C MODELING APPROACH

INTRODUCTION

A model of the Great Salt Lake Basin's hydrology and management system is needed to support the GSLBIP. Appendix H of the GSLBIP Work Plan recommends that two modeling approaches, near-term and mid-term, be completed simultaneously, and a long-term approach be completed after the mid-term is finished. Upon further consideration, the division decided to forgo the near-term approach and instead focus all efforts on the mid-term approach while planning for long term future improvements. This document describes the mid-term modeling approach and details how to implement it.

GOAL AND OBJECTIVES

The main purpose of the model is to support planning and the ultimate adoption of a basin-wide water resource strategy. The model will support the planning objectives by allowing the planning team to explore impacts on water users and Great Salt Lake that result from scenarios of changes in climate, water supply, water demand, hydrosystem policies and hydraulic infrastructure. It is important to note that existing water quality data and tools will be incorporated as appropriate and available, particularly for Great Salt Lake, Utah Lake and Bear Lake. This initial creation of the basin-wide model will not include the development of new water quality data. As more water quality data, tools and research become available after the creation of the initial model development it can be added to the model.

The general goal of the model is to help water managers and policymakers approximate the amount of water that can be used while considering the impacts to the lake and tradeoffs.

A secondary goal is to identify potential water management policies and infrastructure that could benefit the lake and other water users. These objectives support the goal of the GSLBIP to build a resilient water resource system.

Upon completion (2025), the mid-term modeling approach will:

- Build trust and confidence among various partners
- Provide planning-level information at both the water user and basin scale
- Be used to establish an objective, factual basis on causes and effects in the basin
- Quantify the timing, frequency and magnitude of water required to sustain essential functions of the lake under various scenarios of water availability
- Identify the level of water conservation required to sustain essential functions of the lake
- Determine options for how water use reductions could be distributed among water users
- Evaluate different demand, policy and reservoir operation scenarios under a range of supply conditions
- Provide an objective, analytical trade-off analysis to help decision-makers balance water supply and demand and avoid deterioration of agriculture, industry and ecosystems
- Provide information to assist decision-making about how urban conservation, water reuse and agricultural efficiency improvements affect individual water users and the lake
- Leverage and combine existing models

WATER USERS AND PARTNERS IN THE MODEL DEVELOPMENT

The mid-term approach intends to represent the top water users (part of the partner groups) in the basin. A group of organizations with the greatest water rights holdings have been identified. They will be assured representation in the model and will be invited to participate in at least two workshops. Since the model represents physical water supplies and demands, there is no way to represent non-water right holder interests directly in the model. Those will be represented with water users interests by using performance measures to:

- Assure that their hydrosystem and water demands are adequately represented
- Work with the water demand models to come up with demand scenarios and other alternatives to address water resource problems

REPORTING

A final report on model development including assumptions, structure, parameters and input data will be prepared for inclusion as an appendix to the final GSLBIP report (and Basin Study report). Reports on the modeling will be provided to Reclamation as required. The report will include instructions for running and updating the model as well as recommendations for continued maintenance and development. As mentioned in the Planning Approach section above, the Technical Sufficiency Review, required by Reclamation, and pertaining to the model will be conducted and reported on as outlined in Appendix F.

