflows, bays, and protected areas managed for birds).

GSL Assessment

Complexity

Conservation Challenges and Urgency

Great Salt Lake faces unprecedented challenges that threaten its ecological integrity and cause a variety of cascading impacts that are difficult to reverse and costly to mitigate. These challenges are characterized by their complexity as well as the interconnected nature of the watershed’s system—where natural processes and human development are deeply intertwined—creating urgent conservation priorities that demand coordinated action. A collapsing Great Salt Lake ecosystem would have continent-wide ecological consequences, jeopardizing important economic activities for the state and nation, and lead to public health hazards from dust emissions.

Challenges

DECLINING LAKE LEVELS AND CLIMATE CHANGE

The most visible threat to Great Salt Lake is its declining water level. The lake has experienced dramatic reductions in volume over recent decades, and it hit its lowest recorded lake level in 2022. The decline has been driven by a combination of factors including historical and increased water diversions, extended periods of drought, and warming temperatures associated with a changing climate (Bigalke et al., 2025). And now, in the 2026 water-year, the lowest snowpack on record (Utah Division of Water Resources, 2026b) and below-average runoff and persistent drought are driving Great Salt Lake’s water levels to near record lows once again (Utah Department of Natural Resources, 2026; Great Salt Lake Strike Team, 2026). Lower lake levels have led to the loss of nesting islands, exposed formerly submerged lakebed, reduced the extent of aquatic habitat, and disrupted the food web dynamics that support bird populations. Microbialite structures on the lakebed are often exposed and subjected to desiccation, destroying the algal microbiomes they support. When the lake is at a critically low level, salinity spikes or declines (if not managed through engineered solutions) can threaten keystone aquatic invertebrate populations that are critical avian food sources. In addition, when water levels are low, more of the lakebed is exposed, thus contributing to increased dust emissions and stressed wetland habitats.

Climate change projections indicate that conditions in the Great Salt Lake basin will continue to degrade, with models predicting warmer temperatures, altered precipitation patterns, and increased evaporation rates (Baxter & Butler, 2020; Hassan et al., 2023). These changes will impact both the lake itself and the surrounding wetlands and upland areas that provide complementary habitat for birds. The Great Salt Lake Integrated Basin Plan will provide updated information on the anticipated effects of climate change scenarios in the Great Salt Lake Basin (see Utah Division of Water Resources, 2026a and TWR#270).

Water Uses

WATER DIVERSIONS AND COMPETING WATER DEMANDS

Water flowing into Great Salt Lake is heavily managed and allocated through Utah’s prior appropriation water rights system. Upstream diversions for agricultural, municipal, and industrial uses, along with other upstream ecological uses, reduce inflows to the lake and its wetlands. As Utah’s human population continues to grow and development expands, competition for water resources intensifies. Agricultural irrigation diverts water from the system. However, some crop watering methods such as flood-irrigation can provide wetland-like habitats and food resources for birds (Donnelly et al., 2024) in addition to supplying return flows for the hydrologic system that contribute fresh water to Great Salt Lake and its wetlands.

Municipal and industrial water uses also decrease inflows to Great Salt Lake and can degrade water quality (Great Salt Lake Strike Team, 2026).

Balancing these competing water demands while maintaining sufficient inflows to support the lake’s ecological functions is a fundamental challenge. Recent changes have been made to policies in Utah to recognize that water rights can be used for the “reasonable preservation or enhancement of the natural aquatic environment” in places like Great Salt Lake (H.B. 33, 2022; Utah Code Section 73-3-30), increasing opportunities for water to be secured for the benefit of the lake, which improves water levels and wetland habitat through increased and secured inflows. The scale of water needed to stabilize and restore the system is substantial, and it requires strategic prioritization, when possible, in the timing and location of water deliveries.

HABITAT LOSS AND FRAGMENTATION RESULTING FROM DEVELOPMENT

The Great Salt Lake watershed is experiencing pressure from rapid urbanization and growth. The expanding Wasatch Front urban corridor is encroaching upon essential wetland and upland habitats, which are being converted to residential, commercial, and industrial uses (Wasatch Front Regional Council, 2026). As urban development encroaches further into open lands, it impedes birds from

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| <b>Hydrologic &amp; Habitat Connectivity</b> |
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| <b>Objectives</b>                            |
| <b>Informing Decisions</b>                   |

accessing and moving between a variety of habitats. Each converted parcel of wetland, wet meadow, or agricultural land reduces the number of viable habitat alternatives that birds reliant on Great Salt Lake and its wetlands can use; it also narrows movement corridors and diminishes the ecological integrity of the watershed as a functioning system. These land use changes not only directly eliminate habitat, but they also fragment remaining habitats, disrupt ecological connectivity, and introduce hard edges that degrade habitat and water quality and convert water from agricultural to municipal use. This can reduce or eliminate the buffer between the built landscape and natural settings, significantly reducing the presence of sensitive species such as Long-billed Curlew (*Numenius americanus*).

Additionally, conserving hydrologic connectivity for freshwater inflows into Great Salt Lake is not simply a water management concern, but a foundational priority for bird conservation (Pringle, 2001). When hydrologic pathways are severed or degraded (by water diversion, infrastructure, or land conversion) the downstream wetlands they supply may lose the critical timing and duration of inundations and the associated biochemical pathways that make them functional waterbird habitat.

Agricultural lands can provide important supplemental habitat for birds, especially when flooded or fallowed, and they also contribute to groundwater recharge in some cases, but these lands are being converted to municipal and industrial uses. In the Great Salt Lake Basin, it is estimated that agricultural-to-urban land/water conversion between 2024 and 2059 will range between 58,400 acres to 87,600 acres of land and 77,000 acre-feet to 115,700 acre-feet of water (Utah Division of Water Resources, *personal communication*, May 26, 2026). These lands are effectively removed from potential conservation or restoration opportunities once they have been converted to impervious surfaces. The pace of this conversion is accelerating, intensifying the need to preserve habitats before they are permanently lost.

Prioritization of habitat must consider both the intrinsic value of individual sites and their functional connectivity within the broader landscape. For example, isolated habitat patches, regardless of their quality, may not support viable populations if they lack connectivity to other habitats or to essential water sources. This is why a system-level perspective that accounts for hydrologic connectivity and habitat connectivity and that supports the full annual cycle needs of migratory birds at a hemispheric scale is necessary to guide effective conservation action.

Assessment Objectives

The Great Salt Lake Birds and Habitat Assessment was developed to provide a scientific spatial framework for prioritizing waterbird conservation efforts in the Great Salt Lake watershed. An interactive version of an accompanying map—displaying the avian habitat prioritization results, hydrologic inflow pathways, and relevant management classification layers across the study area—is available online for the conservation community and partners to use as a decision-support tool (contact [salinelakes@audubon.org](mailto:salinelakes@audubon.org) for access).

The specific objectives of this work were as follows:

1. Develop a spatial avian habitat prioritization model of indicator species that integrates multiple seasons and life-history stages.
2. Integrate habitat suitability, climate projection, and human modification data into a unified conservation framework that identifies priority conservation areas for waterbirds.
3. Evaluate habitat importance under both current conditions and projected mid-century climate scenarios to enable proactive conservation planning.
4. Model potential hydrologic contributions to Great Salt Lake from upstream wetlands and irrigated agricultural lands to identify opportunities for enhancing water delivery to the lake and its wetlands.
5. Provide spatial data that can inform restoration prioritization, water transactions, open space preservation, and land use planning and policy decisions.

By addressing these objectives, this Assessment provides local, state, regional, and national decision-makers, conservation partners, and resource managers with additional tools needed to make informed decisions about where and how to invest in conservation efforts, particularly when coupled with site-specific analyses. This Assessment is intended to complement other existing plans and studies underway in the region, including water delivery and measurement projects, integrated watershed planning, and habitat and species monitoring.

Assessment Methods

Audubon developed two frameworks as part of this Assessment: an avian prioritization model to evaluate bird species and habitat importance under current and projected climate conditions, and a hydrologic model to predict how wetland and agricultural return flows may contribute to lake inflows.

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Indicator Birds

AVIAN PRIORITIZATION FRAMEWORK

Audubon scientists conducted a series of optimization analyses to identify priority areas focused on the eastern Great Salt Lake Basin. Analyses were conducted for both present and mid-century (year 2050) timesteps based on indicator bird (Table 1) suitability and relative abundance using the methods described in Deluca et al. (2023). The features being optimized included present and future habitat and climate suitability models for the breeding and nonbreeding seasons (Wilsey et al. 2019), as well as relative abundance models for fall and spring migration seasons (Fink et al. 2024, Meehan et al. 2022), for all indicator species (Table 1) in all seasons in which they are present in the watershed.

| Indicator Species       |                     |
|-------------------------|---------------------|
| American Avocet         | Northern Pintail    |
| American White Pelican  | Redhead             |
| Black-necked Stilt      | Ruddy Duck          |
| California Gull         | Snowy Plover        |
| Cinnamon Teal           | Tundra Swan         |
| Eared Grebe             | Western Grebe       |
| Lesser Yellowlegs †     | Western Sandpiper † |
| Long-billed Curlew      | White-faced Ibis    |
| Long-billed Dowitcher † | Wilson's Phalarope  |
| Marbled Godwit †        |                     |

Table 1. Indicator species included in the avian prioritization analysis.  
† species present in the Great Salt Lake watershed only during spring and fall migration

Ranking

If habitat degradation was low, the locations with the greatest suitability/relative abundance for any species in each season received the highest rank of the prioritization. Locations with high levels of human modification (e.g., agriculture, urban, roads; Kennedy et al., 2019) were ranked lower, regardless of suitability. In the future model, the ranks of locations with high suitability were lowered only by impervious surfaces (Dewitz, 2021) and predicted urban growth (US Environmental Protection Agency, 2017), rather than total human modification. This approach was used because reasonable restoration or mitigation strategies exist for most other forms of degradation, while areas already converted to impervious cover (e.g., highways, dense urban development) are treated as effectively permanent for planning purposes given the extremely high costs and low likelihood of large-scale removal or restoration. This reflects a pragmatic assumption for identifying realistic future conservation opportunities. Excluding non-impervious land uses (e.g., agriculture) from the future condition layer allows the model to identify those areas as opportunities if they have high climate suitability in the future.

Management Classes

The present and future prioritizations were combined into a single classified output with three management classes:  
**Ongoing Priority:** high rank in both the present and the future  
**Opportunity:** low rank in the present, high rank in the future  
**Monitor & Adapt:** high rank in the present, low rank in the future

Flooded Fields

HYDROLOGIC INFLOWS ANALYSIS

The hydrologic inflows model is a customized geospatial assessment constrained to the same spatial extent as the avian prioritization with the goal of understanding potential flow pathways into Great Salt Lake from either natural or managed wetland environments. Inflows are the most sensitive cause of lake volume fluctuation in Great Salt Lake (Mohammed & Tarboton, 2012); therefore, this analysis explores an important area of opportunity for conservation action across the watershed. Flooded agricultural fields temper seasonal inflow variability, returning a portion of applied irrigation water to the lake (Null & Wurtsbaugh, 2020). These agricultural return flows are important water sources for the lake, while flooded fields offer surrogate wetland and riparian habitats that are important for birds (Berkowitz & Evans, 2014; Moulton et al., 2022).

Potential contribution reach to Great Salt Lake was quantified by acres as a surface area measurement of water either from flooded agricultural fields or wetlands. To address uncertainty regarding their delineation and width, streams in the model were buffered by 12 meters and joined to wetland and flooded field datasets only at clearly defined intersection points. Researchers ran a downstream flow network analysis to visualize the entire hydrologic network surrounding the lake. This analysis mapped

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Ongoing Priority Areas

Opportunity Areas

Monitor & Adapt Areas

River Corridors

Active Management

Sheetflow Wetlands

Transition Zones

the flow path from the top 80% potential contribution reaches flowing from either wetlands or flooded fields. The 80% metric was chosen to exclude single cells and small fields and wetlands unlikely to yield large contributions to lake levels.

