Great Salt Lake Basin Integrated Plan
2024 Year in Review

The Great Salt Lake Basin Integrated Plan (GSLBIP) will guide water resource decision-making in the Great Salt Lake Basin. Following the GSLBIP Work Plan, the project team (Division of Water Resources and U.S. Bureau of Reclamation) have enlisted project partners to complete numerous planning and modeling tasks throughout 2024.This ensures a secure foundation for a collaborative, technically sound, multi-year planning process.

Planning process

The planning process relies on developing and engaging our project partners. The GSLBIP steering committee and advisory group strategized how to engage our partners at each stage of this multi-year project. The steering committee and advisory group have also begun to explore some of the main GSLBIP planning components, including the development of performance measures and the simulation of future conditions. The project team also engaged with other entities throughout regions who have conducted large-scale, multi-year projects to gather best management practices. Finally, the project team developed a Planning Consulting Services Request for Qualifications, ready to be issued by the Utah Division of Purchasing in early 2025.

Modeling tasks

The numerous modeling tasks completed in 2024 will support the development of a reliable, basinwide model. The model facilitates the planning and ultimate adoption of a basinwide water resource management strategy. Together with the University of Utah Department of Atmospheric Sciences, the project team has begun climate modeling work that will support a flexible and evolving suite of hydroclimate modeling frameworks and tasks. Statistical and dynamical downscaling of Coupled Model Intercomparison Project (CIMP) 6 to CMIP5 is currently underway and will be completed in late 2025. The downscaling ensures that the climate data can be properly integrated into other model data. Three Variable Infiltration Capacity (VIC) models — developed by the division and currently in review by the Bureau of Reclamation —will simulate naturalized flows forced by historical- and future-projected regionally downscaled climate models. The VIC model review will identify any model updates or revisions necessary in order to generate accurate outputs that will provide inputs to the downstream hydrologic models developed in RiverWare, GoldSim and/or Python. Additionally, modeling economic impacts of water management changes within the basin is being explored.

Project team modeling tasks also included the creation of an inventory of major hydrologic features in the basin, including water supply infrastructure, and river basin-specific data gaps to be filled prior to the RiverWare, GoldSim and/or Python model runs. Finally, the project team developed a Request for Qualifications for Technical Consulting Services that will be issued for solicitation by the Bureau of Reclamation in early 2025.

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Additional projects to support Great Salt Lake Basin water resource decision-making

Quantify evaporative losses from Great Salt Lake

Goal: Better quantify and reduce uncertainty of estimates of the volume of water that evaporates from wetlands, mudflats and open water of Great Salt Lake.

Timeline: March 2024-June 2025

Three stations have been installed around Great Salt Lake to measure evapotranspiration (ET) using the eddy covariance method: Phra EC, Playa Flux Tower and Compass Minerals Flux Tower. All the stations are in working condition and collecting data, available through MesoWest. The Phra EC station is monitored by Utah Geologic Survey and the other two stations are measured by the University of Utah Atmospheric Sciences Department. Bimonthly meetings discuss data collection, instrument/sensor conditions, any issues encountered and additional monitoring needed to better understand lake evaporation.

Groundwater well monitoring

Goal: Update groundwater withdrawal estimates within the five Great Salt Lake river basins for integration into groundwater budgets and current modeling efforts.

Timeline: June 2024-June 2026

Contracting between the U.S. Geological Survey and Division of Water Rights has been completed. Candidate wells within the basin have been identified. Field visits will begin in early 2025 to develop new power consumption coefficients.

Bioenergetics study – water requirements of Great Salt Lake shorebirds

Goal: Determine shorebird carrying capacity for a range of different habitat conditions on the lake.

Timeline: January 2025-December 2028

Contracting between Utah State University and the Division of Wildlife has been completed. Work will begin in early January 2025.

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Functional flows for streams

Goal: Quantify flow targets in critically important streams and wetlands to support and maintain local and downstream water quality and aquatic life uses.

Timeline: October 2023-October 2026

Recent progress for the Great Salt Lake Basin Functional Flows project has included several stakeholder engagement efforts. In September, a workshop brought together wetland managers and scientists to collaboratively define ecological management goals and identify wetland functions tied to seasonal hydrologic conditions. Project presentations were also provided to the Utah Angler's Coalition and the Weber River Watershed Council, and as part of the Salt Lake County Watershed Symposium poster session.

Technical progress includes the development of a set of quantitative functional flow metrics for Great Salt Lake Basin streams. These metrics build on those used in California but have been adjusted to better represent northern Utah's hydrology. An updated functional flow calculator programming script has been used to calculate metrics at more than 250 reference gages. Review of the results indicates that the program is accurately identifying key parts of the annual hydrograph. We have also been compiling a set of more than 200 climate and basin attributes to characterize all of the basin's stream reaches. These attributes will be used along with the reference gage metrics to predict functional flows for the basin's streams. We anticipate beginning this modeling effort in the coming months.