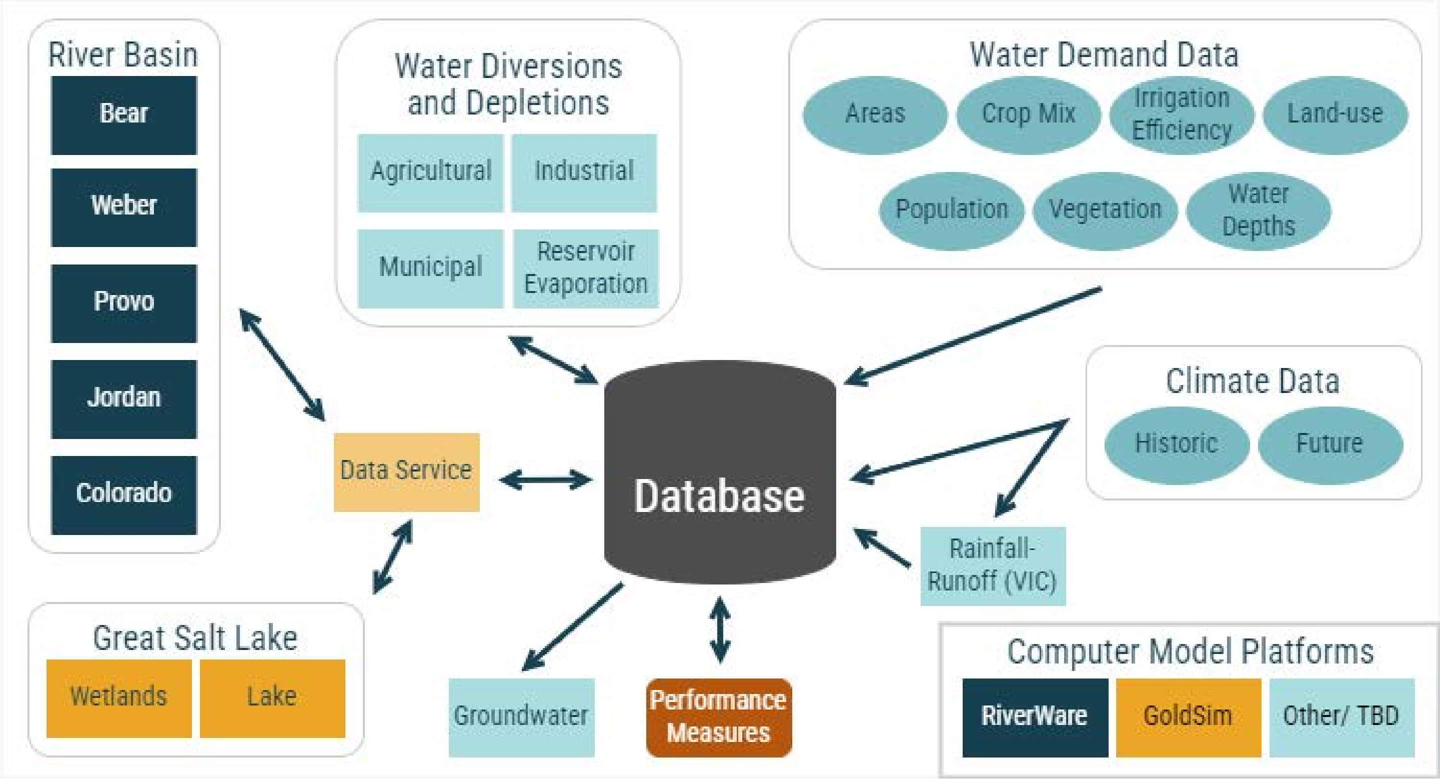
MAIN MODELING COMPONENTS

The mid-term approach will include the primary surface water and groundwater supply sources, including imports from the Colorado River. Additionally, it will represent the major hydraulic infrastructure and the policies which govern their operation. Components to be completed in the mid-term modeling approach include:

1. **Surface Water Supply:** Final calibration and application of a basin-wide rainfall-runoff model and developing future projections of climate change a part of surface water supply
2. **Surface Water System:** Updating, expanding, improving and consolidating four river basin surface water operations models into a single model
3. **Groundwater System:** Developing an empirical groundwater model using knowledge from existing models and studies
4. **Great Salt Lake and Wetland System:** Updating and improving the Great Salt Lake Integrated Management Model (GSLIM), an existing model that helps water managers understand how Great Salt Lake water levels and salinity are influenced by potential changes in inflow and withdrawals from the lake
5. **Water Demand:** Enhancing municipal, industrial, agricultural and environmental water demand models
6. **Database Management and Data Integration:** Designing a database(s) and data access tools to centralize information sharing between models and to loosely integrate models in disparate platforms
7. **Data Visualization and Mapping:** Developing data visualization tools to communicate modeling results

Detailed tasks to complete each component are specified below.

Figure C-1. Modeling components of the GSLBIP



MODELING TEAMS

Each component is completed by a technical team or sub-team. Each team has a leader, working members and advisory members. Working members complete tasks such as data gathering and technical modeling. Where appropriate and feasible, private contractors with unique sub-basin experience will be utilized. Advisory members work with technical members to derive the overall approach and to assure that the model is functioning as intended to adequately represent water users, operations or administration of the water resource system. The advisory group and steering committee are represented through the recommendation of technical team members.

Initially, the technical team will meet weekly as the approach is being determined. A schedule will then be decided and to allow for completion of the technical tasks as needed to adhere to the planning schedule. Method selection, completed tasks, assigned tasks and communication needs will be documented in meeting minutes, then distributed to team members. Quarterly meetings are held with advisory technical team members (or as frequently as needed) for model review and verification. Meetings are organized with water users as needed, but at least two workshops are held with all water users through the modeling process; likely this will be done through the watershed councils. Every two weeks, progress briefs are submitted to the project team manager and project team. Monthly briefs and oral reports are provided to the advisory group and steering committee. Presentations and work sessions are anticipated at every watershed council meeting.