Results

- The management classification outputs synthesize present and future rankings into actionable categories. The three classes are distributed cross the landscape as follows:
1. Ongoing Priority areas (high present rank, high future rank) are concentrated around the open water of the lake body and existing wetland complexes, particularly managed wetlands and state waterfowl management areas. These areas represent the stable core of the conservation landscape and warrant protection, continued management, and, potentially, enhancement. They include key sites such as the Bear River Migratory Bird Refuge, Farmington Bay Waterfowl Management Area, Audubon’s Gillmor Sanctuary, and Bear Lake (which is an important facet of the watershed).
  2. Opportunity areas (low present rank, high future rank) represent the most significant opportunities for proactive conservation. (It is important to clarify what “Opportunity” means in this framework: these are areas where the current condition is degraded in a non-permanent way—meaning restoration is possible. The model does not indicate that conditions are already improving; it indicates that the climate will be suitable for indicator species when the habitat is restored or revitalized. This distinction is critical for interpreting the layer appropriately.) These areas are primarily:
    - Agricultural lands and open water predicted to maintain or gain climate suitability.
    - Degraded but restorable historical wetlands with high predicted future climate suitability for one or more indicator species.
    - Undeveloped areas projected to become more suitable as climate conditions shift, if such areas remain undeveloped.
  3. Monitor & Adapt areas (high present rank, low future rank) are scattered throughout the watershed, often in locations where current climate and habitat suitability are high, but projected climate conditions suggest future challenges. Management strategies can focus on enhancing climate resilience through water or vegetation management. It should be noted that the designated areas of Monitor & Adapt are largely driven by particular bird species in particular locations.

The identification of classified areas is particularly valuable in guiding conservation investment in areas that will provide long-term value, potentially providing supplemental habitat to areas in the “Ongoing Priority” category. Many classified habitat areas are currently in agricultural use, particularly flood-irrigated fields that already provide some wetland function and could be enhanced to provide dedicated wildlife habitat.

HYDROLOGIC INFLOWS ANALYSIS

The hydrologic inflows analysis identified connectivity between both wetlands and flood-irrigated agricultural fields and the stream/canal network flowing to Great Salt Lake.

Wetland Connectivity Patterns

- The wetland inflows analysis shows the spatial distribution of stream reaches with connected wetlands and quantifies the total wetland acreage accessible to each reach. Several patterns emerged:
- High concentrations of connected wetlands occur along major tributary systems including the Bear River, Weber River, and Jordan River. These river corridors support extensive riparian and floodplain wetlands that maintain hydrologic connectivity to the stream flow network.
  - Many hydrologically connected wetlands are actively managed for waterfowl and other waterbirds and typically have reliable water sources and water rights associated with their management and practices, which are strategically aimed at facilitating water delivery to important habitats.
  - Beyond the berms and dikes of managed areas, there are both areas of open water and vast complexes of sheetflow wetlands—areas of shallow, overland waterflow— that are fed by water flowing out onto the lakebed. These wetlands support foraging and nesting resources for many species of wading birds, waterfowl, and shorebirds. Eventually, the sediment and water become too saline for vascular plants to tolerate, but the shallowly flooded mudflats, connected to other wetland areas, are vitally important habitat providing highly productive food resources for many species of shorebirds and other waterbirds.
  - Many highly productive foraging areas are found in areas where freshwater and saline water mix, creating estuarine transition zones that are distinctive in the Great Salt Lake Basin and that act as a nexus between freshwater inflows and Great Salt Lake’s bays.

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| GSL Assessment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>Agricultural Return Flow Connectivity</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | The flooded agricultural field analysis reveals widespread connectivity between flood-irrigated agriculture and the stream network. Key findings include:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Key Zones                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | <ul style="list-style-type: none"><li>• Flooded agricultural fields are extensively connected to streams throughout the lower elevations of the watershed, particularly in areas of intensive agriculture in the valleys surrounding Great Salt Lake.</li><li>• The highest concentration of connected agricultural lands occurs in the same areas as high wetland connectivity—around Great Salt Lake, Utah Lake, and along major river corridors. This overlap indicates that these are key zones where both natural wetlands and agricultural water use contribute to potential inflows.</li></ul>                                                                                                                                                                                                                                                                                                                                               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Seasonal Wetlands                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"><li>• Many flood-irrigated fields provide incidental wetland habitat for birds during irrigation season, effectively functioning as seasonal wetlands within the agricultural landscape. The connectivity of these fields to the stream network also suggests that management of agricultural water may have direct implications for downstream wetland habitats and lake inflows. The present threat of conversion of these agricultural fields to residential development fractures this connectivity.</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                |
| Complexity                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <b>Downstream Flow Network</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | The downstream flow analysis visualizes potential complete flow pathways from source wetlands and agricultural fields to Great Salt Lake. This analysis reveals that:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Convergence Zones                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | <ul style="list-style-type: none"><li>• Multiple flow pathways converge on Great Salt Lake from different portions of the watershed, representing the integrated hydrologic system that sustains the lake and its wetlands.</li><li>• High spatial clustering of flooded fields and wetlands results in overlapping flow paths, particularly in key tributary valleys. These convergence zones represent critical hydrologic functions where water management decisions can have a disproportionate impact on downstream habitats.</li><li>• The network analysis demonstrates the functional connectivity between upland water sources, mid-elevation wetland and agricultural lands, and terminal habitats. This system-level perspective is essential for understanding how water conservation efforts, land use changes, or restoration projects in one location may affect habitats and bird populations elsewhere in the watershed.</li></ul> |
| <b>Conservation Approaches and Key Actions</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| When the avian prioritization and hydrologic connectivity analyses are considered together (Figure 2), several strategic conservation opportunities emerge. These key findings can inform and help prioritize conservation actions and investments in the Great Salt Lake watershed.                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Protect & Enhance                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <b>1. Protect and Enhance Open Water and Core Wetland Complexes:</b> Wetland complexes identified as Ongoing Priority areas that have strong hydrologic connectivity should be prioritized for preserving water flows. The open water of Great Salt Lake and its surrounding wetland complexes—including Bear River Migratory Bird Refuge, Farmington Bay, Ogden Bay, and Willard Spur Waterfowl Management Areas—are classified as Ongoing Priority because they provide essential habitat today that is also projected to persist under future climate conditions. Ensuring reliable and adequate water supplies to these high-quality, core habitats will preserve their long-term conservation values. This could support stabilizing current breeding and staging populations, preventing further habitat loss, and maintaining landscape-scale habitat networks. Preventing degradation or loss of wetlands typically requires less intervention than restoring wetlands after they have been degraded. Key actions can include: |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Actions                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | <ul style="list-style-type: none"><li>• Securing inflows and continuing water deliveries to major wetland complexes and Great Salt Lake bays</li><li>• Enhancing habitat through water management, vegetation management, and water delivery and improving infrastructure</li><li>• Strategically timing water delivery to wetlands identified as Ongoing Priority areas</li><li>• Incentivizing the improvement and preservation of wetland habitats</li><li>• Strengthening management resources at key sites</li></ul>                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>2. Invest in Future Priority Areas:</b> Proactive restoration of future priority areas—classified as Opportunity in Figure 2—positions conservation ahead of climate-driven habitat shifts. Opportunity areas in the avian analysis that also show high connectivity to the stream network represent particularly valuable conservation opportunities. These areas have both the ecological potential to support important waterbird populations in the future and the hydrologic infrastructure to receive and convey water. |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| Proactive Restoration                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |

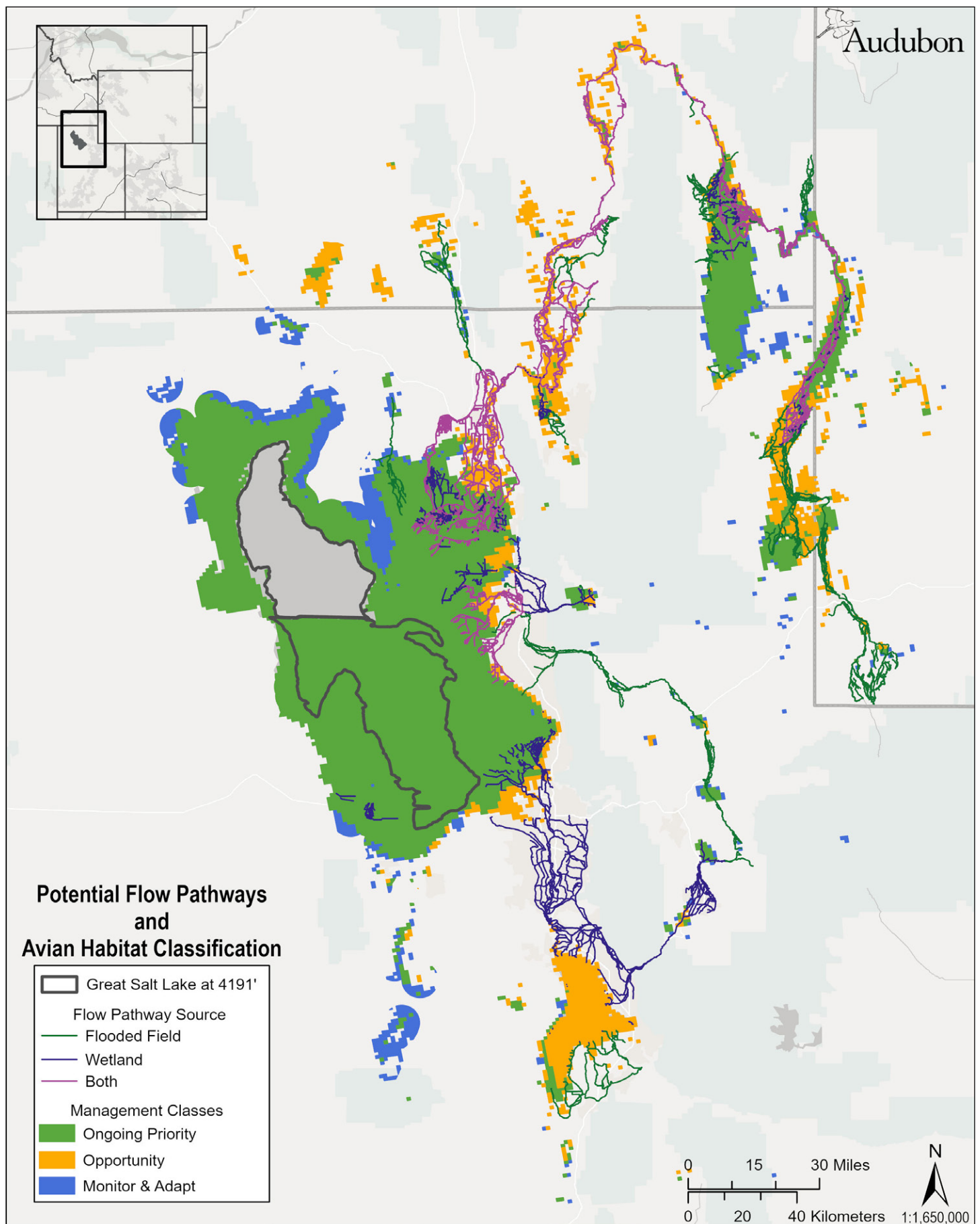


Figure 2. Management classification layers for all indicator species with the overlay of potential pathways for return flows to Great Salt Lake from flooded agricultural fields and wetlands.