Determine the opportunities and costs for agricultural optimization and leasing

Goal: Quantify the potential depletion and diversion savings and costs of agricultural water optimization and conservation, including split-season leases, seasonal leases and coordinated reductions in diversions in the Great Salt Lake Basin.

Timeline: July 2024-April 2025

The first phase of this project aims to better understand the current conditions in the Great Salt Lake Basin. This is done by quantifying the current estimated amount of agricultural depletion. Accordingly, the team has calculated the baseline agricultural depletions for the basin using Grid ET as well as Open ET (eeMETRIC and ENSEMBLE) for all subbasins in the Great Salt Lake Basin. This is done for water years 2019 through 2023. The team documented their methodology for calculating depletions. Their estimations show that the majority of the agricultural depletions (around 65%) occur in the Bear River Basin. Using Water Related Land Use data, the agricultural depletion volume based on irrigation method was analyzed, showing that the majority of the agricultural area and depletion volume in the basin is surface

or sprinkler irrigation. Their study shows that most agricultural lands by area and depletion volume are in the hay/turf crop group (alfalfa, grass hay and turf farms).

The second focus of this first phase of the project is to quantify the opportunity for agricultural depletion reduction from agricultural optimization, split-season leases and seasonal leases across each watershed in the basin at the field scale. Accordingly, the team investigated various methods for high-level estimation of depletion reduction opportunities and drafted their first report for the Great Salt Lake Commissioner's Office mid-November 2024. The division and commissioner's office is currently reviewing this document. Work on the second phase of this project, currently underway, focuses on quantifying the opportunity for agricultural depletion reduction and associated costs.

Determine the opportunities and costs for municipal and industrial water conservation

Goal: Refine future municipal and industrial (M&I) water use projections and the impact of conservation projections; identify viable M&I water strategies to conserve target volumes; and estimate, rank and compare the costs of M&I water conservation opportunities.

Timeline: July 2024-April 2025

The first phase of the study focused on examining the changes in land use within the basin in recent decades, quantifying the amount of water that has been conserved through M&I conservation, evaluating potential amount of future M&I conservation within each subbasin and quantifying the amount of grass in the basin. This phase examined opportunities to reduce demand including landscape conversion and turf replacement, secondary metering and future land development programs. Actions with the greatest likelihood of achieving depletion reductions were recommended and a range of potential savings were presented. The division and Office of the Great Salt Lake Commissioner are reviewing a draft with preliminary findings.

Work has also begun on phase two of the project, which focuses on costs of conservation and the development of a proposed conservation standard for the amount of water needed for each equivalent residential connection in future growth.

