Project Fact Sheets

Work Plan for the Great Salt Lake Basin Integrated Plan

The *Gap Analyses Report* (Appendix G of the *Work Plan for the Great Salt Lake Basin Integrated Plan*; Work Plan) identified an ambitious list of more than 130 potential opportunities to fill gaps in our collective understanding of Great Salt Lake (GSL) and its watershed. During development of the Work Plan, the GSL Steering Committee and GSL Advisory Group discussed the feasibility, impact, and potential value of the complete project list and ultimately identified which projects were the most urgent and important for accomplishing the GSL Basin Integrated Plan (GSLBIP) goals (Table 1). These projects were identified based upon their capacity to accomplish the following:

- Inform decisions to be made by 2026
- Build a foundation for the future
- Be completed within the prescribed GSLBIP timeline and budget

These projects are only recommendations at this time; funding amounts are subject to change.

Table 1. Cost Summary for Recommended Projects

Project Title	Project Category	Estimated GSLBIP Funding Contribution[a]
GSLBIP Work Plan Development (completed)	Decision-Making Track	$700,000
GSL Stormwater Study (completed)	Decision-Making Track	$500,000
Modeling and Scenario Planning[b]	Decision-Making Track	$4,500,000
Quantification of Evaporative Losses from Great Salt Lake	Strategic Research	$400,000
Update of Safe Yield Estimates from Aquifers	Strategic Research	$200,000
Bioenergetics Study: Water Requirements of Great Salt Lake Shorebirds	Strategic Research	$200,000
Analysis to Identify Minimum Functional Flows for Streams	Strategic Research	$300,000
Opportunities and Costs for Agricultural Water Optimization	Solutions Development	$400,000
Opportunities and Costs of Municipal and Industrial Water Conservation	Solutions Development	$400,000
Options and Costs for Great Salt Lake Dust Control	Solutions Development	$300,000
Great Salt Lake Data Hub Development	Capacity Development	$200,000
TOTAL		$8,100,000

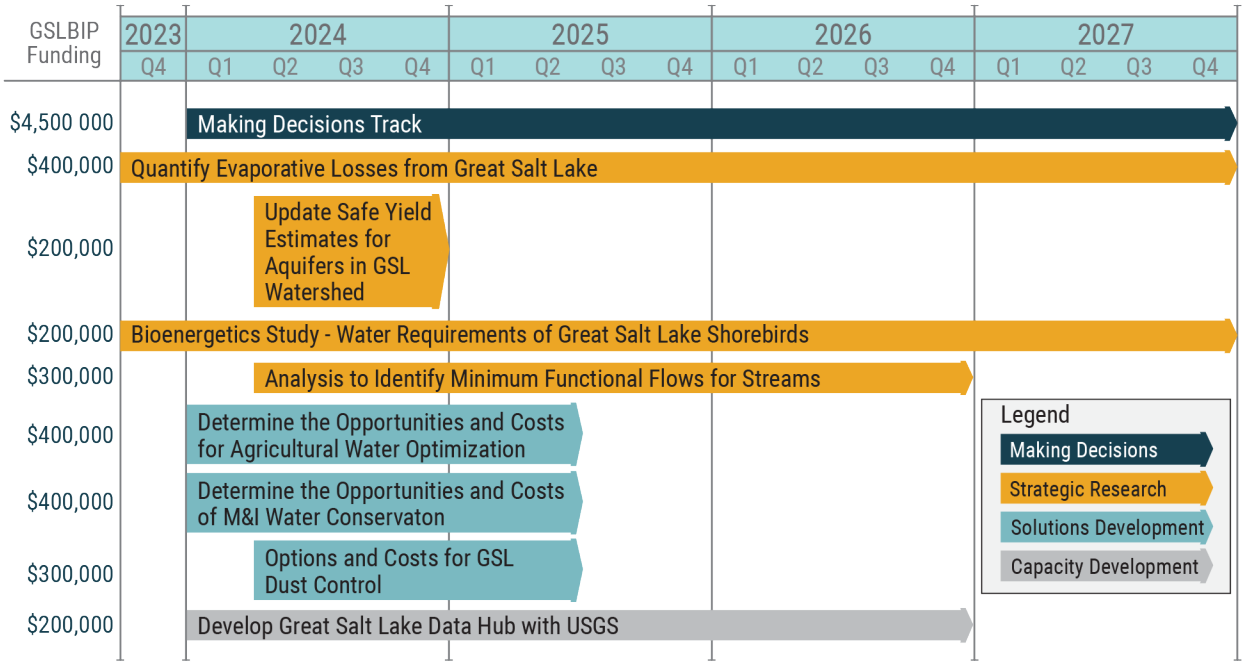
[a] Estimated GSLBIP funding contribution does not include external funding amounts. Individual project fact sheets provide more information on matching funds from project partners.
[b] Refer to Appendix H, *Scoping Plan for the Water Resources Planning Tool*, for additional details on schedule.