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| <div>GSL Assessment</div> <div>Actions</div> <div>Enhance Connectivity</div> <div>Actions</div> <div>Key Takeaways</div> | <p>Proactive restoration may compensate for losses elsewhere, enhance habitat functions, and protect key areas before development pressure increases. Agricultural lands and degraded historical wetlands in the areas surrounding the lake represent conservation opportunities where climate suitability will remain high and where restoration or land protection can generate long-term conservation value. Key actions can include:</p> <ul style="list-style-type: none"><li>• Restoring degraded wetlands predicted to maintain climate suitability (e.g., vegetation management)</li><li>• Incentivizing voluntary land preservation and conservation easements on working lands that provide current and future habitat values</li><li>• Identifying opportunities to strategically protect undeveloped areas projected to become suitable</li><li>• Enhancing hydrologic connectivity and improved water conveyance infrastructure to ensure water delivery to restoration sites</li></ul> <p><b>3. Integrate and Enhance Wetland and Water Connectivity:</b> Enhancing landscape-scale connectivity, especially between wetlands and water sources, would reduce habitat fragmentation and increase resilience to environmental variability. Strategic land protection or restoration in key connectivity areas can maintain or restore landscape functionality even as surrounding areas develop. Undeveloped lands between existing protected wetlands or strategic conservation protections that provide contiguous habitat should be priority locations for enhancing connectivity. Key actions can include:</p> <ul style="list-style-type: none"><li>• Incentivizing land conservation to connect existing wetland complexes and protect riparian zones and wetlands near urban areas to improve water quality and habitat function</li><li>• Developing opportunities for agricultural conservation easements that maintain working landscapes while preserving connectivity</li><li>• Removing barriers to hydrologic and ecological connectivity</li></ul> <p>In summary, the integration of ecological prioritization and hydrologic connectivity analyses equips conservation practitioners, land managers, and other partners with a flexible, science-based tool to support decision-making. Rather than prescribing a single course of action, this Assessment supports a range of conservation approaches that can be applied individually or in combination, depending on local need, partner capacity, and site-specific conditions.</p> <p>The most effective conservation strategy likely involves elements of all conservation scenarios applied strategically across the landscape based on local opportunities, partner capacity, and site-specific conditions. Given the vast extent of Ongoing Priority areas in this region, overlaying the hydrologic priorities (<i>see</i> Figure 2) allows for more targeted prioritization of these areas. The key insight is that strategic, science-informed prioritization enables conservation investments to achieve greater impact than opportunistic approaches.</p> <p><b>Conclusion</b></p> <p>Great Salt Lake sits at the intersection of multiple converging crises: a decades-long decline in lake levels, accelerating pressure from encroaching development across the greater Salt Lake City urban area along the Wasatch Front, increasingly variable precipitation driven by a changing climate, and unrelenting competition for a finite water supply. Against this backdrop, the millions of birds that depend on the Great Salt Lake ecosystem annually have little margin for further habitat loss.</p> <p>This science-based Assessment was developed to prioritize responses to that urgency by identifying where conservation actions will have the greatest impact. By integrating habitat suitability modeling, climate change, and hydrologic connectivity analysis into a spatial prioritization framework, the Assessment can align efforts and provide conservation partners, water and land managers, restoration practitioners, and decision-makers with actionable, defensible guidance on where to focus their efforts.</p> <p>Several key themes warrant emphasis. First, the Great Salt Lake watershed is defined by its heterogeneity of habitat types. The wetland types surrounding the lake range from permanently inundated, heavily managed impoundments to ephemeral playa habitats that may hold water only briefly. Conservation strategies must account for the needs of diverse habitat types and their vulnerability to system-wide threats.</p> <p>Second, hydrologic connectivity is central to bird conservation at Great Salt Lake. Landscape-level conservation and planning decisions can result in the most effective preservation of Great Salt Lake. Protecting and restoring wetland water sources and water delivery pathways that sustain this system is as important as protecting the wetland and lake footprints themselves.</p> <p>Third, the interconnectedness of this ecosystem requires a systemic perspective on conservation and planning decisions. The goal is simple: improve habitat where possible and prevent further degradation where it can still be avoided.</p> |
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## Next Steps

Finally, the work described here is incomplete. Great Salt Lake is one node in a network of saline lake ecosystems across both the western United States and the Western Hemisphere. The birds that rely on this system depend on the integrity and redundancy of that whole network. Further refinement of this avian prioritization framework—through ongoing bird surveys, expanded hydrologic monitoring, and collaboration with partner institutions across the region—will strengthen its utility and extend its reach.

Bird and habitat conservation at Great Salt Lake must consider the dynamic nature of climate change and development pressure in a forward-looking and coordinated approach with multiple partnerships. Every area of quality habitat today warrants attention and protection, and as habitat conditions are predicted to shift in the future, many opportunities to improve the health of the lake and its wetlands have been identified and described in this Assessment. To have the greatest beneficial and durable impact, more conservation resources and strategically aligned efforts are needed to address the challenges facing Great Salt Lake, its habitats, and surrounding communities.

Partners looking to access the interactive web tool, please contact: [salinelakes@audubon.org](mailto:salinelakes@audubon.org). To download the full Assessment or a visual summary, please visit: [www.audubon.org/gsl-assessment](http://www.audubon.org/gsl-assessment)

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**References**

- Baxter, B.K., & Butler, J.K. (2020). Climate Change and Great Salt Lake. In: Baxter, B., Butler, J. (Eds.), *Great Salt Lake biology: A terminal lake in a time of change*. Springer International Publishing. [https://doi.org/10.1007/978-3-030-40352-2\\_2](https://doi.org/10.1007/978-3-030-40352-2_2)
- Berkowitz, J. F., & Evans, D. E. (2014). *A review of the recent scientific literature on irrigation induced and enhanced wetlands* (ERDC/EL TN-14-5). U.S. Army Engineer Research and Development Center, Environmental Laboratory. Vicksburg, MS. <https://apps.dtic.mil/sti/pdfs/ADA607641.pdf>
- Bigalke, S., Loikith, P., & Siler, N. (2025). Explaining the 2022 record low Great Salt Lake volume. *Geophysical Research Letters*, 52(2), e2024GL112154. <https://doi.org/10.1029/2024GL112154>
- DeLuca, W. V., Seavy, N. E., Grand, J., Velásquez-Tibatá, J., Taylor, L., Bowler, C., Deppe, J. L., Knight, E. J., Lentijo, G. M., Meehan, T. D., Michel, N. L., Saunders, S. P., Schillerstrom, N., Smith, M. A., Witko, C., & Wilsey, C. B. (2023). A framework for linking hemispheric, full annual cycle prioritizations to local conservation actions for migratory birds. *Conservation Science and Practice*, 5(8), e12975. <https://doi.org/10.1111/csp2.12975>
- Dewitz, J. (2021). *National Land Cover Database (NLCD) 2019 products, version 2.0* [Dataset]. U.S. Geological Survey. <https://doi.org/10.5066/P9KZCM54>
- Donnelly, J. P., Jensco, K., Kimball, J. S., Moore, J. N., Ketchum, D., Collins, D. P., & Naugle, D. E. (2024). Beneficial 'inefficiencies' of western ranching: Flood-irrigated hay production sustains wetland systems by mimicking historic hydrologic processes. *Agriculture, Ecosystems & Environment*, 370, 109051. <https://doi.org/10.1016/j.agee.2024.109051>
- Downard, R., Frank, M., Perkins, J., Kettenring, K., & Larese-Casanova, M. (2017). *Wetland plants of Great Salt Lake: A guide to identification, communities, & bird habitat*. Utah State University Extension. [https://digitalcommons.usu.edu/extension\\_curall/1761](https://digitalcommons.usu.edu/extension_curall/1761)
- Fink, D., Auer, T., Johnston, A., Strimas-Mackey, M., Ligoeki, S., Robinson, O., Hochachka, W., Jaromczyk, L., Crowley, C., Dunham, K., Stillman, A., Davis, C., Stokowski, M., Sharma, P., Pantoja, V., Burgin, D., Crowe, P., Bell, M., Ray, S., Davies, I., Ruiz-Gutierrez, V., Wood, C., & Rodewald, A. (2024). *eBird status and trends, data version: 2023*. Cornell Lab of Ornithology. <https://doi.org/10.2173/WZTW8903>
- Great Salt Lake Strike Team. (2026). *Great Salt Lake data and insights summary: A synthesized resource document for the 2026 general legislative session*. Kem C. Gardner Policy Institute. <https://gardner.utah.edu/great-salt-lake-strike-team/>

## GSL Assessment

- Hassan, D., Burian, S. J., Johnson, R. C., Shin, S., & Barber, M. E. (2023). The Great Salt Lake water level is becoming less resilient to climate change. *Water Resources Management*, 37(6), 2697–2720.
- H.B. 33, 2022 General Session (Utah 2022). <https://le.utah.gov/~2022/bills/static/HB0033.html>
- Kennedy, C. M., Oakleaf, J. R., Theobald, D. M., Baruch-Mordo, S., & Kiesecker, J. (2019) Managing the middle: A shift in conservation priorities based on the global human modification gradient. *Global Change Biology*, 25(3), 811–826. <https://doi.org/10.1111/gcb.14549>
- Meehan, T.D., Saunders, S.P., DeLuca, W.V., Michel, N.L., Grand, J., Deppe, J.L., Jimenez, M.F., Knight, E.J., Seavy, N.E., Smith, M.A., Taylor, L., Witko, C., Akresh, M.E., Barber, D.R., Bayne, E.M., Beasley, J.C., Belant, J.L., Bierregaard, R.O., Bildstein, K.L., Boves, T.J., Brzorad, J.N., Campbell, S.P., Celis-Murillo, A., Cooke, H.A., Domenech, R., Goodrich, L., Gow, E.A., Haines, A., Hallworth, M.T., Hill, J.M., Holland, A.E., Jennings, S., Kays, R., King, D.T., Mackenzie, S.A., Marra, P.P., McCabe, R.A., McFarland, K.P., McGrady, M.J., Melcer Jr, R., Norris, D.R., Norvell, R.E., Rhodes Jr, O.E., Rimmer, C.C., Scarpignato, A.L., Shreading, A., Watson, J.L., & Wilsey, C.B., 2022. Integrating data types to estimate spatial patterns of avian migration across the Western Hemisphere. *Ecological Applications*, 32(7), e2679. <https://doi.org/10.1002/eap.2679>
- Mohammed, I. N., & Tarboton, D. G. (2012). An examination of the sensitivity of the Great Salt Lake to changes in inputs. *Water Resources Research*, 48, w11511. <https://doi.org/10.1029/2012WR011908>
- Moulton, C. E., Carlisle, J. D., Knetter, S. J., Brenner, K., & Cavallaro, R. A. (2022). Importance of flood irrigation for foraging colonial waterbirds. *Journal of Wildlife Management*, 86(4), e22288. <https://doi.org/10.1002/jwmg.22288>
- Null, S.E., Wurtsbaugh, W.A. (2020). Water Development, Consumptive Water Uses, and Great Salt Lake. In: Baxter, B., Butler, J. (Eds.), *Great Salt Lake biology: A terminal lake in a time of change*. Springer International Publishing. [https://doi.org/10.1007/978-3-030-40352-2\\_1](https://doi.org/10.1007/978-3-030-40352-2_1)
- Pringle, C. M. (2001). Hydrologic connectivity and the management of biological reserves: A global perspective. *Ecological Applications*, 11(4), 981–998. [https://doi.org/10.1890/1051-0761\(2001\)011\[0981:HCATMO\]2.0.CO;2](https://doi.org/10.1890/1051-0761(2001)011[0981:HCATMO]2.0.CO;2)
- US Environmental Protection Agency. (2017). *Updates to the demographic and spatial allocation models to produce integrated climate and land use scenarios (ICLUS)*. (Report No. EPA/600/R-16/366F). <https://www.epa.gov>
- Utah Division of Water Resources. (2026a). *Great Salt Lake integrated basin plan*. <https://water.utah.gov/gsl-basin-integrated-plan/>
- Utah Department of Natural Resources. (2026b). *Drought.Utah.gov: Recent updates (as of April 21, 2026)*. <https://drought.utah.gov/>
- Utah Division of Water Resources. (2026b). *Snowpack*. <https://water.utah.gov/snowpack/>
- Wasatch Front Regional Council. (2026). Generalized future land use. [https://experience.arcgis.com/experience/fce73f8dea5b418db18ce090ee069fe3/page/Page-2#data\\_s=id%3AdataSource\\_3-19640a717da-layer-2%3A641](https://experience.arcgis.com/experience/fce73f8dea5b418db18ce090ee069fe3/page/Page-2#data_s=id%3AdataSource_3-19640a717da-layer-2%3A641)

## Augmentation



## AUGMENTING ARIZONA'S WATER PORTFOLIO



## ARIZONA'S PROCESS TO EXAMINE WATER AUGMENTATION SOLUTIONS IN THE LOWER COLORADO RIVER BASIN

by Ben Altener, Assistant Director for External Affairs  
(Water Infrastructure Finance Authority of Arizona)

## Introduction

Arizona has never had the luxury of treating water planning as a short-term exercise. Communities have grown in one of the driest regions of the country because earlier generations invested in reservoirs, canals, groundwater management, conservation, water reuse, and the institutions needed to manage those systems. That history demonstrates what deliberate planning can accomplish. It also shows why the state cannot wait for a shortage to become a crisis before beginning the next generation of water supply work.