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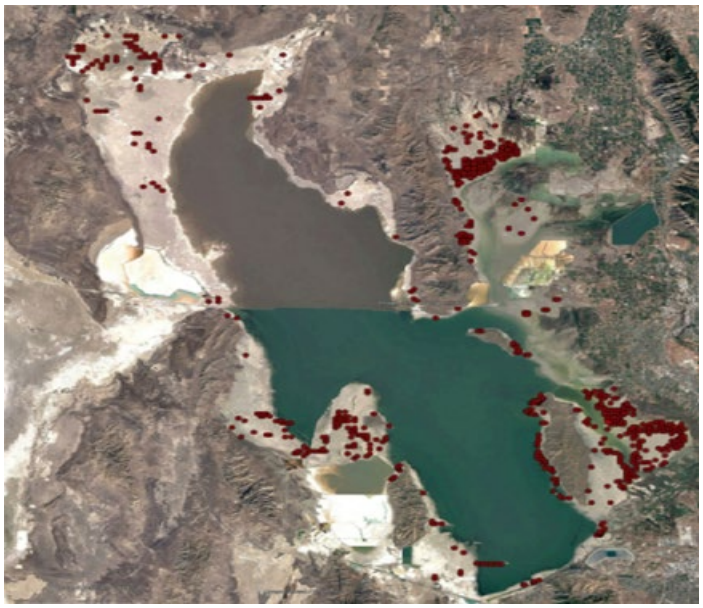
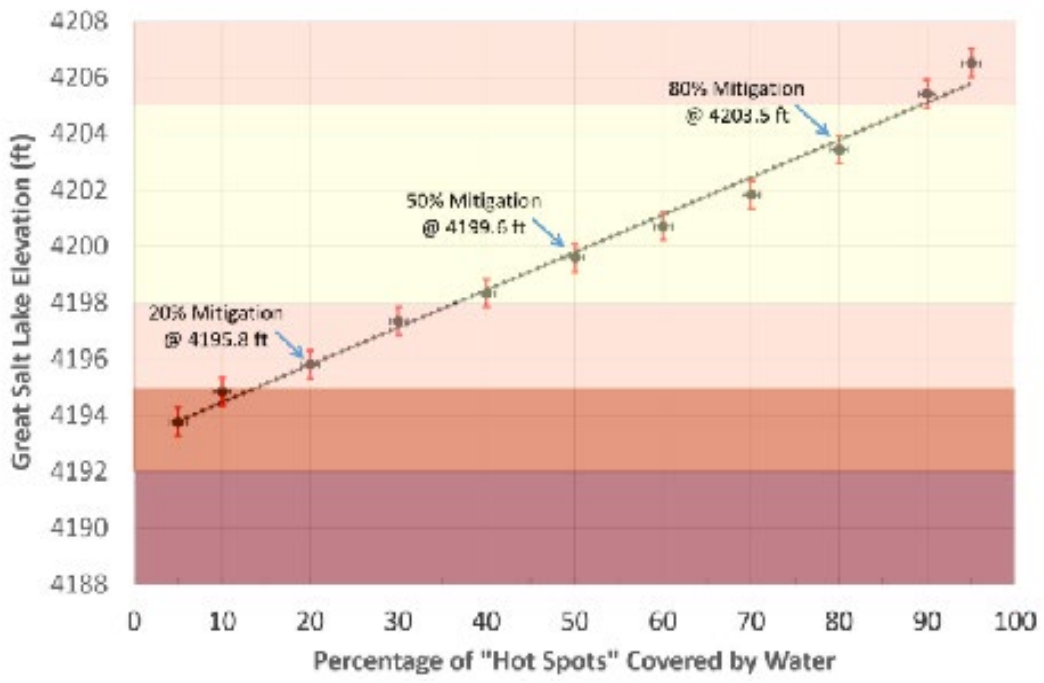
Options and costs for Great Salt Lake dust control

Goal: Characterize the options to control dust emissions from the exposed lakebed, including order of magnitude costs and water demands.

Timeline: September 2024-August 2026

Thus far, this project has worked on updating the dust hotspot elevation distribution and expanding the study area for the 2016 Great Salt Lake dust exposure model at elevations above 4194.5 feet. As the lake continued to recede, reaching a minimum elevation of 4188.5 ft in November 2022, additional dust hotspots were identified. This project updated the dust hotspot database using the 2022 data and determined the elevation of the newly identified dust hotspots using bathymetry. Figures 1 and 2 show the results.





Above, Figure 1 — Updated map showing the location of dust hotspot locations extending down to a lake elevation of 4189.5 feet.

Left, Figure 2 — Updated elevation distribution of dust hotspots extending down to a lake elevation of 4189.5 feet.

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The initial dust exposure model covered the central corridor of Salt Lake, Davis and Weber counties but excluded some border communities. It also excluded counties that could have notable dust contributions: Box Elder, Summit, Tooele, Morgan, Rich, Utah and Duchesne counties. Expanding the model to cover these counties would have added 400,000 new grid cells to the model and increased the computational time by a factor of 10. To navigate around this problem, the project team leveraged 2020 census tract data to define population-weighted centroids that are representative of different communities across northern and central Utah. These centroids were then used to generate dust exposure model simulations. This allowed the team to expand the model domain while improving the computational efficiency of their dust emission model by a factor of 10.

Preliminary model results showed the largest enhancements of dust due to a shrinking lake were observed in population centers on the western side of the Salt Lake Valley. The differences in some locations exceeded over 30%. These results suggest that more work is needed that can assess how dust will impact communities beyond the Wasatch Front.

The next phase of this project will focus on running the dust exposure model for different Great Salt Lake scenarios, while also expanding the analysis to cover additional years such as 2018-2021, 2023 and 2024. The dust hotspot elevation distribution analysis will be incorporated into the dust emission model. Further, the project will examine potential dust mitigation options and their associated costs and water requirements.

Great Salt Lake data hub development

Goal: Determine requirements and possibilities for a central Great Salt Lake database that integrates available water flow, supply, demand and quality data to provide planners, managers and users with consistent access to data and a user-friendly interface.

Timeline: March 2024-December 2026

The Great Salt Lake Commissioner's Office and the Department of Natural Resources have begun to utilize Google Cloud Platform, where the data hub will likely reside. Once this is established and the capabilities are understood, the commissioner's office and department will begin working with Google and the contractor to complete the project outlined in Appendix J of the GSLBIP Work Plan.