Note:

GSLBIP = Great Salt Lake Basin Integrated Plan

A successful GSLBIP depends on translating these opportunities into actual projects and defining project scopes, schedules, and agreements needed to go from concept to operation. The project fact sheets presented in Attachment 1 are intended to facilitate developing scopes of work for the projects listed in Table 1. An overall project implementation schedule is presented on Figure 1.

Figure 1. Great Salt Lake Basin Integrated Plan Project Schedule



Attachment 1
Project Fact Sheets

Quantification of Evaporative Losses from Great Salt Lake

Category	Strategic Research
Goal	This study aims to better quantify and reduce the uncertainty of estimates of the volume of water that evaporates from the wetlands, mudflats, and open water of Great Salt Lake (GSL).
Need	Many methods have been used to estimate evaporation from GSL, but these rates have never been directly measured or suitably modeled. Estimates of evaporation from GSL have ranged from 2,000,000 to 5,000,000 acre-feet per year. The uncertainty associated with estimating the lake's evaporative processes, evaporation rates, and the associated evaporative losses remains high due to the unique chemistry and salinity of the lake. Given the large magnitude of evaporation, even a small amount of uncertainty can translate to hundreds of thousands of acre-feet. This is a critical number in the Great Salt Lake Basin Integrated Plan (GSLBIP) water budget and its evaluation of strategies to balance available water supply.
Description	This study will implement a monitoring and modeling program planned by Utah Division of Water Resources (WRe), Utah State University (USU), University of Utah (UofU), Utah Geological Survey (UGS), United States Geological Survey (USGS), and Utah Division of Forestry, Fire & State Lands (FFSL). Tasks include the following: 1. Establish ground-based monitoring stations (such as eddy covariance stations) to begin active measurements of evaporative processes in the open water of the South Arm and North Arm, an open water location with brackish water (salinity less than 2 grams per liter), a mudflat location with known groundwater levels, a mineral extraction evaporation pond, and in a fully vegetated shoreline wetland with surface water. These stations will need to be operated for no less than 3 years; longer-term monitoring is preferable. Ongoing funding will be required to maintain the network. Field data will be used to develop new estimates of evaporation that will be correlated with remote sensing data and other site-specific conditions. 2. Use data to calibrate input data to models that are used to estimate GSL evaporation. 3. Make recommendations for future monitoring and modeling of evaporation from GSL's systems.
Key Questions Pertaining to the Gap Analysis	▪ How much water does GSL and its wetlands need to support its designated uses? - How much inflow is needed to sustain a particular lake level? · What is the water budget for GSL and its associated wetlands? o What evaporates from the lake, mudflats, and wetlands? o How do we characterize present and future climate conditions relating to evaporation, air temperature, water temperature, and water salinity?
Timeline	▪ March to May 2024: Installation of monitoring stations as budget allows ▪ October 2024: Initial report of field measurements in 2024 ▪ December 2024: Initial recommendations for modeling of evaporation from GSL's systems ▪ July 1, 2025: Final annual report of 2024 evaporation data and recommendations for GSL (annual reports by July 1 of subsequent calendar years) ▪ Monitoring will be ongoing, dependent upon available funding
Linkages to Other Efforts	▪ USGS Integrated Water Availability Assessments ▪ UGS FLUX network ▪ GSLBIP water budget development ▪ FFSL GSL Comprehensive Management Plan ▪ GSL Salinity Advisory Committee ▪ GSL Ecosystem Program
Cost	▪ GSLBIP: $400,000 ▪ Total: $1,500,000 (GSLBIP contribution: $400,000; Additional funding to be determined)
Lead Entity and Key Partners	▪ Lead: WRe ▪ Key partners: United States Bureau of Reclamation, UGS, USGS, USU, UofU, FFSL