The challenge is not that Arizona lacks water management tools but that the conditions surrounding those tools continue to change. Even while Arizona uses roughly the same amount of water it did during the Eisenhower administration, decades of population and economic growth have increased the importance of reliable supplies. Groundwater conditions vary considerably across the state. Communities continue to invest in conservation and reuse, but demand continues to push against supply. At the same time, the Colorado River remains a foundational resource for Arizona, even as the seven basin states and the federal government work through the rules that will govern river operations after 2026.

The Colorado River discussion illustrates the difference between managing current conditions and preparing for long-term uncertainty. Hydrology, reservoir conditions, interstate negotiations, federal decisions, and the needs of Tribal nations, agriculture, cities, and the environment all shape what the river can reliably provide. Arizona must remain fully engaged in protecting its interests on the river. It must also continue developing options that reduce the consequences of any single supply becoming less reliable.

No one project can answer every water challenge facing the state. Conservation, reuse, storage, infrastructure resiliency, natural infrastructure/watershed health, and groundwater management will remain essential. Long-term water augmentation is another part of that portfolio. Its purpose is to identify supplies or arrangements that can add flexibility and reliability over a period measured in decades. Because projects of that scale require years of engineering, environmental review, permitting, financing, and partnership development, the work must begin well before the water is needed.

## The WIFA Expanded Mandate

The Water Infrastructure Finance Authority of Arizona (WIFA) has long helped communities finance drinking water and wastewater infrastructure. In 2022, the Arizona Legislature expanded the WIFA's responsibilities and established the Long-Term Water Augmentation Fund (LTWAF), the Water Supply Development Fund (Rural Fund), and the Conservation Fund. The legislation gave WIFA a broader project development role, including the authority to investigate the feasibility of agreements with public and private entities for projects that could import water into Arizona.

The statutory framework reflects the scale of the assignment. The LTWAF is maintained in perpetuity and is a revolving fund that can receive legislative appropriations, bond proceeds, repayments, investment earnings, and revenues associated with **public-private partnerships (P3)**. The framework is designed to support both early project development and, when justified, later financing and implementation.

That project development function fills an important gap. Large regional water concepts often require significant work before a public agency can determine whether they will be practical. Assumptions about water yield, cost, and technical feasibility must be evaluated and refined. Potential routes and facility locations must be compared. Environmental and regulatory requirements must be understood. Prospective regional partners, communities, and governments must see the potential benefits. A financeable commercial structure must be developed, and potential water purchasers (offtakers) must understand what they may receive and what risks they may assume.

Few individual cities or water providers can independently carry all of that work for a multistate or binational project. WIFA can organize the process at the state level, engage private sector development capacity, and create a common forum for potential partners. WIFA is not a water regulator, and its expanded authority does not replace the responsibilities of the Arizona Department of Water Resources or other permitting agencies. Its role is to develop decision-quality information, structure potential transactions, and protect the state's interests as concepts move from proposals toward projects that can be evaluated on their merits.

## Challenges

## Portfolio Approach

## Statutory Framework

## WIFA Role

|                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Augmentation     | <p>The LTWAF therefore represents more than a construction account, and the nearly \$400 million budget is unlikely to fund construction of a single project. Instead, the LTWAF provides Arizona with the capacity to investigate cogent ideas for projects before committing to them. That distinction matters. Public investment in appraisal work is intended to reduce uncertainty, identify fatal flaws early, and preserve multiple options while the state, prospective regional partners, and potential offtakers learn which approaches are most likely to be technically sound, environmentally responsible, and politically and financially viable.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Teams & Concepts | <p><b>From Big Ideas to Appraisal Studies</b></p> <p>WIFA began the current water importation process by testing the market and then issuing a competitive solicitation in 2024 for teams capable of developing large water supply projects. The solicitation asked for more than the ability to determine whether an idea could produce water; respondents needed to demonstrate the technical, financial, construction, operational, and partnership capabilities required to develop complex infrastructure over many years. This required a customized procurement process because WIFA had not predetermined a single project, location, or delivery path. Unlike a traditional design and construction request for proposal (RFP) for a defined and permitted project, the solicitation sought submissions from teams capable of developing and testing multiple water supply concepts from an earlier stage.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| Process          | <p>WIFA received six proposals in August 2025. They covered a wide range of approaches, including seawater desalination, potable water reuse, groundwater storage and recovery, irrigation modernization, and potential exchanges involving Colorado River water. Receiving a range of approaches was intentional. The program is based on a portfolio approach because the various concepts differ in yield, timing, cost, regulatory complexity, and the partners needed for implementation.</p> <p>The process can be understood in three broad phases. The first was solicitation, during which WIFA invited the market to present qualified teams and concepts. The second is appraisal and due diligence, during which assumptions are tested and progressively refined. A later design and delivery phase would occur only if a concept were to demonstrate sufficient value and if the WIFA Board were to determine that further advancement would be in Arizona’s interest.</p> <p>In August and September 2026, the WIFA Board authorized the initial appraisal scopes for three of the conceptual projects described in this article (Northern Gulf of California Desalination Plant, South Bay Potable Reuse, and California Groundwater Recovery) and the Board is expected to act on the remaining four conceptual proposals in short order. Those actions marked the beginning of detailed study, not approval to construct projects. During appraisal, WIFA and its advisers will examine engineering, potential water yield, energy needs, environmental effects, permitting pathways, legal authorities,</p> |

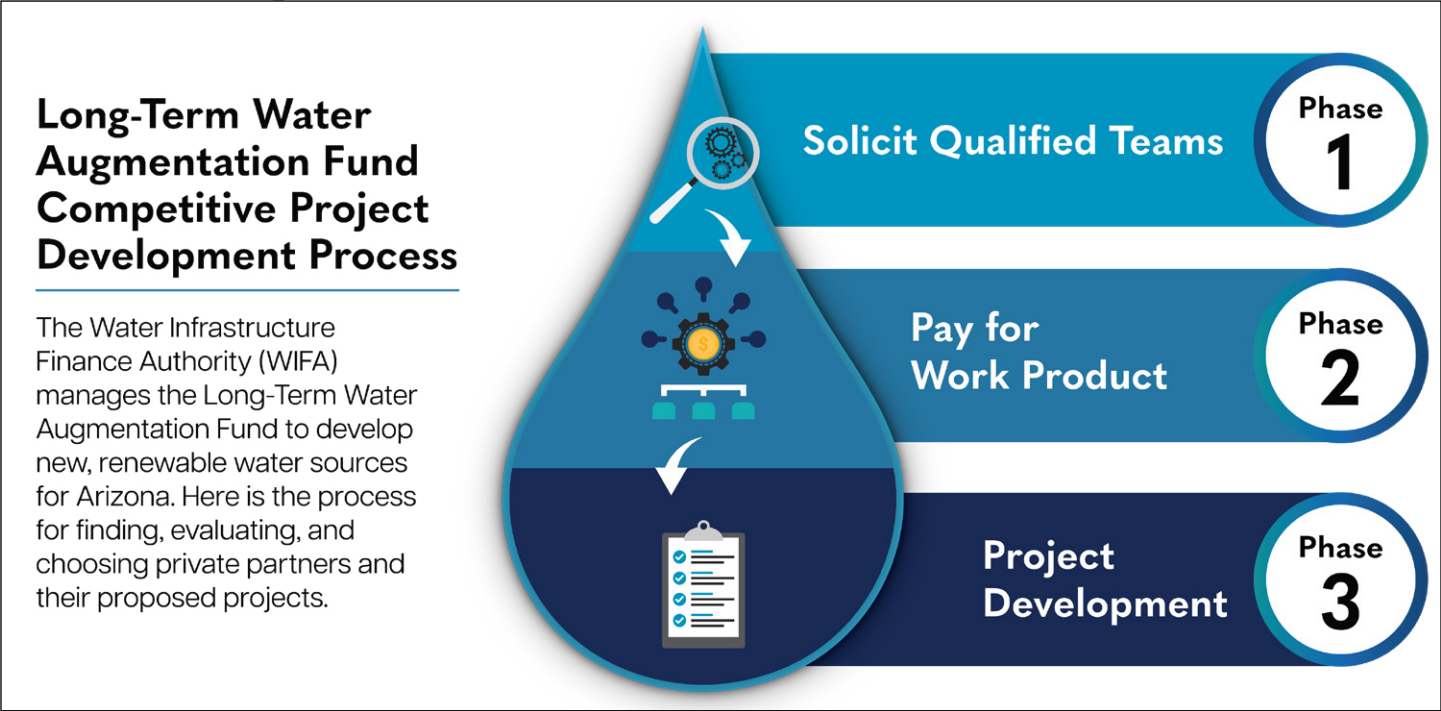


Figure 1. Long-Term Water Augmentation Fund Development Process

**Augmentation****WIFA Board**

financing, delivery schedules, partnerships, and community considerations. Information will become more detailed at each stage, allowing weaker options to be modified or discontinued before larger commitments are made.

The WIFA Board governs the Authority and provides the public decision-making structure for this work. Its members bring experience across water management, infrastructure, finance, utilities, and public service. The Board authorizes appraisal work, reviews findings, and determines whether a concept should advance. This creates visible decision points rather than treating project development as a single commitment made at the beginning of a multiyear process.

Potential water purchasers will also be central to the process. An offtaker is a city, town, Tribe, water provider, or other entity that may ultimately contract for a portion of the water or project benefits. WIFA is developing a structure through which potential offtakers can help evaluate allocation, reliability, cost, risk, and contract terms during appraisal. Participation in that work can improve the project structure without requiring an entity to make a final purchase decision before the relevant information exists.

**Staged Approach**

This staged approach is meant to balance urgency with discipline. Arizona cannot develop major new supplies without accepting some early development risk. It also should not commit to a project before understanding the cost, benefits, and consequences. Competitive procurement, independent review, Board oversight, and decision points between appraisal stages allow the state to move ideas forward while retaining the ability to change course.

**Water Importation Concepts**

The development teams under contract with WIFA are evaluating seven distinct concepts. The descriptions below were supplied by the developer teams. They describe each concept, its location and type, preliminary proposed water supply, team qualifications, and the issues expected to be examined during appraisal. All estimates and characterizations remain preliminary.

