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A ROADMAP TO ACTION

Leveraging the integrated collaborative process, the GSLBIP must incorporate a robust technical approach to achieve its goal and objectives. It must optimize available resources while embracing the challenges we face and the inherent uncertainty of the future. It must drive collaborative decisions that create durable outcomes and shape a future that achieves our goal. This section of the Work Plan provides an overview of the origin and a roadmap toward achieving the GSLBIP ultimate goal—action that ensures a resilient water supply for GSL and all water uses, including people and the environment, throughout the watershed.

GAP ANALYSIS

H.B. 429 required the WRe to complete “a synthesis of available information literature, and data, and an assessment of scientific, technical, measurement, and other informational needs...” to inform the GSLBIP Work Plan development.²⁸ Knowledge gained from interviews, workshops, and a review of available literature was organized in a database and used to identify strengths, gaps in available resources, and opportunities for capacity development and further study. Methods and results from the gap analysis were shared with various participating experts to help validate results and are summarized in the *Gap Analyses Report* (provided in Appendix G). The gap analysis does not in and of itself prioritize new technical analyses; it provides an invaluable synthesis of information pertinent to the GSLBIP goal and objectives. It was the point of origin for a roadmap for this Work Plan.



Key Findings from the Gap Analysis

- We have a solid foundation to build upon. A significant body of work has been completed, is in process, or will be developed soon that will be useful for the GSLBIP. Coordination will be vital to success.
- Opportunities abound to improve our data, tools, processes, and decisions. The challenge is in where to start.
- Decisions can be made today. Completing targeted studies now will enable better decisions tomorrow.
- Studies and solutions have typically been discussed in terms of different timelines. The GSLBIP will consider those to be completed today (in 2023), tomorrow (2024 through 2026 as part of the GSLBIP), and beyond (2027+). The primary purpose of the GSLBIP is to enable informed long-term decisions in 2026.

A ROADMAP FOR THE WORK PLAN FOR THE GREAT SALT LAKE BASIN INTEGRATED PLAN

H.B. 429 required the WRe to provide “a description of how the Work Plan will be implemented to address the needs [that is, opportunities] ...” identified as part of the gap analysis.²⁸ The opportunities identified by the gap analysis were prioritized with input from the GSLBIP Advisory Group and GSLBIP Steering Committee based upon the capacity of the opportunities to accomplish the following: (1) inform decisions to be made by 2026, (2) build a foundation for the future, and (3) be completed within the prescribed timeline and budget for the GSLBIP. The opportunities were then organized into five tracks that, along with the GSLBIP integrated collaborative process, form the Work Plan roadmap (Figures 4-1 and 3-3):

- **Decision-making**—Proposed work will integrate people and tools within a structured process designed to identify and solve problems and make decisions. This is the central effort of the GSLBIP that achieves the requirements of H.B. 429 and Reclamation’s WTR 13-01. All GSLBIP activities will serve to inform this core effort.
- **Strategic research**—Proposed work is intended to investigate and provide essential information that will improve confidence in long-term decisions to be made.
- **Solutions development**—Numerous solutions have been previously recommended. Proposed work will advance selected options and strategies to better characterize these options and inform GSLBIP decision-making.
- **Capacity development**—Proposed work will improve the ability of individuals, organizations, and communities to consider, anticipate, monitor, and make decisions as part of the GSLBIP and beyond. Maximum value from many of these projects may not be realized during GSLBIP development but beyond 2027. They help set both a foundation and trajectory for the future.
- **Policy opportunities**—Opportunities were identified to enhance existing policy to improve process, inform better decisions and enable better outcomes from GSLBIP implementation.

At a minimum, the GSLBIP must meet the following criteria:

- Make projections of future water supply and demand for GSL, its associated wetlands, and its watershed
- Analyze how water infrastructure and operations will perform
- Develop appropriate adaptation and mitigation strategies
- Complete a trade-off analysis (WTR 13-01).