Update of Safe Yield Estimates for Aquifers

Category	Strategic
Goal	The study goal is to define or update safe yield estimates and surface water/groundwater exchanges for aquifers within the five river basins of the Great Salt Lake (GSL) watershed for integration into river basin budgets.
Need	Municipal drinking water and municipal irrigation demand rely heavily on groundwater. According to the Utah Agricultural Experiment Station, "over two-thirds of Utah counties depend on groundwater for at least 70% of their public supply."[1] The United States Geological Survey (USGS) reported that statewide, about 57% of public supply water was groundwater withdrawals in 2015.[2] The safe yield of aquifers that support demands in the GSL watershed are not well defined. Furthermore, the USGS, Utah Geological Survey (UGS), and local water suppliers are reporting aquifer level declines in many regions because of over pumping or diminishing aquifer recharge.
Description	This study will use existing groundwater models developed by USGS and others and stored in Utah Division of Water Rights (WRi) or USGS databases to investigate and develop safe yield estimates in the study area. In some areas, groundwater is being extracted from various aquifers, and knowing each aquifer's safe yield is important to understanding available water supplies for GSL watershed communities. These estimates will be included in the GSL Basin Integrated Plan (GSLBIP) water budget to more accurately characterize the available water supply. Tasks include the following: 1. Collect available groundwater models and work with partner agencies to locate missing models and identify ongoing model update efforts. Prioritize oldest/weakest models for update. 2. Curate recent hydrogeological data including, in order of importance: Hydrogeological studies, well pumpage and level data, and miscellaneous supporting data (such as streamflow records showing groundwater exchanges, weather data, land use data). 3. Update models with collected data (average recharge, most recent well pumping) using accompanying model reports and model authors as a guide. Carefully document changes and test models for stability. 4. Evaluate steady-state groundwater budget (safe yield) and steady-state discharges to wells, evapotranspiration, and surface water.
Key Questions Pertaining to the Gap Analysis	▪ How much water is and will be available for use in the GSL watershed? - What water resources are currently available? · What is the current, assumed reliable groundwater supply (safe yield)? What is the portfolio? o For the overall GSL watershed? o For each river basin and subbasin? o For each water district or utility or irrigation company?
Timeline	▪ January to March 2024: Begin immediately, Task 1 ▪ April to July 2024: Task 2 ▪ August to October 2024: Task 3 and 4 ▪ November 2024: Finalize and report Task 4 findings
Linkages to Other Efforts	▪ USGS GSL Basin regional groundwater model with assistance from UGS ▪ Ongoing updates to USGS models (possible, currently unknown)
Cost	▪ GSLBIP: $200,000
Lead Entity and Key Partners	▪ Lead: WRi ▪ Key partners: United States Bureau of Reclamation, UGS, USGS, WRi, river commissioners, utilities

[1] Wang, Simon. n.d. *Utah's Water Future*. Utah State University. https://caas.usu.edu/uaes/archive-stories/utahs-water-future.

[2] United States Geological Survey (USGS). 2018. *Water Use Data for Utah*. https://nwis.waterdata.usgs.gov/ut/nwis/water_use?format=html_table&rdb_compression=file&wu_area=State+Total&wu_year=2015&wu_category=ALL&wu_category_nms=--ALL%2BCategories--