*Inclusion in WIFA's appraisal process does not constitute final project selection, approval to construct, or a commitment by Arizona, any prospective regional partner, any sovereign government, or any potential offtaker to purchase water.*

**Acciona Fengate Water Augmentation Alliance****TEAM OVERVIEW**

Through its Long-Term Water Augmentation Fund, WIFA selected the Acciona Fengate Water Augmentation Alliance (AFWAA) to identify new, long-term water supplies for Arizona. The team is led by ACCIONA and Fengate as equity partners and is supported by Carollo, GHD, TYP SA, Pulice, and Avenue Consultants.

ACCIONA is a global leader in seawater reverse osmosis desalination, with experience delivering more than 90 desalination plants worldwide, including some of the world's largest and most advanced facilities, through integrated design, build, finance, operate, and maintain, public-private partnership, and alternative delivery models. With more than 540 water and wastewater treatment facilities and the operation and maintenance of more than 160 facilities worldwide, ACCIONA brings project development, engineering, procurement, construction, and long-term operations experience from concept evaluation through implementation.

Fengate is the equity investor and financial structuring partner, bringing long-term capital and infrastructure expertise to advance Arizona's water resilience objectives. A North American infrastructure firm with more than \$27 billion in assets under management, Fengate supports project development through financial modeling, delivery planning, and commercial oversight. Together, the team brings the technical, financial, delivery, and stakeholder expertise needed to evaluate the concepts as water supply opportunities that must ultimately be technically feasible, financeable, implementable, and supported by the agencies and communities they would serve.

**PROJECTS UNDER APPRAISAL**

AFWAA proposes to evaluate four water importation projects simultaneously through a 26-month, three-stage process of progressively refined technical evaluations, potential options, and recommendations. At the end of each stage, findings will inform which concepts merit further consideration before advancing, giving WIFA and key stakeholders a clearer picture of the opportunities, constraints, and tradeoffs.

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| Augmentation                          | Sea of Cortez Desalination | <b>Base conceptual project Sea of Cortez Desalination and Binational Conveyance</b><br><b>Location:</b> Sonora, Mexico<br><b>Project Type:</b> Seawater desalination and binational conveyance<br><b>Preliminary Proposed Water Supply:</b> Up to 350,000 acre-feet per year<br>The Base conceptual project evaluates development of one or two large-scale seawater desalination facilities along the Gulf of California near the United States–Mexico border. The study will evaluate the infrastructure necessary to convey this new water supply across the border toward Arizona. Because of its scale and binational nature, the evaluation will address water yield, energy requirements, treatment and conveyance costs, environmental impacts, binational conveyance, water rights exchange, and the infrastructure needed to develop and operate a project spanning the United States and Mexico. As a new source of water, desalination could provide a more drought-resilient supply.<br>The Base conceptual project is anticipated to generate the most water of AFWAA’s four concepts, but it also has the longest estimated development timeline, up to 15 years. The concept would require major development, exchange agreements, design, and implementation. The three parallel initiatives are intended to evaluate whether additional water resources could become available to Arizona in the near, middle, and long term. |
|                                       |                            | <b>Parallel Initiative 1: Pacific Coast Desalination</b><br><b>Location:</b> California, United States, and Baja California, Mexico<br><b>Project Type:</b> Seawater desalination with potential exchange or direct conveyance<br><b>Preliminary Proposed Water Supply:</b> 50,000 to 200,000 acre-feet per year<br>The Pacific Coast Desalination conceptual project evaluates opportunities associated with existing or planned facilities along the Pacific coasts of California and Baja California. The concept examines whether coastal water supplies and regional partnerships could create additional pathways for augmenting Arizona’s water resources. Water supplied by a desalination plant could be exchanged for a portion of California’s or Mexico’s Colorado River water or conveyed directly to Arizona. Key considerations include direct conveyance versus exchanges, existing infrastructure capacity, project costs and energy requirements, environmental permitting, and state, federal, and international agreements.                                                                                                                                                                                                                                                                                                                                                                                                 |
|                                       |                            | <b>Parallel Initiative 2: Water Reclamation and Reuse</b><br><b>Location:</b> San Luis Rio Colorado, Tijuana, and Mexicali, Mexico<br><b>Project Type:</b> Advanced water reclamation and reuse with potential exchange<br><b>Preliminary Proposed Water Supply:</b> 20,000 to 130,000 acre-feet per year<br>The Water Reclamation and Reuse conceptual project examines opportunities to increase the beneficial use of existing water through advanced reclamation and reuse. The concept proposes recovering, treating, and reusing water in Mexico to help communities stretch existing supplies, reduce reliance on potable water for appropriate nonpotable uses, and create additional flexibility within regional water portfolios. Water developed through the concept could be used by surrounding communities, reducing their withdrawals from the Colorado River. That benefit could support an exchange for a portion of Mexico’s Colorado River water.                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Conveyance vs Exchange                | Reclamation & Reuse        | <b>Parallel Initiative 3: Irrigation Efficiency and Modernization</b><br><b>Location:</b> California, United States, and Mexicali, Mexico<br><b>Project Type:</b> Irrigation modernization and water conservation with potential exchange<br><b>Preliminary Proposed Water Supply:</b> 16,000 to 466,000 acre-feet per year<br>The Irrigation Efficiency and Modernization conceptual project evaluates investments in irrigation infrastructure to reduce water losses associated with aging or inefficient agricultural and commercial systems. Potential improvements could include canal lining, piping, controls, and other technologies designed to reduce seepage, evaporation, or operational losses. Water conserved through modernization could support an exchange for a portion of California’s or Mexico’s Colorado River water.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                       |                            | <b>PORTFOLIO APPROACH</b><br>Collectively, AFWAA’s conceptual projects represent a diversified portfolio of water augmentation strategies, each distinguished by scale, timeline, and cost. The team’s integrated and iterative approach allows each concept to be evaluated not only for the water it may produce but also for its feasibility and path to implementation. WIFA and its partners will receive progressively refined information to determine which concept, or combination of concepts, may offer a viable path toward a resilient, long-term water supply for Arizona and the lower basin.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Irrigation Efficiency & Modernization |                            |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
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Augmentation

EPCOR Water Innovation Partners

TEAM OVERVIEW

EPCOR Water Innovation Partners is an integrated team assembled to assess and potentially deliver complex water infrastructure projects. EPCOR serves as the operations and maintenance lead, Stantec Consulting Services is the lead engineering firm, PCL is the lead construction contractor, and Plenary Americas provides project finance expertise. Collectively, the team brings experience in water resources planning, environmental review, engineering design, construction delivery, public-private partnerships, infrastructure finance, and long-term asset management.

EPCOR develops and operates water and wastewater infrastructure across North America and brings experience with major water supply projects, including the Vista Ridge Pipeline in Texas. Stantec’s portfolio includes potable reuse and groundwater storage initiatives, including Pure Water San Diego, Pure Water Southern California, and large-scale aquifer storage and recovery programs. PCL and Plenary have experience delivering and financing major public infrastructure projects, including water and wastewater facilities. This breadth of expertise supports evaluation of the technical, permitting, financing, construction, operational, and stakeholder considerations needed to advance complex augmentation projects.

PROJECTS UNDER APPRAISAL

WIFA is evaluating two concepts proposed by EPCOR Water Innovation Partners. Although the concepts take different approaches, both examine how strategic investment in regional water infrastructure could benefit partner agencies and support exchange arrangements that may increase water availability for Arizona. WIFA authorized both concepts to enter the first stage of technical and financial appraisal in August 2026.

California Groundwater Storage and Recovery

**Location:** California, United States, with specific locations to be identified during appraisal

**Project Type:** Groundwater storage and recovery with potential exchange

**Preliminary Proposed Water Supply:** 10,000 to 100,000 acre-feet per year for individual opportunities

The California Groundwater Storage and Recovery concept explores opportunities to capture excess runoff during high-flow periods and store it for future use. Under the concept, WIFA and the developer team would identify opportunities to invest in groundwater storage and recovery capacity in California, allowing available water supplies to be stored in aquifers and recovered when needed.

The concept reflects growing recognition of aquifers as critical water infrastructure. Like surface reservoirs, groundwater basins can provide substantial storage capacity, helping water managers capture supplies during wetter periods and increase reliability during drier years. In California, where precipitation and runoff can vary significantly from year to year, additional groundwater storage could help preserve water resources that might otherwise be difficult to retain for future use.

By increasing California’s ability to capture and store available water, the investment could support future exchange arrangements that create additional water supply benefits for Arizona. The current study phase will evaluate potential storage locations, available water supplies, storage and recovery capacity, infrastructure requirements, regulatory considerations, and the interest of potential California partners. Actual yields would depend on site-specific conditions, available supplies, infrastructure requirements, and the structure of any future exchange arrangements.

South Bay Potable Water Reuse

**Location:** San Diego County, California, with potential water supply benefits in Mexico and Arizona

**Project Type:** Advanced potable reuse with potential binational exchange

**Preliminary Proposed Water Supply:** Approximately 14,000 to 95,000 acre-feet per year through phased development between 2031 and 2043

The South Bay Potable Water Reuse concept examines how advanced water recycling could create a new potable water supply while supporting a potential binational exchange framework. The concept centers on the South Bay International Wastewater Treatment Plant in San Diego County, which treats wastewater originating in Tijuana. Much of the treated effluent is currently discharged through the South Bay Ocean Outfall to the Pacific Ocean rather than reused as a water supply resource.

Under the concept, an advanced potable reuse facility would be developed near the existing treatment plant using treatment technologies that are increasingly being deployed throughout the western United States. The facility would convert treated wastewater into a new, high-quality potable water supply for beneficial use in Mexico.

Groundwater Storage & Recovery

Advanced Potable Reuse

|                       |
|-----------------------|
| Augmentation          |
| Desalination Exchange |
| Energy                |

By creating an additional drinking water supply for communities in Mexico, the project could support future exchange arrangements that increase water availability for Arizona. The concept could also expand the beneficial use of treated wastewater, strengthen regional water reliability, and contribute to broader efforts to address longstanding water and wastewater infrastructure opportunities along the United States–Mexico border. WIFA and EPCOR are also evaluating potential conveyance alternatives and delivery pathways to determine how water produced by the project could support future exchange arrangements.

Sacyr

TEAM OVERVIEW

Sacyr, a global Spanish company with major projects in 25 countries, leads the Northern Gulf of California Desalination Plant concept. Sacyr and Plenary are the developers; Sacyr is also the lead contractor and operator; and Arcadis is the lead engineering firm. The team also includes subcontractors supporting legal, social, and communications work.

Sacyr Water has delivered desalination projects during the past 30 years in Australia, Spain, Israel, Oman, Algeria, Chile, and other countries, and is the largest desalination operator in Spain.

Project Under Appraisal  
Northern Gulf of California Desalination Plant

**Location:** Baja California, Mexico, with potential sites near San Felipe and Cerro Prieto

**Project Type:** Seawater desalination and potential Colorado River water exchange

**Preliminary Proposed Water Supply:** Up to 500,000 acre-feet per year, developed in three approximately 167,000 acre-foot phases

The concept would develop a desalination plant in three phases and convey the desalinated water to Morelos Dam and potentially other locations along the route for use in Mexico. The additional supply could support an exchange through which Arizona receives Colorado River water. The project would not involve directly conveying desalinated water from Mexico to Arizona.

If appraisal demonstrates economic, environmental, regulatory, and social viability and WIFA elects to proceed, the project is initially envisioned as a long-term concession. This structure would maintain developer involvement through development and long-term operations.

