B PLANNING APPROACH

INTRODUCTION

A plan for water management in the Great Salt Lake Basin is needed to articulate a view of the future that will enable coordinated decision-making and action to benefit water users, including Great Salt Lake. The GSLBIP Work Plan lays out the goal and objectives of the plan; essential strategies to achieve them; and the process for collaboration and decision making. This portion of the Work Plan details the planning approach that will be followed to accomplish those goals, strategies and collaboration. The development of the water management plan will utilize the information derived from the modeling process, discussed in the next section.

GOAL AND OBJECTIVES

The goal is to produce a plan which will, when implemented, ensure a resilient water system for Great Salt Lake and all water users in the basin. The plan will be the initial iteration of a planning process that will continue into the future.

Upon completion of the plan, interested and affected parties will be able to:

- Communicate the key water management issues to partners
- Quantify, qualify and display the current status of addressing key water management interests
- Assess how key water resource interests may be affected in the future
- Evaluate how alternative water demands, policies, operations and hydraulic infrastructure may impact key water resource interests
- Evaluate the robustness of those alternatives under plausible future climate conditions
- Provide an assessment of the trade-offs between the tested alternatives
- Select and combine the simulated alternatives into an implementable plan
- Build relationships with communities as the connectivity between water and community resilience is illustrated throughout the planning process

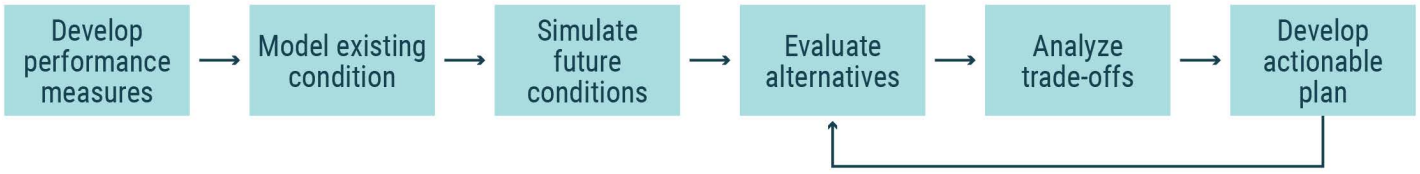
REPORTING

Annual briefs on project status, work completed and future needs will be drafted and presented to the advisory group and steering committee. Those reports will be written with Reclamation and will become initial drafts of the chapters in the final report. A draft outline for the plan will be created at the inception of the planning process with Reclamation and will continue to evolve and be completed as planning continues. Reclamation will draft the report to meet requirements of the Basin Study Grant. The division will add chapters, appendices and a summary once the final strategy is selected (Planning Component 6). The modeling report, discussed in the following section, will be appended to the general report. Throughout the project, the Technical Sufficiency Review, required by the USBR, will be conducted and reported on as outlined in Appendix F.

MAIN PLANNING COMPONENTS

1. **Develop system performance measures**
2. **Model the existing condition**
3. **Simulate future conditions**
4. **Evaluate alternatives**
5. **Analyze trade-offs**
6. **Develop actionable plan**

Figure B-1. Main planning components of the GSLBIP



1. DEVELOP PERFORMANCE MEASURES

Objective

Work closely with team members and partners to develop and share the best ways to measure their interest, evaluate the current water management system's effectiveness, and compare the costs and benefits of different planning options.

Description

The Project Team needs to measure and understand how the water management system behaves in different situations to meet the needs of water users and other project partners. This involves translating data into useful information for decision-making. Partner input and collaboration with the modeling team are crucial for this task. The specific performance measures will be included to evaluate each simulation scenario. These data are essential for trade-off analysis, which helps in selecting the best plan alternatives.

Tasks

- Present the concept of performance measures and the critical role they play in the trade-offs analysis and final development of the plan to project participants
- Outreach to the water user groups to inform them about the GSLBIP planning process and performance measures
- Participants develop draft quantitative, qualitative and graphical performance measures
- Modeling team designs a software tool to compute and display performance measures using dummy data until formal model outputs are available
- Performance measures and display tool are improved throughout the planning process

Partner Interactions

The project team will work with partners, including water users, through watershed council workshops and with the advisory group and steering committee to develop the suite of system performance measures.