Bioenergetics Study: Water Requirements of Great Salt Lake Shorebirds

Category	Strategic Research
Goal	This study aims to determine the shorebird carrying capacity of Great Salt Lake (GSL) for different habitat conditions.
Need	GSL's food and habitat resources are increasingly a crucial part of sustaining waterbird populations in the Western Hemisphere. Although the Great Salt Lake Ecosystem Program (GSLEP) has developed an extensive dataset and models of bird use and the associated aquatic ecology of GSL, resource managers do not have a means to evaluate the bird carrying capacity of GSL and its wetlands. Bioenergetics models can provide that means and allow wetland managers to make informed decisions regarding water management for birds. It is a critical means to evaluate how much water GSL and its wetlands will need to support the waterbirds that rely on them.
Description	This study will provide funding to GSLEP via the Utah Division of Wildlife Resources (DWR) to augment its existing "Waterbird Bioenergetic Models for GSL" effort to include shorebirds. GSLEP is already developing a bioenergetics model for waterfowl at GSL (began January 2023); this study will add funding to include shorebirds at GSL. Work will be contracted via GSLEP to Dr. Mike Conover of Utah State University (USU). The work will include a literature review to understand bird energetic requirements, analysis of remote sensing and geographic information system (GIS) data to evaluate the various habitats of GSL, field studies to correlate bird use and food items to habitat type, and an assessment of bird carrying capacity for each habitat type. Recommendations will be provided to determine spatial and temporal correlation between available hydrology and habitat type.
Key Questions Pertaining to the Gap Analysis	▪ How much water does GSL and its wetlands need to support its designated uses? - What is the value and consequence of changing lake water level? · How will the ecology change with fluctuating water levels? o For open water, mudflat, unimpounded marsh complexes, impounded marsh complexes, and islands… (a) How will the food chain change with water level? (b) How does habitat structure change with water level? (i) What is the available foraging and nesting habitat? (c) How will bird use change with water level? (i) How will food abundance change with water level?
Timeline	▪ January 2024: Begin immediately ▪ July 15, 2024: First annual report for both waterfowl and shorebird studies (annual reports by July 15 of subsequent calendar years) ▪ October 30, 2024: Initial estimates of bird carrying capacity by habitat type ▪ July 15, 2025: Second annual report for both waterfowl and shorebird studies, updated estimates of bird carrying capacity by habitat type ▪ December 30, 2027: Final reports for both waterfowl and shorebird bioenergetic models for GSL
Linkages to Other Efforts	▪ Direct linkage to GSLEP "Waterbird Bioenergetic Models for GSL" effort. ▪ Quarterly coordination with GSLEP Technical Advisory Group (TAG), USGS Integrated Water Availability Assessments, GSL Basin Integrated Plan (GSLBIP) water budget development, Utah Division of Forestry, Fire & State Lands GSL Comprehensive Management Plan, and GSL Salinity Advisory Committee
Cost	▪ GSLBIP: $200,000 ▪ Total for shorebird bioenergetics study: $375,000 (GSLBIP contribution: $200,000; Additional funding to be determined) ▪ DWR and its partners for parallel waterfowl study: $460,000; Combined total: $835,000
Lead Entity and Key Partners	▪ Lead: DWR, GSLEP TAG ▪ Key Partners: USU, WRe

Analysis to Identify Minimum Functional Flows for Streams

Category	Strategic Research
Goal	This study aims to identify and quantify flow targets in streams and wetlands that are most ecologically critical to the support and maintenance of local and downstream water quality and aquatic life uses. Expected output is a GIS-based data interface (RiverWare) that can be used to quantify the nature and extent of ecological modifications resulting from hydrologic alterations and make recommendations about what changes in flow management would most benefit Great Salt Lake (GSL), GSL wetlands and upstream tributaries in the basin.
Need	There are many competing interests for water in the streams of GSL's watershed. Ideally, the timing and rate of water deliveries to GSL would also maximize water quality and aquatic life benefits in upstream tributaries. The appropriate rate, volume and timing that can holistically protect these ecosystems, however, is rarely understood. Functional flows represent distinct aspects of a natural flow regime that sustain ecological, geomorphic, or biogeochemical functions, and that support the life history and habitat needs of native aquatic species. Functional flows are characterized using a suite of flow metrics calculated at reference stream flow gages. These metrics are evaluated to establish flow-based conservation objectives. Strategies to deliver water to GSL can then also maximize water quality and support of aquatic life uses in upstream waterbodies. The functional flows approach also maps reach-scale estimated natural functional flows for all streams in the watershed so that the extent of existing hydrologic modifications can be evaluated, which is needed to develop more efficient and effective restoration strategies in degraded waterbodies. A conceptually similar approach will be used to define important hydrologic objectives for Great Salt Lake and its surrounding wetlands so longitudinal relationships can be evaluated and mapped using the same framework. This approach will help identify upstream reaches where altering the timing or quantity of water delivery can improve ecological conditions throughout the watershed. Finally, functional flows will be evaluated for wet-, moderate- and dry-year conditions so that water and other natural resource managers can better take advantage of wet years or mitigate adverse effects in dry years. Functional flow metrics will provide the GSLBIP with critical input about how water supply can be more effectively managed to be ecologically protective.
Description	This study will provide funding to the Utah Division of Water Quality (DWQ) to augment its existing "Establishing a Functional Flow Framework (FFF) for the Great Salt Lake Basin" effort. Development of a FFF will include the following: 1. Determination of which hydrologic attributes are most important to GSL, GSL wetlands and upstream waters 2. Reach-scale maps of natural functional flow metric ranges for all streams in the GSL watershed and for wet, moderate, and dry water year types 3. Measures or estimates of existing hydrologic conditions and functional flows alteration assessment 4. An evaluation of linkages among functional flow metrics and conservation targets (e.g., fishery health, biological integrity, water quality) 5. Recommendations for using the framework to inform best management practices in the GSL watershed Project results will be made available online via a user-friendly, map-based interface.