The concept would examine renewable energy supplies, including geothermal and other sources, to reduce emissions and energy costs. Because energy may represent 40 to 60 percent of desalinated water production costs, the energy source will be an important component of appraisal. The plant would be designed to reduce environmental and community impacts and would use a modular approach, with production capacity added in three phases as demand grows. The concept anticipates sizing intake, discharge, and conveyance infrastructure for the full proposed capacity during the first phase, subject to the findings of appraisal and applicable approvals.

The project will also evaluate emerging approaches in desalination and the circular economy, including membrane recycling, resource recovery from brine, and potential energy production from brine. Digital tools, including operational optimization and digital twins, may also improve efficiency in the desalination plant and conveyance system.

The appraisal will evaluate the project’s economic, environmental, regulatory, technical, and social viability as a binational initiative. This work will include engaging public and private stakeholders, including community and non-governmental organizations, to understand the project’s potential benefits and effects. It will also require coordination among governmental partners, review of applicable environmental, water rights, regulatory, and permitting requirements, and engagement with potential offtakers to develop a workable allocation and commercial structure. A central consideration will be whether the proposed benefits to Mexico, including high-quality water delivered at Morelos Dam or other locations in Baja California, can support a mutually beneficial exchange arrangement.

Like the other conceptual projects, the concept must address regulatory complexity and build understanding among different states and countries. Water exchange rights, community acceptance, and stakeholder engagement will play important roles in determining feasibility. The appraisal will test whether seawater desalination can provide a dependable, drought-resilient supply in a technically, environmentally, and financially sustainable manner.

|                    |
|--------------------|
| Augmentation       |
| Technical Reviews  |
| Collaboration      |
| Exchange Framework |
| Costs              |
| Key Lesson         |

What the Appraisal Process Must Resolve

These conceptual projects differ significantly, but each must answer the same fundamental question: can it provide a reliable water supply to Arizona and/or prospective regional partners at a cost and level of risk that potential water users can support? The proposed annual yield is only a starting point. These appraisal studies must determine how much water would be available under different conditions, when it could be delivered, and what infrastructure would be required for delivery and storage. Most saliently, there must also be a win-win for the community hosting a given project.

Technical reviews will examine treatment processes, conveyance, storage, energy use, construction sequencing, operations, maintenance, and resilience. Environmental and regulatory work will identify the reviews, permits, and governmental approvals that would be required in each jurisdiction. For desalination concepts, that work may include intake and discharge effects, energy sources, brine management, and marine resources. Reuse, storage, and irrigation concepts raise different questions regarding water quality, groundwater accounting, existing infrastructure, and the durability of conserved or exchanged supplies.

*Projects involving California or Mexico cannot be developed by Arizona acting alone. They require arrangements that would provide value and benefit to communities and water users where the facilities would be located or the water produced. Win-wins are a must.*

They may also require coordination among local, state, Tribal, federal, and foreign governmental entities. Relationship-building will therefore not be separate from project development; it will be a part of determining whether a concept is implementable.

Potential exchanges require particular care. Producing, storing, or conserving water in another jurisdiction does not automatically create water for Arizona. The parties must establish the legal, operational, and accounting mechanisms through which a regional benefit could translate into an Arizona supply benefit. Those arrangements must fit within applicable law, interstate and international agreements, facility operations, and the interests of the participating agencies. The Bureau of Reclamation and other federal and state water entities will likely be required to participate in establishing this exchange framework.

Financial appraisal must convert preliminary concepts into realistic ranges for development, construction, financing, energy, operation, and replacement costs. It must also identify who bears the risks related to schedule, permitting, performance, inflation, and water availability. Public-private partnership structures can align design, construction, financing, and long-term operations, but the structure must produce terms that potential offtakers can evaluate.

These issues explain why an appraisal-level study takes time. The objective is not to predict every future condition with false precision. Rather, the aim is to narrow the range of uncertainty, identify dependencies, compare alternatives, and give decision-makers better information at each stage. Progress should be measured through completed studies, resolved questions, stronger partnerships, and increasingly reliable cost and schedule ranges.

Building Long-Term Resilience

Arizona’s water future will continue to depend on a diversified portfolio. Existing supplies must be protected and used efficiently. Communities will continue investing in conservation, reuse, storage, and infrastructure. At the same time, the state must develop options that may provide additional flexibility as population, hydrology, and regional water management continue to change.

The LTWAF gives Arizona a structured way to do that work. It allows the state to invite ideas through competition, test them through staged due diligence, involve potential water users before commercial terms are fixed, and make later decisions based on better information. Some concepts may advance; others may change substantially. Some may not prove to be viable, and that’s okay, as that’s what the process is designed to do. Learning that before committing to construction is one of the principal benefits of the process.

The broader lesson for the West is that long-term water resilience requires more than identifying a promising source or embracing a big idea. It requires institutions capable of organizing technical work, financing, public oversight, and partnerships across jurisdictional boundaries. Arizona’s current appraisal process is designed to build that capacity while preserving choices. The goal is to develop options that can withstand technical review and public and political scrutiny and that are also bankable and implementable.

## Augmentation

### For Additional Information:

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**Ben Alteneder** is the Assistant Director for External Affairs at the Water Infrastructure Finance Authority of Arizona, where he leads legislative strategy, stakeholder engagement, and public affairs to support the state's long-term water security. A native Arizonan, Ben has dedicated his career to managing the external public representation of primarily natural resource and water policy, public, private, and non-profit organizations. Prior to joining WIFA in 2025, he served as Chief Legislative Liaison at the Arizona Department of Water Resources. His work is grounded in a deep commitment to public service, rural and urban collaboration, and ensuring a resilient water future for Arizona.

## References

- [Arizona Revised Statutes Section 49 1203 01 Water Infrastructure Finance Authority Additional Powers and Duties](#)
- [ADWR Data Dashboards Portal](#)
- [Arizona Revised Statutes Section 49 1302 Long Term Water Augmentation Fund](#)
- [Arizona Revised Statutes Section 49 1303 Long Term Water Augmentation Fund Purposes and Limitation](#)
- [WIFA Seeking Teams with Capacity to Develop Water Importation Projects Through Competitive Solicitation](#)
- [WIFA Receives Six Proposals for Water Importation Projects](#)
- [Arizona Advances Studies for Potential Long Term Water Supply Solutions](#)
- [Bureau of Reclamation Lower Colorado Basin Post 2026 Colorado River Operations](#)

## WATER BRIEFS

### POLLUTANT RESEARCH US DRINKING WATER

On Sept. 9, the US Environmental Protection Agency (EPA) announced a new scientific study using cutting-edge methods to improve the agency's understanding of what pollutants may be present in drinking water. This groundbreaking new research by EPA scientists goes beyond traditional testing methods to screen for a broad array of pollutants, including pharmaceuticals, PFAS, and more than 1,000 potential contaminants. This action advances EPA's commitment to help Make America Healthy Again while following gold standard science.

This study and EPA's ongoing efforts implementing the Safe Drinking Water Act are accelerating progress to ensure that all Americans have confidence their drinking water is safe. EPA's new study represents a major step in aligning EPA research with the concerns of hardworking Americans. This scientific assessment will use Non-Targeted Analysis, which can identify unknown pollutants present in a drinking water sample. While conventional analytical methods measure a handful of specific chemicals at a time, Non-Targeted Analysis

allows researchers to scan for thousands of potential pollutants. The resulting insights will help EPA prioritize future actions to ensure that drinking water is safe.

The agency's new study complements existing Safe Drinking Water Act programs being implemented by EPA. This spring, the agency released its draft Sixth Contaminant Candidate List (CCL 6), which helps prioritize funding, research, and information collection to better understand the potential health risks of unregulated contaminants in drinking water while advancing the agency's commitment to gold standard science. For the first time, EPA designated both microplastics and pharmaceuticals as priority contaminant groups on the draft CCL 6. In June, the agency proposed its Sixth Unregulated Contaminant Monitoring Rule (UCMR 6), which would require monitoring for contaminants not currently regulated but may be present in drinking water. UCMR 6 would require monitoring using existing approved methods to detect 30 unregulated contaminants. The agency's non-targeted analysis complements these efforts by filling in gaps not addressed by the Safe Drinking Water Act's Contaminant

Candidate List and Unregulated Contaminant Monitoring processes.

**FOR INFO:** <https://www.epa.gov/dwucmr>

### COLORADO RIVER WEST MINUTE 334

The Department of the Interior (Interior) and Bureau of Reclamation (Reclamation) welcomed the signing of Minute 334 and the collaborative approach that was undertaken to complete this agreement on Colorado River operations through 2028 by the United States and Mexico. The agreement advances collaborative, innovative, and practical measures to manage challenging hydrologic conditions, including shared water use reductions, salinity management, continued evaluation of new water sources, and desalination.

Interior and Reclamation remain focused on collaboration, flexibility and continued work with the seven basin states, the 30 basin tribal nations, and Mexico to sustain the river for farms and ranches, communities, energy, and natural resources.

Minute 334 of the International Boundary and Water Commission, United States and Mexico, "Colorado River Basin

Cooperative Measures through December 31, 2028,” was signed on Sept. 2, 2026, in El Paso, Texas, and approved by the United States and Mexican governments. The Secretary of the Interior signed the Record of Decision for the Decision Framework for Colorado River Guidelines: Coordinated Operations of Lake Powell and Lake Mead (2027–2036), along with the Colorado River Guidelines for Coordinated Operations of Lake Powell and Lake Mead for Operating Years 2027 and 2028 on Aug. 21, 2026.

**FOR INFO:** <https://www.ibwc.gov/wp-content/uploads/2026/09/US-and-Mexico-announce-Colorado-River-cooperative-agreement.pdf>

## **FLOOD RISK CA INCENTIVES & RECOMMENDATIONS**

A report released Sept. 9 by California Ocean Science Trust (OST), in partnership with UC San Diego’s Scripps Institution of Oceanography, analyzes the state of the science behind flood risk modeling and mitigation as part of an effort to incentivize risk reduction.

The report assesses current flood modeling practices and offers eight recommendations to improve how mitigation infrastructure is reflected in the catastrophe models that are used to set insurance prices. Titled *Strengthening Incentives for Flood Risk Reduction in Catastrophe Modeling and Insurance: Recommendations for California Coastal Counties*, it calls for improved practices ranging from better representation of phenomena such as atmospheric rivers in the models, greater access to federal flood insurance data, and making it clear in insurance premiums what savings could be achieved through risk reduction.

Flood-related property damage in California is estimated to be \$8 billion per year on average, according to the California Earthquake Authority. As a “super” El Niño strengthens through the winter, NOAA warns of more frequent, widespread, and deeper flooding in coastal communities due to a long-term trend of sea-level rise combined with a strong El Niño year.

According to a 2011 US Geological Survey study, an abnormal year featuring a catastrophic 1-in-1000-year flood event in California could cause roughly \$725 billion in property damage and business losses, more than \$1 trillion in today’s dollars.

“To truly protect consumers in an age of climate change, insurance regulators must shift from a reactive stance of crisis management to agile, proactive leadership: anticipating disasters like coastal flooding before they strike so communities and markets can weather the storm,” said California Insurance Commissioner Ricardo Lara. “Strengthening Incentives for Flood Risk Reduction in Catastrophe Modeling and Insurance: Recommendations for California Coastal Counties—a collaboration of my Department’s climate experts, the California Ocean Science Trust, and researchers at UC San Diego—shows this leadership in action.”

Brett Sanders, Chancellor’s Professor at UC Irvine in Civil and Environmental Engineering Urban Planning and Public Policy, along with Michael Beck, director of the UC Santa Cruz Center for Coastal Climate Resilience, and Tim Farrell of the National Association of Insurance Commissioners, served on the report’s Technical Steering Committee.