Figure 4-1. The Five Tracks and Integrated Collaborative Process of the Work Plan for the Great Salt Lake Basin Integrated Plan Roadmap



Scenario Planning Process

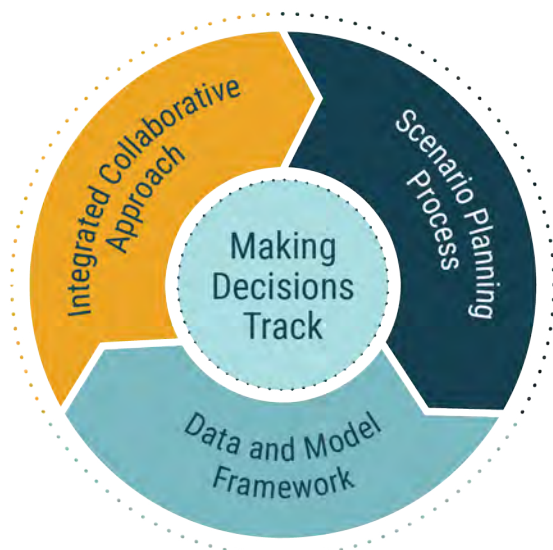
The process involves identifying the key forces or drivers that will likely influence future water supply and water demand, ranking of the driving forces as to their relative influence and uncertainty, and using the most influential and uncertain driving forces to identify various themes and storylines (narrative descriptions of scenarios) that describe how water conditions (water supply and water demand) may evolve in the future. The water conditions of the various scenarios are then quantified and used to assess future system reliability and risks and then assess the performance of options and strategies.

The following sections summarize the recommended approach to develop each track in support of the GSLBIP.

Decision-Making

Tasks in this track serve as the core of the technical approach and will inform the decisions that must be made today (2023), tomorrow (2024 through 2026) and beyond (2027+). As such, development of these tasks is the top priority for the GSLBIP. Tasks will be facilitated by the integrated collaborative process and incorporate a scenario planning process and a new model framework and database (Figure 4-2).

Figure 4-2. Three Components of the Making Decisions Track of the Work Plan



Integrated Collaborative Process

The integrated collaborative process described in Section 3 will be central to developing the GSLBIP.

Scenario Planning Process— A Strategy for Coping with Uncertainty

The water resource management decisions we must make must consider the future amount of water that is available and required in GSL’s watershed over the next 50 years. The future of water is highly uncertain, dependent upon a complex interplay between natural and human systems, and driven by climatic, demographic, economic, social, institutional, political, and technological factors. The precise trajectory of this interplay over time, and the resulting state of the physical system over time, are uncertain and

Figure 4-3. General Steps Involved in the Scenario Planning Process



cannot be adequately represented by a single view of the future or even consideration of anticipated “good,” “satisfactory,” and “poor” conditions. The range of uncertainty in the factors that influence future water supply and water demand is simply too broad.

An integrated collaborative framework using a scenario planning process will best position Utah to develop an actionable GSLBIP for the future.

A scenario planning process (Figure 4-3) will be implemented to consider the broad uncertainty and vast range of future possibilities and portray the broad range of plausible futures in a manageable number of scenarios. Scenario approaches have been widely applied in water planning and management, from global to regional scales, although specific methodologies have varied considerably.^{2, 7, 10, 21, 33, 48} A scenario planning approach allows for the identification and consideration of risks and uncertainties and also how different combinations of strategies may mitigate those risks and uncertainties.

Scenarios are alternative views of how the future might unfold; they are not predictions or forecasts of the future. A set of well-constructed scenarios represents a range of plausible futures that assists in the assessment of future risks and the development of mitigation and adaptation options and strategies.

Figure 4 4. Conceptual Representation of a System's Uncertain Future (also known as the Cone of Uncertainty)
Source: Adapted from Timpe and Scheepers, 2003.