Analysis to Identify Minimum Functional Flows for Streams continued

Key Questions Pertaining to the Gap Analysis	▪ How can watershed management benefit water quantity and quality in the watershed? - What is the condition of GSL's watershed? · What have been and will be the long-term trends in watershed condition? · What is level of and current risk our watershed face that could impact water quantity and quality? - What are the options for and potential benefits of sustaining river flows in the low flow season? · How can river flows in the low flow season be increased in the GSL watershed? o How should objectives be defined? What metrics should be used? - What are the options for and potential benefits of improving water quality? · How can water quality be improved in the GSL watershed? o What much water is required to sustain high priority ecological sites? ▪ How can managing water quality benefit a resilient water supply? - What water quantity and quality is needed to sustain high priority ecological sites? · How much water is required to sustain high priority ecological sites? o What is the minimum flow to sustain water quality and function?
Timeline	▪ October 2023: Work began ▪ January 2024 – Hold expert workshops to establish conservation targets ▪ October 2024: Initial estimates for FFF ▪ December 2024: Initial recommendations for incorporating FFF into water budget models ▪ July 1, 2025: Updated recommendations for incorporating FFF into water budget models ▪ October 2026: Final recommendations for incorporating FFF into water budget models
Linkages to Other Efforts	▪ DWQ development of FFF for all of Utah ▪ DWQ water quality assessments ▪ GSLBIP water budget development ▪ Utah Department of Wildlife Resources' (DWR's) Utah Wildlife Action Plan ▪ Trout Unlimited High-Frequency Data Logger Program ▪ Weber Basin Water Conservancy District ▪ Utah Lake and Jordan River Hydrological Simulation Program - FORTRAN (HSPF) modeling
Cost	▪ GSLBIP: $300,000 ▪ Total: $677,000 (USU/USGS: $317,000, GSLBIP: $300,000, Additional funding to be determined)
Lead Entity and Key Partners	▪ Lead: DWQ ▪ Key Partners: Utah State University, DWR, Utah Division of Water Resources

Opportunities and Costs for Agricultural Water Optimization

Category	Solutions Development
Goal	This study aims to quantify the opportunity to reduce agricultural depletions in the Great Salt Lake (GSL) watershed through optimization programs and quantify the associated cost of these opportunities. Secondary goals include an improved understanding of the results and benefits of current agricultural optimization programs and how these programs may be enhanced in the future and to spatially characterize the agricultural depletions in the GSL watershed.
Need	Utah's Legislature invested $200 million into agricultural water optimization programs in 2023, and the Governor's Office supports investments in agricultural infrastructure,[1] however, the impact of these and past agricultural optimization programs have had on agricultural depletion is not well understood. An improved understanding of results and benefits of past optimization programs combined with an understanding of the opportunities to reduce agricultural depletions and the associated costs will enable the state of Utah to maximize the impact of its current and future agricultural optimization programs and establish obtainable goals for agricultural depletion reduction.
Description	This study is envisioned to include the following four work tracks: 1. *Optimization program review and recommendations for future enhancement*—A comprehensive review of past and current agricultural optimization programs to characterize the optimization methods, project locations, associated costs, and resulting changes in crop production and depletion. Following compilation of review results, recommendations for future program enhancement will be provided. 2. *Characterization of existing crops, irrigation methods, and associated depletions*—A spatial characterization of agricultural land uses including crops, irrigation method, and estimated depletions. The state's Water Related Land Use Program currently supports characterization of agricultural land uses, including field scale identification of crop type and irrigation method. Many approaches currently exist to estimate depletion, including theoretical approaches, which use local weather data, remote sensed methods, and on field measurement techniques. A state adopted depletion quantification method is needed, and work is currently being conducted in this area. This work track is envisioned to implement the state's adopted method(s) to estimate field scale depletions across the GSL watershed and align them with field specific information from the Water Related Land Use dataset in a geographic information system (GIS) environment. The result will be a spatial understanding of where the depletions are occurring in the watershed, which will inform where opportunities for reduction in depletion exist. 3. *Quantify the opportunity for agricultural depletion reduction and associated costs*—The opportunity for agricultural depletion reduction will be assessed across the watershed at the field scale using the latest information and methods from ongoing work by state agencies and institutions including the Colorado River Authority of Utah (CRAU) and Utah State University (USU) Extension and supporting literature sources. Practical considerations of optimization methods should be integrated into the analysis based on the results of the Optimization Program Review, known industry trends, and land capability information. Once the opportunities are identified and characterized, a review of current cost data will be conducted to quantify the costs of the various optimization methods and system conversions. 4. *Cost/benefit analysis and goal development*—Once the opportunity for depletion reduction and associated costs are quantified, a cost benefit analysis will be conducted to identify the optimization measures with the greatest impact. Deployment scenarios will be considered, and goals developed considering Conservation Target Scenarios in the GSL Policy Assessment (GSL Strike Team 2023).[2]