The report highlights the value of greater information exchange—including increasing baseline measurement, improving model inputs, and increasing transparency in how risk reduction is reflected in insurance outcomes. From quantifying statewide flood insurance protection gaps to developing comprehensive data sets of California flood-risk and defense structures to creating a California Public Flood Risk Model, the authors outlined key steps to make flood risk mitigation visible in the data, credible in the models, and transparent in the markets.

With the foundation this report builds, California can better prioritize mitigation across public investment, private risk-reduction decisions, insurance pricing, underwriting, and oversight. Taking these actions would position California as a national and global model for understanding flood risk, said OST leaders.

**FOR INFO:** <http://oceansciencetrust.org/in-practice/flood-modeling-report>

## **SAN JOAQUIN VALLEY CA NEW WATER ROADMAP**

On Sept. 3, Water Blueprint for the San Joaquin Valley and the California Water Institute at Fresno State released the Unified Water Plan for the San Joaquin Valley, a congressionally authorized, federally

funded report that gives local, state, and federal decision-makers a single roadmap for water investment across the eight-county region.

The California Water Institute at Fresno State prepared the plan with the Water Blueprint for the San Joaquin Valley and Stantec, and its results will be reported to the Senate Committee on Energy and Natural Resources and the House Committee on Natural Resources. The plan integrates the adopted Groundwater Sustainability Plans of all sixteen Valley subbasins into one regional strategy covering Fresno, Kern, Kings, Madera, Merced, San Joaquin, Stanislaus, and Tulare counties. Congress directed the study in Public Law 111-11, the 2009 San Joaquin River Restoration Settlement, and the US Bureau of Reclamation funded it.

The plan establishes the first Valley-wide measure of the region’s water challenge: an annual supply-demand gap of about 2.5 million acre-feet per year by 2040. Without coordinated action, that gap would take up to one million acres out of irrigated production and cost the region about \$7.2 billion in annual farm revenue, 85,000 jobs, and \$2.1 billion in annual employee compensation, with losses concentrated in communities already facing economic and drinking water challenges.

The plan responds with three nested investment scenarios, ranging from roughly \$18 billion to \$33 billion, that sequence the region’s response. The scenarios begin with restoring the capacity of subsidence-affected Central Valley Project and State Water Project canals, a foundational investment that protects existing deliveries and enables the local recharge, reuse, and storage projects that follow. Throughout, the plan integrates water supply reliability, flood risk reduction, and ecosystem enhancement as one strategy. With coordinated investment, the land transition drops from an unmanaged loss of up to one million acres toward a deliberate repurposing of up to 400,000 acres.

The stakes reach well beyond the region. The eight-county Valley includes seven of the nation’s ten highest-producing agricultural counties, grows more than 250 crops, and produces about \$24 billion in farm value each year. The plan also addresses reliable drinking water for more than 300 disadvantaged communities, flood protection for roughly one million residents

and \$112 billion in structures within FEMA flood zones, and water for wetlands and river habitat.

The plan is candid that even the full range of investments will not entirely close the gap, and it calls for a structured, transparent process to evaluate and select projects as the next step. It is designed for regular updates and feeds directly into the California Water Plan, giving federal, state, and local partners one shared reference for Valley water decisions.

**FOR INFO:** <https://waterblueprintca.com/information/the-unified-water-plan/>

## BIRD HABITAT CONSERVATION RANCHING

CA

The National Audubon Society proudly announces five California ranches that have earned its Bird-Friendly Land Certification, which recognizes their efforts to support quality wildlife habitat and resilient working lands. Secured through the Audubon Conservation Ranching program, the newly certified producers include C&R Ranch near Red Bluff, Deer Creek Hills Preserve near Sacramento, Durst Home Ranch near Capay, Gabilan Ranch near San Juan Bautista, and Jalama Canyon Ranch near Lompoc.

Audubon Conservation Ranching is a science-based certification program that aims to stabilize the decline of grassland bird populations through partnerships with farmers and ranchers. Since 1970, North America's grassland birds have seen the steepest population declines of all terrestrial biomes. To combat this loss, Audubon works with more than 155 certified farms and ranches in the United States, all taking voluntary conservation action to support grassland birds and biodiversity across a combined 4.5 million acres. Because most grassland birds live on private land, partnering with landowners is one of the best ways to help these species at scale.

California's 61 million acres of rangeland provide essential ecosystem services, from food production and carbon sequestration to water infiltration and wildlife habitat. However, research shows that around 20,000 acres of grasslands in the state are converted to other uses each year, harming birds that rely on high-quality, intact rangelands to fulfill their life cycles. To help birds recover, Audubon expanded its conservation

ranching program to California in 2019. Currently Audubon partners with 20 certified ranching operations in California—including the five newly certified ranches—and has enhanced more than 314,000 acres of habitat.

To earn Audubon's Bird-Friendly Land Certification, ranches must meet rigorous standards for habitat management, environmental sustainability, and animal welfare, verified through independent audits. Producers work with Audubon range ecologists to create Habitat Management Plans tailored to each ranch's conditions and goals. These plans use practices such as adaptive grazing, invasive species control, and native plant restoration to support biodiverse, resilient grassland ecosystems that benefit wildlife and producers.

Now that these five California ranches have achieved Audubon's Bird-Friendly Land Certification, they may use the associated seal on beef products, signaling to consumers that their purchases support habitat conservation for imperiled grassland birds. Through their management efforts, these ranches demonstrate how bird-friendly practices can be applied across California's ecologically rich landscapes, from grasslands and oak woodlands to wetlands and riparian areas.

**FOR INFO:** <https://www.audubon.org/california/projects/audubon-conservation-ranching-california> or [ConservationRanching@Audubon.org](mailto:ConservationRanching@Audubon.org)

## CONSERVATION FUNDING WEST COLORADO RIVER

The Colorado River carved the Grand Canyon and has shaped the American West for millions of years. It serves 40 million people, 5.5 million acres of farmland, 30 tribal nations, and hundreds of plant and animal species across seven states and Mexico. It powers the Hoover Dam and supplies water to Los Angeles, Phoenix, Las Vegas, and the farms that produce 90% of America's winter vegetables.

But after 25 years of severe drought, the river's largest reservoirs are below 30% capacity, and the gap between supply and demand is roughly 1 trillion gallons per year. To address this, Amazon is launching the Colorado River Basin Collaborative (CRBC) and plans to invest \$20 million in water conservation in communities that rely on the Colorado River. The CRBC's

objective is to create one of the biggest corporate water conservation efforts for a single US watershed.

Amazon is also joining the Water Resilience Coalition to help lead collaborative action on priority water challenges around the world. So far, participating companies have voluntarily committed more than \$32 million—which includes Amazon's \$20 million—toward an objective of \$100 million in two years. The effort is backed by the Climate Pledge, a commitment by more than 700 companies to reach net-zero carbon emissions by 2040. Other participating organizations include Aldi, The Coca-Cola Foundation, Ecolab, EdgeConneX, Grundfos, Vantage, and Xylem.

Examples of where Amazon is already at work include investing \$2.2 million over three years with the Municipal Water District of Orange County, which provides water to 3.2 million residents. Amazon's funding will expand leak detection in communities that can't afford it on their own, as well as pay for leak repairs. Once fully implemented, the project is expected to save more than 189 million gallons of water per year.

Amazon is also investing \$2.4 million with Arable, an agricultural technology company, on irrigation efficiency on tribal farmland in the Lower Colorado River Basin. The project uses AWS-powered sensors that give farmers real-time data on when their crops need water, helping them draw significantly less water from Lake Mead, Las Vegas' primary water source. The project is expected to save approximately 238 million gallons of water per year.

Rather than pooling contributions into a single fund—where competing priorities can delay deployment—each company will contract directly and independently with vetted project teams across the basin. That structure lets funding flow faster, gives every organization a clear line of sight into the impact their investment delivers, and makes it easier for new companies to join at their own pace and scale.

The projects range from AI-powered sensors that help farmers use only the water their crops actually need, to lining canals so less water is lost in transit, to finding and fixing leaks in city water systems. These help keep more water in the river for communities, farms, and ecosystems that

depend on it. Several of these use AWS tools to help farmers and water managers make decisions in real time.

The Water Resilience Coalition, part of the Pacific Institute, will run the program daily—vetting projects, tracking results, and bringing in new funders. The Climate Pledge is using its collective reach to connect companies interested in this work with tangible action they can take, recognizing that climate resilience and water security are deeply interconnected—and applying the same coalition approach that helps accelerate decarbonization to the water crisis unfolding alongside it.

**FOR INFO:** <https://www.aboutamazon.com/news/tag/the-climate-pledge>

## WEF GRANT US FEDERAL IMPACT PROGRAM

Water Environment Federation (WEF) announced on Sept 28, the new Federation Impact Grant Program, a \$1 million investment designed to strengthen WEF's network of Member Associations (MAs) through funding over a three-year period that supports innovation, organizational resilience, leadership development, and community impact.

Unveiled during WEFTEC 2026, the grant program is funded through proceeds from the sale of WEF's former headquarters building, which WEF's member associations were instrumental in securing years ago. The headquarters was made possible thanks to the vision, commitment, and funding from WEF Member Associations and their volunteer leaders.

The Federation Impact Grant Program will provide funding through four grant categories:

- 1. Foundational MA Investment Fund:** \$450,000 to support core organizational needs, infrastructure and technology improvements, membership growth initiatives, student engagement, volunteer development, and participation in WEF programs.
- 2. MA-Led Innovation and Pilot Program Fund:** \$350,000 to support new ideas and pilot projects that advance strategic priorities such as workforce development, community engagement, the circular water economy, and other innovative approaches that strengthen the water sector.
- 3. Centennial Legacy Support Fund:** \$100,000 to help Member Associations preserve and celebrate their history,

document their contributions to the water profession, and participate in activities associated with WEF's upcoming Centennial anniversary.

- 4. MA Emergency and Resilience Reserve:** \$100,000 to help Member Associations navigate unforeseen challenges and maintain continuity during unexpected events or disruptions.

WEF developed the program to strengthen the long-term health of the federation while empowering local leaders to address the unique needs of their members, communities, and regions.

Detailed application materials, eligibility requirements, funding guidelines, and evaluation criteria will be released when the application period opens on Nov. 1.

**FOR INFO:** Trinity Foreman, Director of Communications, [tforeman@wef.org](mailto:tforeman@wef.org)

## LEAD GUIDANCE US EPA RELEASE

On Aug. 21, the US Environmental Protection Agency (EPA) released guidance to help drinking water systems that are working to keep their communities safe from lead. This guidance advances the agency's commitment to clear and plain language communication while sharing information, definitions, and useful examples to help water systems comply with lead pipe replacement requirements of the Lead and Copper Rule. Reducing exposure to lead—a powerful neurotoxin that is especially dangerous to children—advances the Trump EPA's commitment to Making America Healthy Again.

EPA released two documents (see below) to provide practical information to help water systems and states implement the Lead and Copper Rule Improvements (LCRI). In April 2026, EPA sought the public's input on these two Tips documents and EPA considered the comments received in the development of these final resources.

EPA is taking on lead in drinking water holistically, including prioritizing collaboration, practical implementation, and communication. The agency recently published a revamped lead website which includes a new StoryMap about Lead and Children's Health. The streamlined website allows parents and caregivers, contractors, health care professionals, and other users to quickly find critical information on how to prevent exposures from lead.

**FOR INFO:** <https://www.epa.gov/dwreginfo/lead-and-copper-rule-implementation-tools#Tips>

## SANTA CRUZ AQUIFER US/MX BINATIONAL STUDY

The US and Mexican Sections of the International Boundary and Water Commission (IBWC) have published a Binational Study of the Transboundary Santa Cruz Aquifer, an important contribution to characterizing groundwater shared by Arizona and Sonora. Developed under the Transboundary Aquifer Assessment Program (TAAP), the study is the product of sustained scientific and technical collaboration between the two countries.