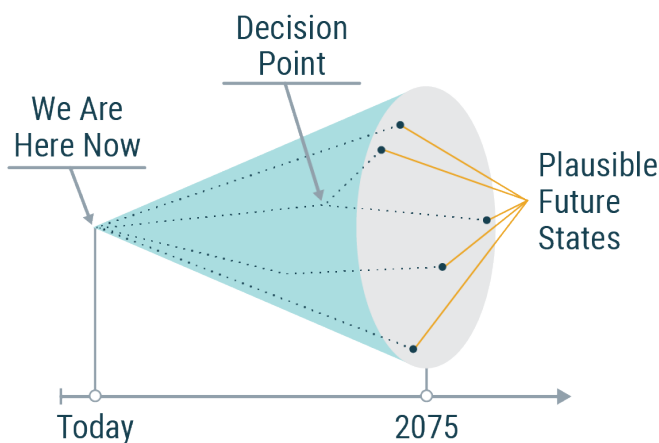


Figure 4-4³¹ illustrates this concept. We have a present understanding of the current state of the GSL watershed, represented as “today”. Future uncertainty increases with time; represented by the funnel. The integrated collaborative approach will be used to identify and define a range of plausible future states or scenarios at a future time; represented by 2075. The suite of scenarios used in the planning effort should be sufficiently broad to span the plausible range. This approach will facilitate the identification of critical signposts (decision points) when a water supply shortage might be expected within the study planning horizon, the potential magnitude of the shortage and how much inflow may be required to maintain different water levels in GSL. This will help the State of Utah respond to the key planning question of when and how much of a potential water shortage the watershed might experience and evaluate and select the best combination of actions to implement to ensure a resilient water supply.

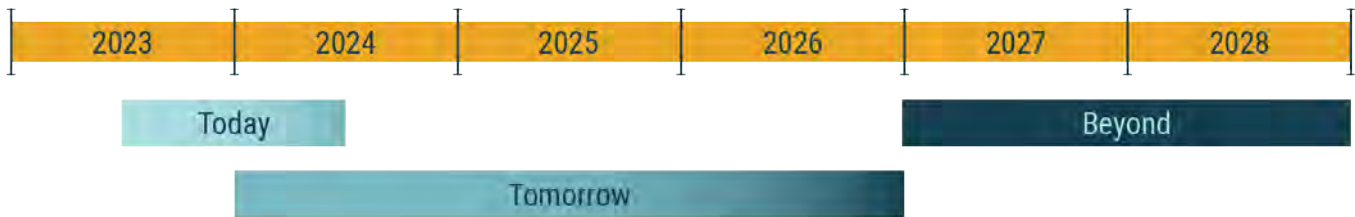
Data and Model Framework

Central to the GSLBIP technical approach will be development of a framework of data and models that will enable the scenario planning process and accomplish the GSLBIP’s objectives.⁴⁶ The model framework must inform our decisions today, tomorrow, and beyond (Figure 4-5). Planning is not a finite event; it is and will be a continual process we must be prepared for.

The GSLBIP must enable an adaptive approach toward stakeholders making better and better decisions into the future.

Decision Horizons for the Great Salt Lake Basin Integrated Plan

Figure 4-5. Decision Horizons for the Great Salt Lake Basin Integrated Plan



Today (2023)

Informed decisions can be made with the models and data we have today. The State of Utah has invested significantly in studying how to manage water resources in GSL^{5, 19} and throughout its watershed,^{39, 40, 41, 42, 43, 44} how changes in climate and throughout the watershed can influence GSL,¹⁰ and developed recommendations to preserve flows for GSL.^{11, 26} Data, tools, and recommendations are available for decisions today. In most cases, however, existing analyses do not consider the watershed as a whole or downstream impacts upon GSL, nor adequately capture or enable an evaluation of future possibilities.

Tomorrow (2024 through 2026)

H.B. 429 prescribes that the GSLBIP must be completed by November 30, 2026.²⁸ As illustrated on Figures 4-6 and 4-7, data and tools must be available in December 2024 to identify and locate the water gaps in the GSL watershed and begin assessing and validating challenges and opportunities. Additional data and tools must be available in 2025 to enable stakeholders from throughout the watershed to evaluate options and develop and evaluate strategies and tactics to adapt to and mitigate potential water shortages.

Figure 4-6. Model Development Schedule



Trade-off analyses must begin by August 2025 to enable final recommendations for actions in August 2026. The *Scoping Plan for the Water Resources Planning Tool* (provided in Appendix H) describes the recommended modeling and database approach for the GSLBIP.