Deliverable

A computer application that provides graphical, statistical and qualitative summaries from scenario simulations for the aspects of the water resource system that are of interest to partners will be created. This tool would be linked into the integrated model framework to organize and display results.

2. MODEL EXISTING CONDITION

Objective

Establish baseline performance measures by using the model to simulate an agreed upon representation of current conditions using the historical hydrology.

Description

Set the model to represent current water user demands (constant or conditional diversions and depletions), evapotranspiration rates, system configuration, hydraulic infrastructures and reservoir operations. Force the model using the historical hydrologic sequence for a time span (e.g.1990 - 2023). Generate performance measures using the tool developed in Component 1. Going forward these performance measures will represent the baseline condition to which all scenario performance measures will be compared.

Tasks

- Modeling team configures model to simulate existing basin conditions using the historical hydrologic sequence
- Modeling team derives the historical hydrologic sequence from observed time series with spatial and temporal gaps filled using the VIC model and historical climate data
- Outputs of the existing conditions model are post-processed into the performance measures
- Results are documented and presented to partners
- Feedback on the model results are received and the necessary adjustments are made to the model and performance measures

Partner Interactions

The technical team sets the model to simulate an existing condition. Model outputs are shared through the watershed council, water users workshops, advisory group and steering committee meetings. Once finalized, a report is drafted to document the existing conditions model. The resulting performance measures will be shared with partners, then be verified or adjusted as needed to best reflect partner interests. The performance measures will be documented in the report.

Deliverable

Validated existing conditions model with baseline performance measures. A report on the model and results.

3. SIMULATE FUTURE CONDITIONS

Objective

Develop a dataset of plausible projections of future weather (temperature, precipitation–including snowfall and snow accumulation, wind, relative humidity, solar radiation) and hydrology (soil moisture, watershed evaporation, streamflow) across the basin. This will enable simulation of the water resource system performance when using the best available scientifically derived and defensible representations of future climate conditions. These plausible hydrology and climate data sets are used to test the robustness and resiliency of proposed management alternatives.

Description

This task provides key input data to the GSLIM, river basin, groundwater and Water Demand models.

Tasks

- Engage partners to identify climate scenarios they wish to evaluate
- Process existing statistical downscaling climate data produced with MACA and CMIP5
- Apply statistical downscaling to produce 4 km grids of future climate over Great Salt Lake Basin using the MACA method applied to all CMIP6 simulations. Temporal disaggregation will be used. Apply dynamical downscaling using the WRF model. Select three cases to span the full range of CMIP6 results:
- Average of future projections
- Hottest and driest
- Coolest and wettest results
- Compile climate data and model input data and review for completeness and accuracy
- Use the climate data within the calibrated VIC model to derive inflow hydrographs at all the supply points in the RiverWare and GSLIM models.

Partner Interactions

Reclamation's Technical Service Center, the University of Utah and the division coordinate participant workshops and information sessions concerning scenario development, climate modeling and how they will be utilized in the planning process. The outcome of these workshops is direction on the type of climate scenarios, both plausible and possible, that partners would like to use to test the robustness and resiliency of the current system and of management alternatives.

The University of Utah completes the technical tasks to gather the Global Climate Model output, downscale, post-process then transfer to the Technical Service Center. The Technical Service Center runs the VIC model using the climate data set to produce hydrologic input to the RiverWare and groundwater models. The climate data is transferred from the Technical Service Center to the modeling database so that the data can be used as input to the GSLIM and Water Demand models.

Deliverable

Climate and hydrology datasets that represent plausible and possible future climate conditions which water users and scientists would like to use to test management alternatives and strategies.

4. EVALUATE ALTERNATIVES

Objective

Alter the existing conditions model with baseline hydrology according to demand, policy, operations and infrastructure scenarios identified, vetted and selected by partners. Evaluate system performance of each alternative using the performance measures.

Description

Many potentially feasible management (demand, policy, infrastructure) options have been identified in previous studies, committees and ad hoc efforts. This will include actions identified in the 2024 Great Salt Lake Strategic Plan. That list will be compiled, added to and then refined through engagement with partners. Other planning partners will be surveyed as well, including the Governor's Office of Planning and Budget, Office of the Great Salt Lake Commissioner and general public.