1. SURFACE WATER SUPPLY

Objective

Develop and calibrate a rainfall-runoff model for the entire Great Salt Lake Basin that simulates weather (temperature, precipitation, wind, relative humidity, solar radiation) and hydrology (soil moisture, watershed evaporation, streamflow).

Description

This task develops a rainfall-runoff model which provides key input data to the GSLIM, River Basin, Groundwater and Water Demand models. The variable infiltration capacity (VIC) model is a large-scale, semi-distributed hydrologic model and is commonly coupled to GCMs or used for hydrologic studies, such as in the Colorado River Basin. The VIC model is a grid-based macroscale hydrologic model that focuses on climate change impact assessment. The division has nearly completed development and calibration of a VIC model for the mountainous regions of the basin. The VIC model will provide consistent hydrologic data across the basin. The primary application of VIC output will be a natural flow data set which provides natural flow at key inflow locations in the river basin model.

Tasks

- Review and evaluate the hydrologic model
- Update the hydrologic model and revise as needed, such as to include the portion of the Colorado River Basin that yields waters imported to the Great Salt Lake Basin or to cover the MODFLOW model boundary
- Run hydrologic simulations to produce historic natural flow and climate scenario hydrologies
- Draft chapter on hydrologic model and model simulations
- Provide output data for storage in the database
- Provide simulation data and calibration results for validation by a review team

Technical Team Members

Results of the hydrologic modeling for historic conditions will be presented to the steering committee and advisory group and watershed councils for review and validation.

- Reclamation: Maribeth Kniffin
- University of Utah: Court Strong

Special Considerations

This task relies upon the expertise of Reclamation’s Technical Service Center and the University of Utah. Division of tasks and communication between the two will be coordinated by them. The current version of the VIC model and related data are transferred from the division to the Technical Service Center. Data is transferred between the university and the Technical Service Center. Lastly, weather and hydrologic data are transferred from the Technical Service Center to the division. Agreements for this task must be approved of and signed.

Deliverable

A calibrated VIC model capable of predicting natural flow of the streamflow network throughout the Great Salt Lake Basin will be created along with associated documentation. Historical hydrological data and regional downscaled future projections will be shared with the Division of Water Resources. These data are the primary inputs to the river operations model (RiverWare).

2. SURFACE WATER SYSTEM

Description

Current models exist for each individual river basin. RiverWare models will be prepared to align with the others in simulation period and timestep. The Weber River model will be ported into the Utah Lake model and connected via the Weber-Provo Canal. Then the Jordan River model will be converted from GoldSim into the combined RiverWare to connect with the Utah Lake system. Lastly, the Bear RiverWare model will be ported in the combined model. Rules will be written to connect operations between Weber and Utah Lake models. A simple model representing water availability and imports from the Colorado River basin will be included. It is yet to be determined whether the groundwater system will be represented explicitly in the RiverWare model. Input data management interfaces will be consolidated and linked to a single datasource (Excel Workbook, which is the current input/output data storage for all RiverWare models, until a more advanced option is available) and a single output data management interface created. Each model network will need to represent water users by basin. Generally, all models need some level of improvements to the following: accounting, revised rules, inclusion of new users, important streams, water user return flows and key hydraulic infrastructure.

Tasks

Bear River Model

- Update the model to run through water year 2023
- Add the Logan, Cub, Blacksmith Fork, Little Bear and Malad Rivers
- Convert to monthly timestep
- Improve rules that determine Bear Lake release
- Change forecast rules
- Include accounting for storage and contract limits
- Include U.S. Fish and Wildlife Service as water user (depending on how they are handled in the wetland model)
- Include hydropower methods
- Add return flows
- Review by Idaho Department of Water Resources, PacifiCorp, Wyoming State Engineer's Office and other water users

Weber River Model

- Update the model to run through water year 2023
- Meet with the Division of Water Rights and Provo River Water Users Association to model operation of the Weber-Provo Canal
- Expand model to represent Davis County streams and corridor inflows to Farmington Bay
- Include accounting as needed
- Add return flows
- Include M&I demands as needed
- Include Division of Wildlife Resources as water users (wildlife management areas) and other users downstream of Plain City (depending on how they are handled in the wetland model)
- Explicitly represent water users (currently many users are aggregated)
- Consider improvements to ruleset
- Include discharges from wastewater treatment plants