And Beyond (2027+)

The central water resources database and model data and algorithms developed as part of the GSLBIP will eventually be integrated into a coupled surface and groundwater model that can be used to inform future river basin implementation plans, water right distribution models, and local water-planning decisions. A strategy to guide development of this model should be prepared as part of the GSLBIP.

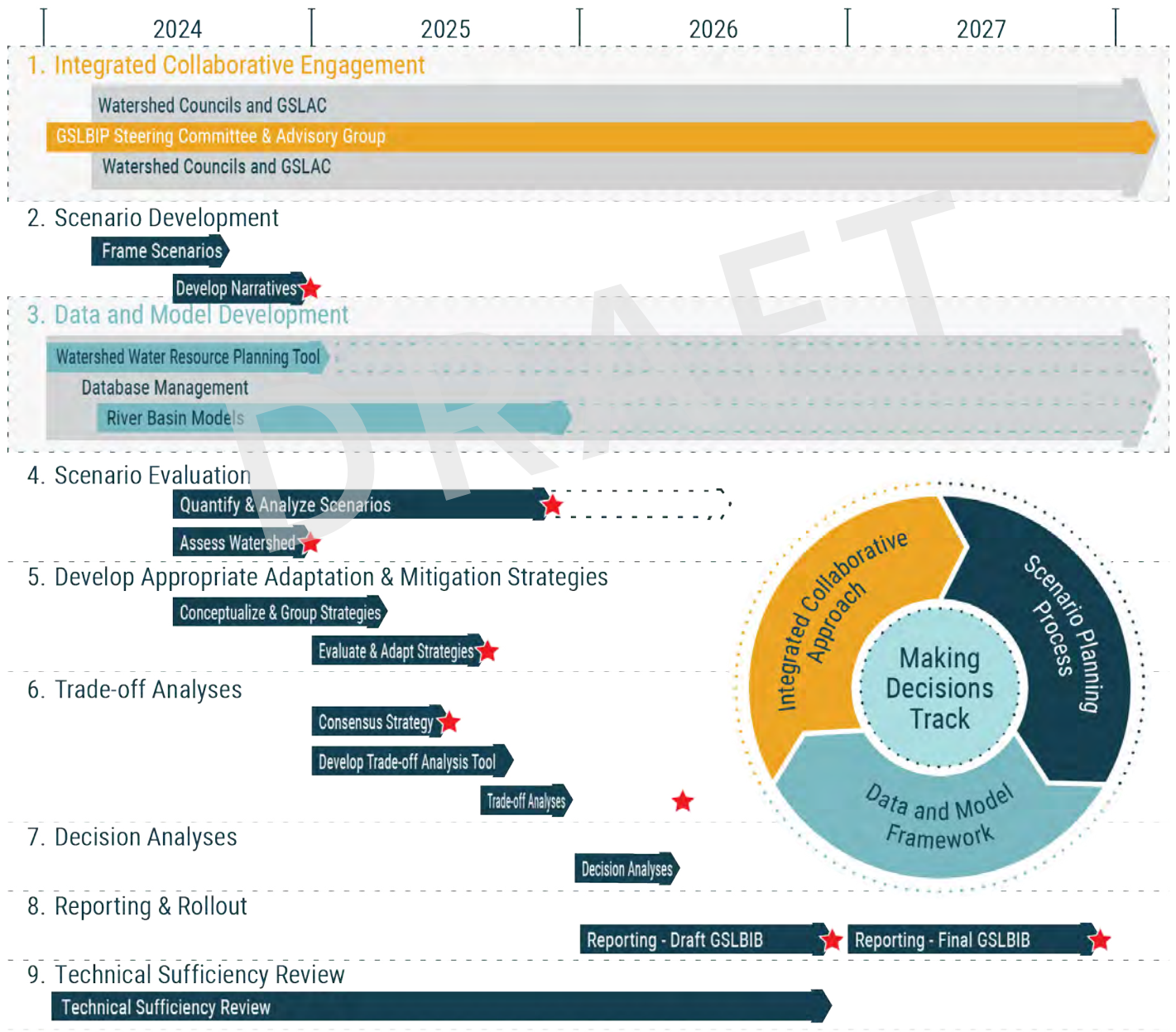
Technical Sufficiency Review

An important GSLBIP objective will be to ensure that technical information, data, models, analyses, and conclusions resulting from GSLBIP development are technically supported and defensible. A *Technical Sufficiency Review Plan Technical Memorandum* has been prepared to outline the approach and methods to be used for reviewing this information and is provided in Appendix F.