The initial list of management alternatives will pass through a screening process by removing ones that cannot be represented in the model or that are not supported by a significant number of partners or are untenable to water users and other criteria to be determined. Each alternative on the refined list will be independently incorporated into the existing conditions model and performance measures generated for each.

Tasks

- Compile list of existing management alternatives
- Survey and workshop with partners to identify additional management alternatives not yet considered or particular to their systems
- Refine the list through an initial screening process
- Simulate each alternative using the baseline hydrology and existing conditions model
- Generate performance measures for each alternative and create a means to communicate them

Partner Interactions

The project team will compile the initial list of management alternatives. All participant groups will be surveyed and invited to participate in workshops to enhance and refine the list. Participants work with the project team to represent the management alternatives within the existing conditions model.

Deliverable

Summary report of a range of management alternatives selected and vetted by partners along with the accompanying performance measures for each alternative evaluated using the baseline hydrology.

5. ANALYZE TRADE-OFFS

Objective

Assess how the water resource system would perform under each of the water management alternatives under a wide range of possible future conditions.

Description

Once the system performance under the alternative management scenarios has been assessed using the baseline climate and hydrologic conditions, they will be stress tested by simulating them under a range of possible, unobserved climate conditions. The climate scenarios used for testing the refined list of management alternatives will have been selected jointly by the project team and partners.

Tasks

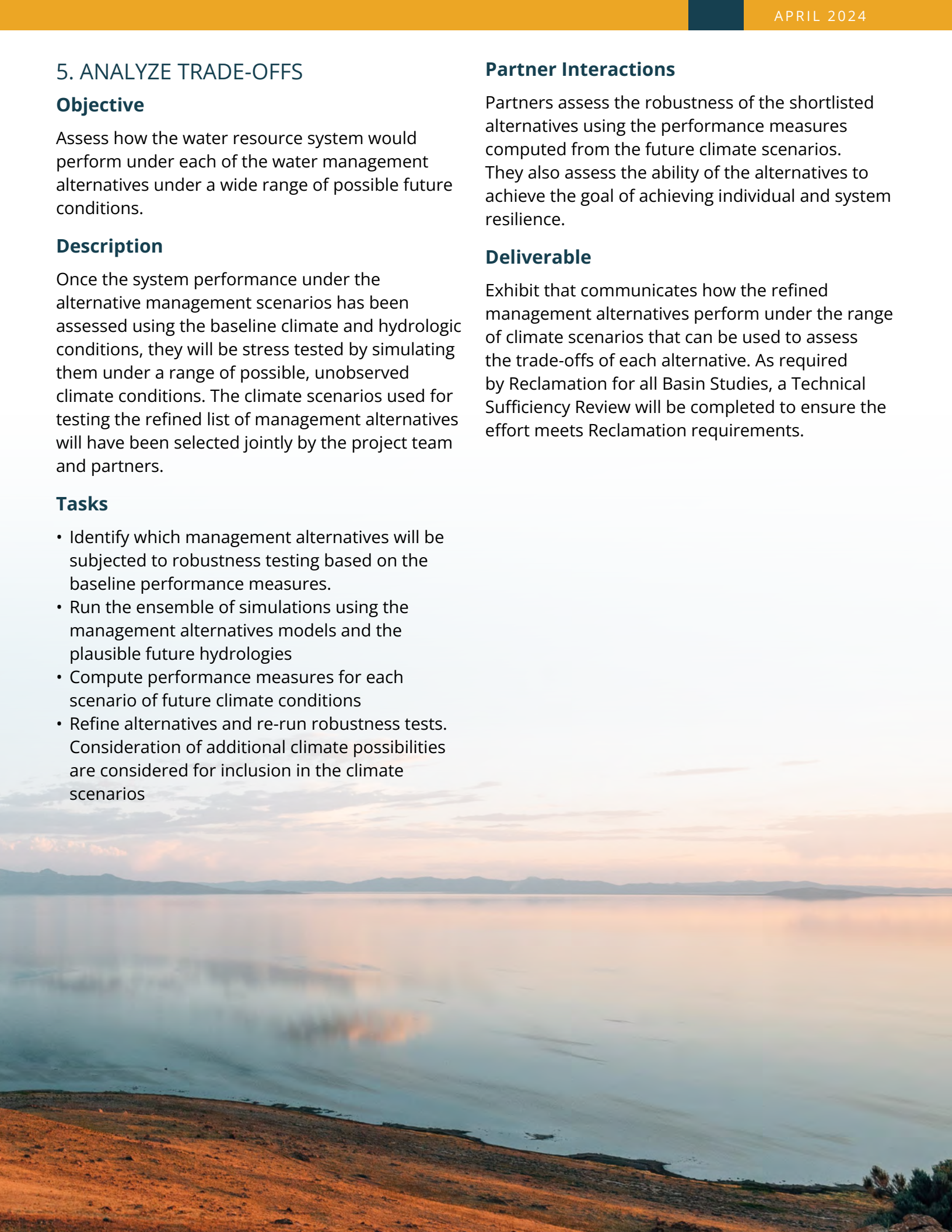
- Identify which management alternatives will be subjected to robustness testing based on the baseline performance measures.
- Run the ensemble of simulations using the management alternatives models and the plausible future hydrologies
- Compute performance measures for each scenario of future climate conditions
- Refine alternatives and re-run robustness tests. Consideration of additional climate possibilities are considered for inclusion in the climate scenarios