Jordan River Model

- Update the model to run through water year 2023
- Convert objects, links, parameters and methods into RiverWare
- Include features and system representation from newer versions of the GoldSim models as appropriate (e.g. Salt Lake City's model)
- Include streams, reservoirs and water users who are not included in the current model
- Explicitly represent all major streams
- Include accounting as needed
- Include Division of Wildlife Resources as water users (wildlife management areas) and other users downstream of the bifurcation of the Surplus Canal and Jordan River (depending on how they are handled in the wetland model)

Provo River/Utah Lake Model (Colorado River)

- Update the model to run through water year 2023
- Meet with the Division of Water Rights and Provo River Water Users Association to model operation of the Weber-Provo Canal
- Include outflows from wastewater treatment plants
- Add Salt Creek and Mona Reservoir
- Add water users and infrastructure to each tributary as needed
- Determine the best approach to simulate water supply availability, imports from the Colorado River Basin and impacts to that basin
- Link outflow from Utah Lake and Salt Lake City aqueducts to the Jordan River model components
- Consideration for including the HSPF water quality model for Utah Lake as a post-processing tool
- Include Division of Wildlife Resources as water users given their implementation of the June Sucker Recovery Program and involvement with water rights, administered by Central Utah Water Conservancy District, for June Sucker recovery

Technical Team Members

Teams will coordinate with water users individually and through the watershed councils to identify, collect and organize the data required to improve the models. Work with them to assure that the model satisfactorily represents the water resource network, operations, and management and that the model will be able to evaluate the water management alternatives they will wish to investigate.

Bear River Model

- Division of Water Resources: Jake Serago
- PacifiCorp: Connely Baldwin
- Utah State University: Beth Neilson
- Division of Water Rights: Michael Lasswell
- Idaho Department of Water Resources: David Hokema
- Wyoming State Engineer’s Office: Mike Johnson
- Division of Water Rights: Sue Odekirk
- Division of Water Quality: Mike Allred

Weber River Model

- Division of Water Resources: Scott Mcgettigan
- Division of Wildlife Resources: Rich Hansen
- Weber Basin Water Conservancy District: Riley Olsen
- Davis-Weber Canal Company: Rick Smith
- Weber River Commissioner: Kent Wilkerson
- Division of Water Quality: Paul Burnett

Jordan River Model

- Division of Water Resources: Danyal Aziz
- Division of Water Rights: Susan Odekirk
- Division of Wildlife Resources: Dave England
- Utah Division of Water Quality: Nick von Stackelberg
- Rudy Duck Club: Justin Dolling
- Upper Jordan River Commissioner: Kyle Johnson
- Lower River Commissioner: Lane Jensen
- Metropolitan Water District of Salt Lake and Sandy: Eric Sorensen
- Jordan Valley Water Conservancy District: Jacob Young
- GoldSim: Jason Lilywhite
- Kennecott Utah Copper: Ted Balling
- Salt Lake City Department of Public Utilities: Tamara Prue

Provo River/Utah Lake Model (Colorado River)

- Central Utah Water Conservancy District: Rachel Musil
- Utah Division of Wildlife Resources: Russ Franklin
- River Commissioner: Scott Bergendorf
- Division of Water Rights: Sue Odekirk
- Division of Water Quality: Scott Daly

Special Considerations

Many technical details have yet to be determined. The best approach will be determined by the modeling teams. While each river basin has its own expert team, members from the various teams also form the basin-wide team. Alternatives that involve physical configurations or alterations to the hydraulic infrastructure will require a separate model file, whereas alternatives involving demands or policies can be simulated using the baseline model. As no surface water model of the

West Desert Watershed exists, that area is not represented in the surface water system model. The approach to simulate surface-groundwater interactions has yet to be determined. Configuration of the model for sharing and the method of model development are critical to completing this component by the deadline.

Deliverable

A single RiverWare model file representing current conditions of the major surface waters in the basin will be developed. The baseline supply will be 30-year hydrologic inflow and demands from observed data with gaps filled using the water demand models described in Component 5. This model will represent all the largest water right holders as well as all key hydraulic infrastructure and water management policies.