Key Tasks for Decision-Making

The core effort of leading and delivering the required tasks for decision-making will be completed by WRe and Reclamation. The GSLBIP budget for this track is \$4,500,000. A detailed description of task goals, activities, deliverables, and assumptions is in Appendix I.

Figure 4-7. Decision-Making Tasks and Schedule for the Work Plan for the Great Salt Lake Basin Integrated Plan



STRATEGIC RESEARCH

Numerous gaps could and should be investigated. The proposed projects in the strategic research track focus upon informing the decisions to be made by 2026. They will fill an important role of investigating essential questions and providing information that can make a significant improvement in confidence in the long-term decisions to be made as part of the GSLBIP. However, they cannot be completed alone. They must be integrated with results from numerous efforts already being implemented by others (Figure 4-8). A detailed fact sheet for each GSLBIP-funded strategic research study is found in Appendix J. Note that recommended funding amounts are subject to change.

Available Data and Tools

For decisions today

- Great Salt Lake Policy Assessment³ based upon WRe's 2023 GSL Water Budget Model
- GSL Integrated Model¹⁰ based upon WRe's 2017 Water Budget Model data

For decision tomorrow

- WRe's 2023 Water Budget Model
- WRe's 2023 climate and natural flow projections for the GSL watershed through the year 2100
- A rebuilt GSL Integrated Model based upon updated information that enables planning efforts by December 2024
- New river basin models developed with stakeholders to represent the same water resources data as the GSL Integrated Model and also incorporate detailed local operations, enable connection, and develop a shared understanding and validation of strategies by December 2025
- New, centralized water resources database with climate, water supply, water demand, and land use data developed during the GSLBIP
- New, long-term strategy to develop a coupled surface and groundwater model

SOLUTIONS DEVELOPMENT

Numerous options and strategies have been recommended in past studies, however, very few have been advanced to evaluate their feasibility, costs, and how they might be implemented. The proposed studies in the solutions development track focus on the most likely solutions, investigate their feasibility and potential costs, and provide input into the evaluation to be completed in 2024 and 2025 and long-term decisions to be made in 2026. However, they cannot be completed alone. They must be integrated with results from numerous efforts already being implemented by others (Figure 4-9). A detailed fact sheet for each GSLBIP-funded solutions development studies is found in Appendix J.. Note that recommended funding amounts are subject to change.

CAPACITY DEVELOPMENT

A number of programs and studies were identified in the gap analyses that work to improve the ability of individuals, organizations, and communities to consider, anticipate, monitor, and make decisions as part of the GSLBIP and beyond. Planning and implementation of these efforts and the maximum value from their investments may not be realized until after 2027. However, the proposed study in the capacity development track will work in concert with and will help inform the GSLBIP even as it builds a strong foundation and steers the trajectory for implementation beyond 2027. However, it cannot be completed alone. It must be integrated with results from numerous efforts already being implemented by others (Figure 4-10). A detailed fact sheet for the GSLBIP-funded capacity development study is found in Appendix J. Note that recommended funding amounts are subject to change.