Partner Interactions

Partners assess the robustness of the shortlisted alternatives using the performance measures computed from the future climate scenarios. They also assess the ability of the alternatives to achieve the goal of achieving individual and system resilience.

Deliverable

Exhibit that communicates how the refined management alternatives perform under the range of climate scenarios that can be used to assess the trade-offs of each alternative. As required by Reclamation for all Basin Studies, a Technical Sufficiency Review will be completed to ensure the effort meets Reclamation requirements.



6. DEVELOP ACTIONABLE PLAN

Objective

Formulate the suite of alternatives (actionable water resource plan) acceptable to water users and non-water right holding interests in the basin through a partner selection process.

Description

The final planning component involves significant communication, collaboration and involvement between water users, project team and partners to select a plan for collectively managing water resources in the Great Salt Lake Basin. Using the tested and narrowed list of management alternatives, different suites of alternatives are selected and tested. Scenarios and performance measures can be refined as necessary. Opinions are collected from decision makers and the general public which can be incorporated into the facilitation process that the project team and water users employ to select a final plan. The plan is adopted by water users and made a resource they can use to assure consistency with their individual water resource plans.

Tasks

- Identify which management alternatives will be combined for testing their interactions based on the robustness tests
- Make any final refinements deemed necessary to the performance measures, alternatives or climate scenarios
- Select different suites of alternatives with varying trade-offs
- Identify how those water users who may be impacted by the implementation of the alternatives could be compensated
- Host workshops to present options for alternative suites to partners including water users, watershed councils, and the advisory group and steering committee
- Survey the general public and specific population sectors to obtain data on public sentiment of the alternatives
- Facilitate final workshops with partners, including water users, watershed councils, and the advisory group and steering committee to recommend a plan to the division and Reclamation, which includes a specific suite of alternatives, phased implementation of that suite of alternatives and compensations for those negatively affected by the suite of alternatives

Partner Interaction

Using the further refined list of alternatives as well as input from partners, the technical team will test different combinations of alternatives. They work with the project team to make any refinements to the analysis. Then water users select the suite of alternatives and work with other partners to determine the best approach for implementation and compensation.

Deliverable

An actionable plan adopted by water users for collective water resource management in the basin that balances water supply and demand while avoiding the deterioration of agriculture, industry, municipalities and ecosystems. The plan describes the current water management system, water users, partner interests, policies, infrastructure and measures of existing performance. It describes the existing system robustness by predicting what performance could be under possible and plausible future climate and demand scenarios.

Importantly, the plan presents a partner recommended suite of management (demand, policy and infrastructure) alternatives to the current management and how that suite of alternatives would have changed the existing system performance and conditions had it been in effect throughout recent history. Furthermore, the plan reports how robust the alternatives are and how they impact system resiliency. The plan recommends alternative phasing and compensation mechanisms to improve conditions for all water users, including Great Salt Lake.