[1] Utah Governor's Office of Planning & Budget, Utah Governor's Office of Economic Opportunity, Utah Department of Agriculture and Food, Utah Department of Environmental Quality, Utah Department of Natural Resources, and Colorado River Authority of Utah. 2022. *Utah's Coordinated Action Plan for Water*. November. https://gopb.utah.gov/wp-content/uploads/2022/11/2022_11-Plan-for-Coordinated-Water-Action-FINAL.pdf.

[2] Great Salt Lake Strike Team. 2023. *Great Salt Lake Policy Assessment*. https://gardner.utah.edu/wp-content/uploads/GSL-Assessment-Feb2023.pdf.

Opportunities and Costs for Agricultural Water Optimization continued

Key Questions Pertaining to the Gap Analysis	▪ How much water is needed for our communities, businesses, agriculture, environment, and GSL? - What are the current demands? · What are our current agricultural water demands? - How can we adapt water demands? · What immediate enablers are needed to support water demand quantification activities? · What best management practices could be implemented to reduce human water demands? · What data and management resources are needed to evaluate actions? · What are the costs of changes? - What are our future demands? · What are our future agricultural water demands? - How much have and will demands change over time? · What have been and will be the long-term trends in population and land use? o How has and will climate change influence water demands? o What are the critical elements that would enable more accurate predictions?
Timeline	▪ Project Start: January 2024 ▪ Work Track Completion Dates: - June 2024: Optimization Program Review and Recommendations for Future Enhancement - June 2024: Characterization of Existing Crops, Irrigation Methods, and Associated Depletions - December 2024: Quantify Opportunity for Agricultural Depletion Reduction and Associated Costs - June 2025: Cost/Benefit Analysis and Goal Development
Linkages to Other Efforts	▪ GSL Basin Integrated Plan water budget (used to characterize depletion and return flows) ▪ Agricultural Water Optimization Program: Utah Department of Agriculture and Food (UDAF) ▪ Water Depletion Accounting: USU, Utah Division of Water Rights (WRi) ▪ Agriculture Water Demonstration, Research, and Implementation Pilot Program: USU, CRAU, Central Utah Water Conservancy District ▪ Water Optimization Research: USU ▪ Drought Mitigation Programs: CRAU ▪ Water Related Land Use Program: Utah Division of Water Resources (WRe) ▪ Agricultural Water Resiliency Plan: Central Utah Water Conservancy District
Cost	▪ GSLBIP: $400,000 ▪ Total: $1,500,000 (GSLBIP contribution: $400,000, Additional funding to be determined)
Lead Entity and Key Partners	▪ Lead Entity: WRe ▪ Key partners: UDAF, WRi, USU, CRAU