Figure 4-8. Targeted Strategic Research Studies

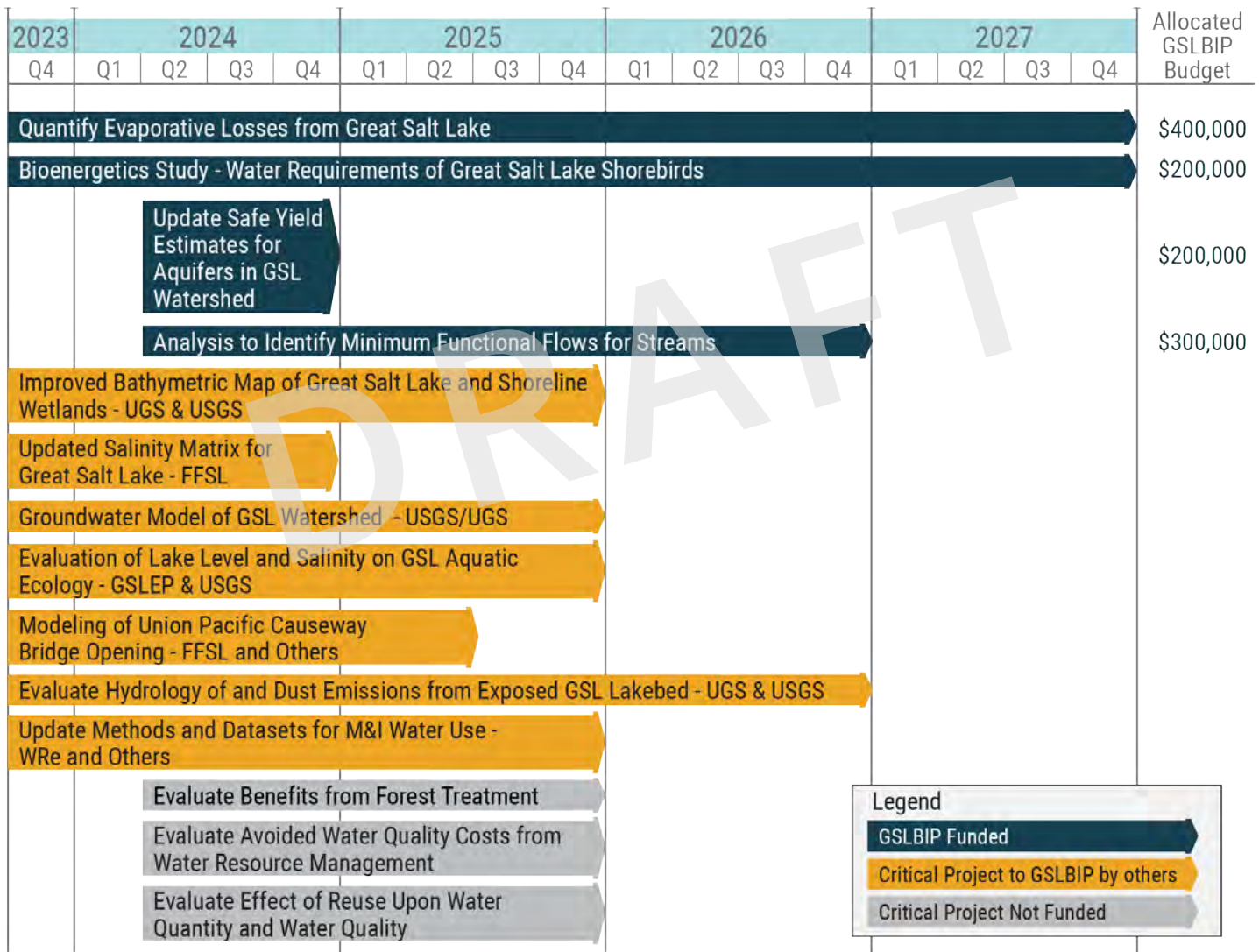


Figure 4-9. Targeted