3. GROUNDWATER SYSTEM

Description

The approach to represent the groundwater system has not yet been determined. However, one is needed because 57% of public supply water in Utah was from groundwater withdrawals in 2015. Within the Great Salt Lake Basin, more than 30% of the municipal use and 15% of agricultural use comes from groundwater pumping. Groundwater use is anticipated to increase in the future. Groundwater may contribute a larger proportion of inflow to the lake than previously thought. For basin planning purposes, the project team needs to be able to predict the impacts on the water supply of climate and pumping on recharge, surface-groundwater interactions, and groundwater discharge to Great Salt Lake.

A method is needed that can do the following, in priority:

- Account for changes in recharge and withdrawals on streamflow and/or discharge to the lake
- Represent groundwater recharge
- Represent groundwater withdrawals
- Track groundwater storage

Tasks

- Summarize the state of knowledge, groundwater data availability, aquifer characteristics and condition of available models
- Identify options to model the groundwater system(s) in the basin
- Select an approach and document the rationale and needed assumptions
- Execute the approach

Technical Team Members

- University of Utah: Kip Solomon
- U.S. Geological Survey: Tom Marston
- Central Utah Water Conservancy District: Derek Bruton
- U.S. Geological Survey: Kyle Davis
- U.S. Geological Survey: Melissa Masbruch
- Division of Water RIghts: Keyvan Asghari
- Utah Geological Survey: Hugh Hurlow
- U.S. Geological Survey: Sam Lopez
- University of Utah: Paul Brooks

Special Considerations

There are several ways to approach this, ranging in complexity:

- Utilize existing groundwater models only
- Build a single groundwater model
- Represent the groundwater system in the surface water models
- Build a conceptual model applying knowledge from existing models and studies

Deliverable

While the exact final product is not yet determined, the outcome will be a modeling tool that allows for quantifying the groundwater budget and to simulate the budget under different demand and supply scenarios.

4. GREAT SALT LAKE AND WETLAND SYSTEM

Description

GSLIM routes surface water flow through the peripheral wetlands of Great Salt Lake as well as the water and salt balance in the lake. By linking the river operations models and groundwater with GSLIM, we will be able to evaluate how the lake responds to scenarios of changes to upstream supply, demand, infrastructure and policy. While GSLIM is usable in its current condition, several improvements can be made to the model to better represent the hydraulics and hydrodynamics of the lake and surrounding wetlands.

Tasks

- Improve causeway flow DLL (Dynamic Library Link file). Assure work by Utah State University:
  - Improves current simulation
  - Has methodology that can be used for various berm configurations
  - Verifies DLL is the correct format and language to be used in GSLIM
  - Tests DLL with GSLIM
  - Provides documentation and code
  - Improves the salinity bidirectional flow through the breach
- Improve evaporation equations. Study various evaporation methods which provide the best results with the least amount of input data
- Improve the salinity balance
  - Obtain better initial conditions for Bear River Bay and Farmington Bay salinity levels
  - Improved capability to predict the formation and extent of deep brine layer
  - Improved representation of return flows
  - Add the flushing of mineral ponds
  - Better represent the mineral company operations
- Improve the way the model reads and writes data
- Consider how the model could be modified to simulate physical changes to the lake hydraulics and effective area
- Remove the river basin module components so that GSLIM can be used with a student license
- Verify the outflow points from each managed and unmanaged area into the lake module bays
- Verify the inflow points and routing through the wetland areas
- Update the vegetation types, evaporation coefficients and spatial representation as needed
- Include open water areas and corresponding evaporation model
- Include wetland operations, dike elevations and flow throughs

Technical Team Members

Technical team members will work with pertinent water users and GSLAC to gain guidance on model purpose and intent, as well as to understand challenges, questions, policies, operations, hydrology and hydrography within the wetlands and the lake. Results of the model and model improvements will be presented to the steering committee, advisory group and GSLAC for review and validation. GSLAC will approve of the model for use in the GSLBIP.

- Division of Water Resources: Leila Ahmadi
- Division of Water Resources: Craig Miller
- Division of Wildlife Resources: Rich Hansen
- University of Utah: Bill Johnson
- Utah State University: Som Dutta
- U.S. Geological Survey: Christine Rumsey

Special Considerations

GSLIM requires precipitation and temperature input data. This data will have to be consistent with climate/supply scenarios. In its current form, GSLIM is usable as a planning tool. However, there are numerous aspects of the model that should be improved. These must be prioritized for their respective impact on planning scenarios.

Deliverable

An upgraded GSLIM model capable of representing the primary hydrologic and hydraulic characteristics of the open water and wetland systems will be created. A more flexible model that can simulate different wetland management, mineral company operations and physical lake configurations.