Opportunities and Costs of Municipal and Industrial Water Conservation

Category	Solutions Development
Goal	This study aims to refine future municipal and industrial (M&I) water use projections and the impact of conservation on projections, identify viable M&I water conservation strategies to conserve target volumes, and estimate, rank, and compare the costs of M&I water conservation opportunities.
Need	In 2020, the Great Salt Lake Advisory Council (GSLAC) and Weber Basin Water Conservancy District (WCD) studied the impact of water conservation on water resource planning (that is, the timing of large water development projects).[1] Of four WCDs within the study scope, three need conservation beyond the regional conservation goals before approximately 2055 to avoid large future water development projects. Currently, M&I water conservation implementation is inconsistent because incentives for M&I water conservation vary and depend on local water values.
Description	The M&I Water Conservation Plan will address the priorities resulting from the Conservation Impacts Study. Specifically, the plan will examine the way population growth interacts with land use changes, refine water supply, and water demand data and estimate and rank the costs of M&I water conservation opportunities. Finally, these M&I conservation costs will be compared with of future large water development projects, costs of Great Salt Lake (GSL) dust control, and costs of agricultural conservation. Plan tasks are as follows: 1. Identify key goals, metrics, and scenarios to be evaluated as part of this study 2. Collect the most recent data on water supply, water demand, population, population projections, land use, and land use projections. Coordinate land use projection data gathering at the county or city levels (as budget allows). 3. Study how land and water use changes over past decade correlated with population increases to identify patterns or trends. Study patterns in the entire basin or in representative sub-regions (as budget allows). 4. Develop new land and water use projections using data and analysis from Tasks 1 and 2. 5. Identify potential M&I water conservation opportunities and estimate costs. Normalize costs by amount of water conserved. 6. Compare M&I water conservation opportunity costs with costs of future large water development projects, costs of GSL dust control, and costs of agricultural conservation.
Key Questions Pertaining to the Gap Analysis	▪ How much water is needed for our communities, businesses, agriculture, environment, and GSL? - How can we adapt water demands? ▪ What best management practices could be implemented to reduce human water demands? ▪ What are the top three actions the average water user can implement to conserve water? ▪ How can we evaluate, incentivize, implement further reductions in water use? ▪ What are the costs of changes and what are the opportunity costs?
Timeline	▪ January to March 2024: Begin immediately, Task 1 and Task 4 (Identify opportunities) ▪ April to June 2024: Task 2 and Task 4 (Identify opportunities) ▪ July to August 2024: Task 3 ▪ December 2024" Task 4 (Estimate and normalize costs) and Task 5 ▪ June 2025" Finalize results
Linkages to Other Efforts	▪ Local Water Conservancy Districts master planning ▪ Local County and City general planning and zoning
Cost	▪ GSLBIP: $400,000
Lead Entity and Key Partners	▪ Lead: Utah Division of Water Resources ▪ Key partners: GSLAC, Utah Division of Water Rights, GSL Strike Team, WCDs, Counties, Cities

[1] Bowen Collins & Associates. 2020. Conservation Impacts Study: Final Draft. Accessed October 27, 2023. https://documents.deq.utah.gov/water-quality/standards-technical-services/gsl-website-docs/other-studies/DWQ-2020-021042.pdf.

Options and Costs for Great Salt Lake Dust Control

Category	Solutions Development
Goal	This study aims to characterize the options to control dust emissions from the exposed lakebed of Great Salt Lake (GSL), including order of magnitude costs and water demands.
Need	Although dust emissions from GSL are increasingly considered a significant risk when lake water levels are low, sources, composition, loading, risks, and mitigation options are only recently beginning to be understood. We have only begun to consider potential strategies to reduce dust emission loads from GSL. We have not completed an engineering assessment of the potential costs or how much water might be required solely for dust mitigation. Lessons from Owens Lake and Salton Sea in California indicate proactive planning and implementation of dust control measures could significantly reduce long-term dust mitigation costs and water demands. We must identify critical steps to reduce risks in the short-term and be prepared for potential mitigation in the long-term. Improving our assessment of options and potential costs for dust control and mitigation will be critical for the decisions that will need to be made as part of the Great Salt Lake Basin Integrated Plan (GSLBIP).
Description	The following major tasks will be completed as part of this project: 1. Synthesize work to characterize GSL dust emissions. Develop an initial methodology to estimate how dust emissions could vary with lake level. 2. Identify options for monitoring dust emissions and impacts from dust emissions with associated costs. 3. Identify options for controlling dust emissions on exposed portions of GSL lakebed with associated costs. Identify potential water requirements for these options, as this may impact the GSL water budget. 4. Summarize how dust control and mitigation costs could change with lake level. Provide recommendations for next steps.
Key Questions Pertaining to the Gap Analysis	▪ How much water does GSL and its wetlands need to support its designated uses? - What is the value and consequence of changing lake levels? · How do water levels affect GSL's watershed? o How does the surface area of the exposed lakebed affect dust emissions in the watershed? o How does the surface area of the exposed lakebed affect salt dispersion in the watershed?
Timeline	▪ March 2024: Begin work ▪ June 2025: Complete desktop assessment
Linkages to Other Efforts	▪ Division of Forestry, Fire & State Lands (FFSL) GSL Comprehensive Management Plan
Cost	▪ GSLBIP: $300,000
Lead Entity and Key Partners	▪ Lead: Utah Division of Water Resources ▪ Key partners: FFSL, United States Geological Survey, Utah Division of Air Quality, University of Utah, Utah State University, Dust^2, GSL Advisory Council