Studies for Solutions Development

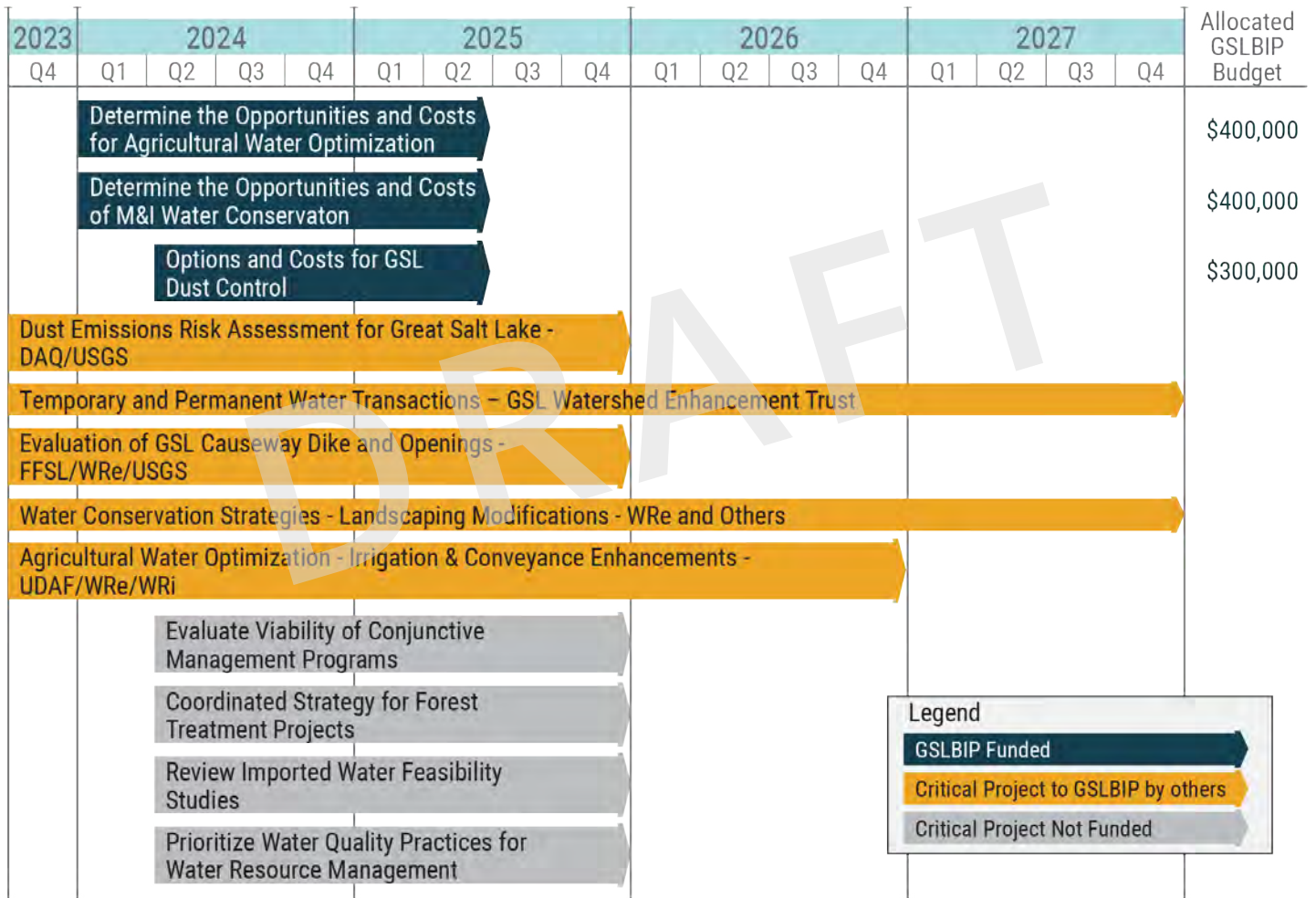
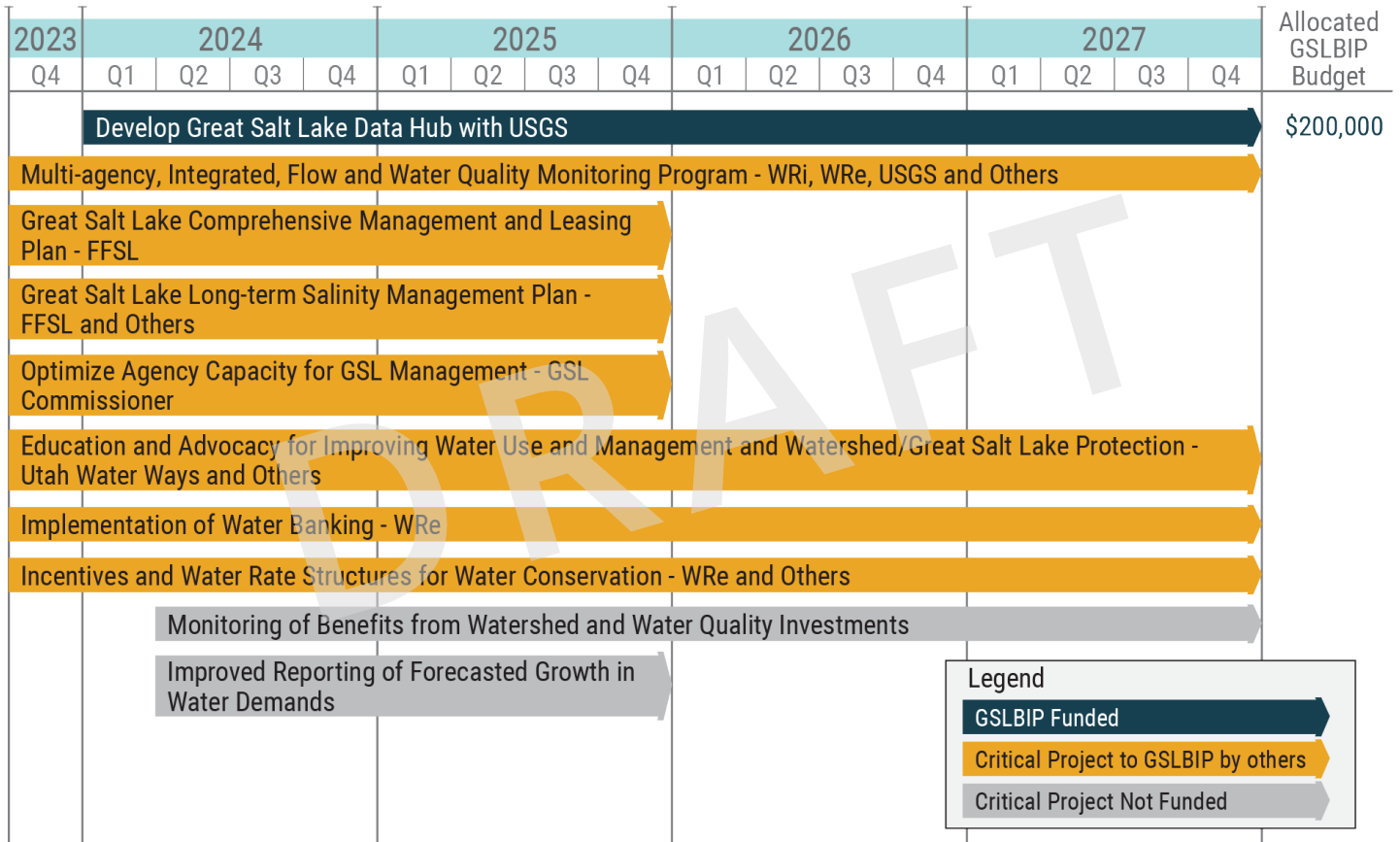