Released simultaneously in English and Spanish, the report brings together scientific information from both countries on climate, geology, surface water and groundwater, water quality, land use, and water use. By integrating and comparing information across the international border, the study strengthens the shared understanding of the Santa Cruz aquifer and helps identify information gaps and priorities for continued research and monitoring.

The report was developed by scientists and technical experts from the US Geological Survey (USGS), Mexico's National Water Commission (CONAGUA), the University of Arizona Water Resources Research Center (WRRRC), and Universidad de Sonora, working within the binational cooperative framework established through the IBWC.

**FOR INFO:** <https://wrrc.arizona.edu/news/ibwc-publishes-binational-study-transboundary-santa-cruz-aquifer>

## ZEBRA MUSSELS UT DETECTION

Fragments of zebra mussel DNA were recently detected in the Colorado River in Utah for the first time, and the Utah Division of Wildlife Resources and partner agencies are reminding boaters and other watercraft users to remain vigilant in preventing the spread of aquatic invasive species.

Zebra mussels are an emerging threat in the Upper Colorado River basin, with an established infestation documented near Loma, Colorado in 2025. The detection of environmental DNA in the water only indicates the presence of an animal somewhere upstream—it does not confirm that live mussels are present.

“Once established, zebra mussels can clog pipes and infrastructure, create recreation hazards on rocks and beaches, and alter ecosystems,” Utah Department of Natural Resources Law Enforcement Aquatic Invasive Species Statewide Operations Lt. Bruce Johnson said. “It is critical for anyone who uses boats, paddleboards, kayaks and any other watercraft to adhere to all the laws and to clean, drain and dry their watercraft in order to prevent these aquatic invasive species from spreading further into Utah.” The Utah Division of Wildlife Resources began sampling for invasive mussels in the Colorado River in 2025 from the state line to Moab, Utah.

In June and July, an environmental DNA autosampler was deployed at a new location near the Potash Boat Ramp, approximately 14 river miles downstream of Moab. The sampler collected daily water samples, which were then analyzed by the US Geological Survey for zebra and quagga mussel DNA. Four of 22 samples came back positive for zebra mussel DNA during this period. Environmental DNA and veliger (the larval stage of the mussel) samples collected this spring and summer from other locations along the Colorado River in Utah did not come back positive.

The recent detection is a stark reminder of the serious nature of this threat. DWR and the Utah Division of Law Enforcement will continue to work with the US Geological Survey, the National Park Service, and the Bureau of Land Management to better understand the status of zebra mussels in the Colorado River within the state.

All river users in Utah—including those using nonmotorized watercraft such as canoes, paddleboards, and rafts—are required to complete Utah’s annual mussel-aware boater course, which is a great opportunity for all boaters and floaters to learn about this invasive species, how they are problematic, and how to help protect all of Utah’s waters from this threat.

**FOR INFO:** <https://stdofthesea.utah.gov/>

## **DATA CENTERS** **US** **HARM MITIGATION**

Today’s fights over data center water use are significant in their own right, but they are also an opening. Campaigns that began as opposition to a single facility are surfacing broader questions about

who bears the cost of industrial water use, what accountability corporations owe to the communities they affect, and what transparency the public is entitled to expect.

In some states and cities, moratoriums and reporting requirements are already being extended beyond data centers to include other large industrial water users.

For water advocates and funders, this moment is an opportunity not just to protect specific watersheds or support specific local communities, but also to shift the norms and policies that will govern industrial water use for years to come. To better understand the implications and opportunities ahead, the Water Foundation has put together a report that acts as a primer on data centers and water. It also outlines five harm mitigation strategies that should be considered as data center proliferation continues.

**FOR INFO:** <https://waterfdn.org/wp-content/uploads/2026/07/Water-Data-Centers-2026.pdf>

## **WATER REUSE** **US** **NEW INITIATIVE**

On Sept. 15, the US Environmental Protection Agency (EPA) Administrator Lee Zeldin launched the G20 Water Reuse Initiative during the G20 Energy Abundance Ministerial Session, advancing a shared framework for expanding the safe reuse of treated water as demand from industry, agriculture, and energy production continues to rise. Every G20 member assembled in Houston agreed to the Water Reuse Outcome Document spearheaded by EPA.

The Initiative is built on a “fit-for-purpose” approach, treating water to the quality its intended use requires, grounded in rigorous science, rather than forcing every application through a single standard. Water reuse can reduce pressure on freshwater supplies, improve drought resilience, and enhance the reliability of critical infrastructure.

The G20 Water Reuse Initiative recognizes there is no one-size-fits-all model for water reuse and that national, subnational, and local circumstances differ, which echoes EPA’s commitment to cooperative federalism at home in the United States. The Trump EPA supports approaches that preserve state sovereignty, respect local conditions, and empower decision-makers to choose the most effective solutions for their communities.

The agency also recognizes the role of private sector innovation and investment in advancing modern water infrastructure and efficient water management.

Specifically, the initiative supports technology-neutral “fit-for-purpose” reuse standards; streamlined permitting and administrative processes; strong environmental and human health safeguards; reclamation and recycling across energy, manufacturing, agriculture, municipal systems, and data centers, voluntary information sharing, technical exchanges, and pilot projects; and capacity building and knowledge transfer, including support for developing countries.

**FOR INFO:** [https://www.epa.gov/system/files/documents/2026-09/g20-water-reuse-initiative-final-09\\_15\\_26.pdf](https://www.epa.gov/system/files/documents/2026-09/g20-water-reuse-initiative-final-09_15_26.pdf)

## CALENDAR

**October 15-16 NE**

**The State of Water in Nebraska Conference, Lincoln.** East Campus Union, University of Nebraska-Lincoln. Presented by Nebraska Water Center. For info: <https://watercenter.unl.edu/news/2026-nebraska-water-conference-state-water-nebraska/>

**October 20 CO**

**Resilience in the Rockies Summit, Denver.** CSU Spur Campus, Hydro Building (Confluence Theater). Presented by WaterNow. For info: <https://coloradowaterwise.org/event-6837028>

**October 20-21 MT**

**26th Annual Montana Water Law, Helena.** Best Western Premier Helena Great Northern Hotel. Presented by The Seminar Group. For info: <https://www.theseminargroup.net/seminars/7392>

**October 20-21 IA**

**Dubuque Riverview Conference, Dubuque.** Grand Harbor Resort. Presented by Iowa Rural Water Association. For info: <https://iowaruralwater.org/dbq-attendee-information>

**October 21-22 OR**

**Asset Management Seminar, Portland.** Oregon Convention Center. Presented by American Water Works Association. For info: <https://www.awwa.org/event/asset-management-seminar/>

**October 21-23 OR**

**WaterSmart Innovations Conference, Portland.** Oregon Convention Center. Presented by Alliance for Water Efficiency. For info: <https://allianceforwaterefficiency.org/events/watersmart-innovations-conference-2/>

**October 22-23 OR**

**35th Annual Oregon Water Law Conference, Portland.** Embassy Suites Portland Downtown. Presented by The Seminar Group. For info:

<https://www.theseminargroup.net/seminars/7391>

**October 23 AZ**

**Beyond Efficiency: Transforming Water Systems with AI, Sensing Technologies, and High Performance Treatment, Phoenix.** Gateway Community College. Presented by AZ Water Association. For info: <https://www.azwater.org/events/EventDetails.aspx?id=2076102&group=>

**October 23-24 OR**

**Oregon Groundwater Association Fall Convention, Redmond.** Eagle Crest Resort. Presented by Oregon Groundwater Association. For info: <https://www.ogwa.org/event-6767145>

**October 26-28 CA**

**Stormwater Quality Annual Conference, Sacramento.** SAFE Credit Union Convention Center. Presented by California Stormwater Quality Association. For info: <https://www.casqa.org/events/annual-conference>

**October 26-28 CA**

**Water California Can Count On, Monterey.** Monterey Plaza Hotel & Spa. Presented by California Water Association. For info: <https://calwaterassn.com/events/cwa-2026-annual-summit/>

**October 26-30 NC**

**Water & Health Conference, Chapel Hill.** The Friday Conference Center. Presented by The University of North Carolina at Chapel Hill. For info: <https://waterinstitute.unc.edu/our-work/unc-water-and-health-conference>

**October 27 UT**

**Utah Water Users Summit.** Presented by Utah Water Users. For info: <https://reg.eventmobi.com/2026summit>

**October 27 WEB**

**Tribal Sovereignty in the Colorado River Basin & Beyond, Virtual Event.** Presented by Water Resources Research Center, The University of Arizona. For info: <https://wrrc.arizona.edu/events/wrrc-water-webinar-tribal-sovereignty-colorado-river-basin-beyond>

**PFAS Update: Litigation, Regulation, and What's Next, Virtual Event.** Presented by American Water Works Association. For info: <https://store.awwa.org/product/44591?whence=>

**October 28 WEB**

**Tour of Virgin Valley Water, Las Vegas.** Tuscany Suites & Casino. Presented by Nevada Water Resources Association. For info: <https://angela-stokely-xnen.squarespace.com/tour-of-virgin-valley-water>

**October 28 NV**

**Stewarding a New Era in Western Water, Sacramento.** The Sawyer Hotel. Presented by the Water Education Foundation. For info: <https://www.watereducation.org/foundation-event/water-summit-2026>

**October 29 CA**

**Water Law in Washington, Virtual Event.** Presented by Law Seminars International. For info: <https://www.lawseminars.com/seminars/2026/26WATWA.php>

**October 29-30 WEB**

**Law of the Colorado River: The View from the Lower Basin, Phoenix.** Beus Center for Law and Society. Presented by Arizona State University. For info: <https://asuevents.asu.edu/event/law-colorado-river-view-lower-basin>

**November 4 AZ**

**NWRA 2026 Annual Conference and Federal Advocacy Forum, Coronado.** Loews Coronado Bay Resort. Presented by National Water Resources Association. For info: <https://www.nwra.org/event-6444793>

**November 3-5 CA**

**Navigating Waves of Change, Monterey.** Portola Hotel & Spa. Presented by Association of Women in Water, Energy & Environment. For info: <https://awwee.org/2026-conference>

**November 4-6 CA****November 4-6 CA**

**Kern River Tour 2026, Bakersfield.** Hyatt Place Bakersfield. Presented by the Water Education Foundation. For info: <https://www.watereducation.org/tour/kern-river-tour-2026>

**November 9-11 PA**

**Moving Beyond 250: Crossing Boundaries to Build a More Water-Secure Future, Philadelphia.** Hilton Penn's Landing. Presented by American Water Resources Association. For info: [https://www.awra.org/Members/Events\\_and\\_Education/Events/2026-Landing-Pages/01\\_Annual/Annual2026.aspx](https://www.awra.org/Members/Events_and_Education/Events/2026-Landing-Pages/01_Annual/Annual2026.aspx)

**November 10-13 CA**

**Localizing California Waters: Catalyze, Connect, Transform, Groveland.** Rush Creek Lodge. Presented by Localizing California Waters. For info: <https://localizingcaliforniawaters.org/lcw-conference-2026>

**November 12 TX**

**Water Environment Horizon Conference, Austin.** Long Center for the Performing Arts. Presented by Water Environment Association of Texas & Texas Association of Clean Water Agencies. For info: <https://www.weat.org/events/horizon-conference-2026>

**November 15-19 TN**

**Water Quality Technology Conference, Memphis.** Renasant Convention Center. Presented by American Water Works Association. For info: <https://www.awwa.org/event/water-quality-technology/>

**November 16-17 TN**

**Effective Utility Management Seminar, Memphis.** Renasant Convention Center. Presented by American Water Works Association. For info: <https://www.awwa.org/event/effective-utility-management-seminar/>



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