Great Salt Lake Data Hub Development

Category	Capacity
Goal	This project aims to determine the requirements and possibilities for a central database (Great Salt Lake [GSL] Data Hub) that integrates available water flow, supply, demand, and quality data to provide planners, managers, and users a consistent user interface. The GSL Data Hub will be a central repository for GSL information that can be accessed by multiple agencies and the public.
Need	Many efforts to monitor water quality and quantity within the GSL Basin are parallel and may be undertaken in isolation with little to no coordination. Developing a central repository for GSL information would help coordinate studies and projects, leverage existing resources, reduce redundancies, and facilitate a shared understanding of current conditions in the GSL Basin. Although both the Utah Division of Water Quality (DWQ) database (AWQMS) and United States Geological Survey (USGS) database (NWIS) push data to the nationwide U.S. Environmental Protection Agency (EPA) Water Quality Exchange database (WQX), they do not handle high-frequency data well, which complicate efforts to maintain water quality data at a single location. Furthermore, USGS is now using Aquarius to manage time-series data, but it is cost prohibitive for DWQ to switch to this platform. While the USGS GSL HydroMapper water data dashboard includes the entire GSL Basin, it offers minimal water quality information (water temperature and turbidity). DWQ's GSL Data Explorer pertains only to GSL monitoring locations and not the GSL Basin.
Description	Multiple agencies will need to convene to identify specific criteria and requirements of the GSL Data Hub and the type of data that can be stored. Potential GSL Data Hub criteria include the following: ▪ Ability to manage high-frequency data ▪ Ability to present information spatially in an interactive map-based environment ▪ Ability to provide a reports library and findings of GSL Basin ongoing strategic research studies ▪ Ability to either provide storage for, or links to, existing monitoring data within the GSL Basin ▪ Ability to integrate data from new gauging systems, annual reporting from public water suppliers, water, and supply modeling ▪ Ability to provide data outputs that can be readily integrated into water planning models and efforts ▪ Any additional information or sources determined during Phase I of database development One possibility for the GSL Data Hub is to leverage the existing USGS HydroMapper platform and link surface water locations to the EPA WQX database that is central to USGS and DWQ. GSL Data Hub development could be broken up into four phases. It is anticipated that Phases I, II, and III could be funded by the GSL Basin Integrated Plan (GSLBIP). The suggested four phases are as follows: ▪ Phase I: Determine Requirements of the GSL Data Hub ▪ Phase II: Evaluate Options and Possibilities ▪ Phase III: Develop a Technical Framework for GSL Data Hub ▪ Phase IV: Develop the GSL Data Hub
Key Questions Pertaining to the Gap Analysis	▪ What is the quality of existing water bodies and water resources? - What programs are being implemented to monitor and assess water quality? ▪ Where are the individual programmatic data housed? ▪ Numeric criteria, beneficial uses, and 303(d)/305(b) reporting ▪ What water quality monitoring data do we have and where? ▪ What is the condition of GSL's watershed? ▪ What mapping and data do we have to document and monitor the watershed's condition? ▪ What can be done to improve our water supply? ▪ What immediate enablers are needed to support water supply quantification activities? ▪ Data development? ▪ What are the current demands? ▪ How are water demands managed in each sector and at each scale? ▪ How are demands currently monitored? By whom? ▪ What are the existing data sources? How thorough and accurate are they? ▪ What immediate enablers can support water demand quantification activities/data development?

Great Salt Lake Data Hub Development continued

Timeline	▪ January to March 2024: Project kickoff ▪ June 2024: Phase I: Determine Requirements ▪ July 2024 to December 2024: Phase II: Evaluate Possibilities and Options ▪ January 2025 to August 2025: Phase III: Develop Technical Requirements ▪ October 2025 to December 2026: Phase IV: Develop the GSL Data Hub ▪ Ongoing: Database maintenance and annual review to propose feature enhancements or integrate new information
Linkages to Other Efforts	▪ USGS Hydro Mapper ▪ Utah Geological Survey (UGS) Groundwater Quality Spatial Database ▪ DWQ GSL Data Explorer ▪ DWQ High Frequency Data Dashboard ▪ USGS NWIS Database ▪ USGS Saline Lakes Ecosystems Integrated Water Availability Assessment ▪ DWQ AWQMS Database ▪ Utah Division of Water Rights (WRi) Database and Map ▪ Utah Division of Wildlife Resources (DWR) GSL Ecosystem Program ▪ GSL Salinity Advisory Committee
Cost	▪ GSLBIP: $200,000 ▪ Ongoing maintenance cost: to be determined
Lead Entity and Key Partners	▪ Lead: Utah Division of Water Resources ▪ Key partners: USGS, GSL Advisory Council, Utah Division of Forestry, Fire and State Lands, DWQ, Utah Geological Survey, DWR, GSL Strike Team, WRi, Water providers within the GSL Basin, Utah State University, Colorado River Authority of Utah