Figure 4-10. Prioritized Studies for Capacity Development



POLICY OPPORTUNITIES

A number of opportunities were identified to enhance existing policy to improve process, inform better decisions and enable better outcomes. These opportunities are summarized in Appendix D and may be considered during and after GSLBIP development.

SUMMARY

The *Gap Analyses Report* (Appendix G) identified an ambitious list of over 130 potential opportunities to fill gaps in our collective understanding of GSL and its watershed. During Work Plan development, the Project Team, GSLBIP Steering Committee and GSLBIP 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 to accomplishing the GSLBIP goals (Table 4-1 and Figure 4-11). These studies were targeted based upon their capacity to 1) inform decisions to be made by 2026, 2) build a foundation for the future, and 3) be completed within the prescribed timeline and budget for the GSLBIP. Further investment in additional efforts would add additional value and accelerate implementation of solutions.

Table 4-1. Cost Summary for Great Salt Lake Basin Integrated Plan Projects

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

^a Estimated GSLBIP funding contribution does not include external funding amount. Appendix J, *Project Fact Sheets*, provide more information on matching funds from project partners.

^b Appendix H, *Scoping Plan for the Water Resources Planning Tool*, provides additional schedule details

Figure 4-11. Studies Roadmap of the Work Plan for the Great Salt Lake Basin Integrated Plan