5. WATER DEMAND

Description

The amount of water used and consumed or depleted by human activities is the only decision variable that is entirely within human control. Yet, not all water diversions, depletions, system losses and return flows are measured. Models are used to fill in areas where measured data is not available as well as to simulate water demand under different conditions than current or historical. Demand scenarios based on selected variables such as population, consumption rate, land use, system efficiency, crop type, climate scenarios, etc. are derived from these models of municipal, industrial, agricultural and environmental models. Some version of a demand model exists for each water user type. Therefore this work is about assessing the adequacy of those models, then upgrading them as needed to meet project objectives. The purpose of these models is to provide inputs to the RiverWare operations models for determining diversion amounts.

Tasks

- Update the Division of Water Resources' Municipal Water Demand Tool
  - Determine whether a basin-wide model can be applied to all municipal water users and what methods, if any, need to be altered in the tool
  - Identify municipal water provider service area boundaries
  - Determine method to estimate outdoor demand for current conditions and future conditions
  - Determine method to estimate indoor demand for current and future conditions
  - Determine approach for quantifying system losses and system efficiencies
- Quantity and model water demand from industrial uses
  - Primarily mineral extraction ponds around the lake. These demands are represented in the GSLIM model
  - Verify dike elevations and pond areas
  - Represent basic pond operations include units and water depths
  - Refine evaporation rates
  - Refine return flow quantities, quality (salt loading) and locations
  - Assess whether any other industrial users should be accounted for in the models (e.g. sand and gravel, mining, food processing)
- Model agricultural water demand
  - Simulate major water users (those agricultural uses in the water user list)
  - Work with Utah Department of Agriculture and Food, watershed councils and water users to derive data and methods for this model
  - Quantify volumetric and temporal aspects of requested depletions and diversions
  - Utilize Water Related Land Use Map
  - Update GridET data flow to use climate scenario data in the database
  - Identify service area boundaries
  - Estimate system losses and efficiencies
  - Identify return flow points
  - Assess how to compute water demand for urban areas with secondary water
- Compute potential evaporation rates
  - Compute reservoir evaporation rates for input into the RiverWare model and possible the GSLIM model (depending on how wetland open water evaporation and Great Salt Lake evaporation are handled in GSLIM)
  - Quantify water demand at natural and managed wetlands around Great Salt Lake and significant wetlands upstream of the lake
  - Quantify a flow demand pattern for the open water zone of the lake based on assumptions of target elevation/functionality and time to reach target (when lake is at or above the target
- Collect all pertinent data and store it in the data repository system built in Component 6

Technical Team Members

The technical team members will work with water users individually and through the watershed councils to identify, collect and organize the data required to improve the models. Working with them will assure that the model satisfactorily represents their water supply system and the water demands. They will also give input so that the models can be built to evaluate the water management alternatives they will wish to investigate. Watershed councils will approve of the model for use in the GSLBIP.

- Division of Water Resources: Scott McGettigan
- Division of Water Resources: Clay Lewis
- Division of Water Resources: Leila Ahmadi
- Division of Water Rights: Brandon Mellor
- Division of Water Rights: Skyler Buck
- Department of Agriculture and Food: Brian Christensen
- Compass Minerals: Joe Havasi
- Rudy Duck Club: Justin Dolling

Special Considerations

These models need to be built in collaboration with those water users whose demands are being modeled. Thus there should be a basic level of verification and model adjustment to ensure that the models represent the water users' historic demands adequately enough for planning. This task is difficult, but the models are critical to assist planning and obtain an understanding of water use in the basin.

Deliverable

Refined models that can simulate the components of water demand for all the major water users in the basin will be created. The models are developed and linked to the model database in such a manner that demand scenarios based on climate and water user decisions can be readily generated, cataloged and simulated in the overall system model.

6. DATABASE MANAGEMENT AND MODEL INTEGRATION

Description

This task links together discrete, pre-existing models to effectively provide a basin-wide simulation. Primarily it involves the digital infrastructure to pre-process data, store data (in various formats) and access the data for both simulation and post-processing (Component 7). The digital infrastructure facilitates the simulation of a variety of scenarios as well as the orderly storage of the model results. It also provides access to data through simple scripting, a web platform or a desktop GUI.

Tasks

- Identify and catalog all data and data types which will be stored and accessed by the various models
- Organize model sharing and storage system
- Design the data storage system and a management approach
- Build the data storage system
- Design supporting software to access and view the data storage system
- Program a digital workflow to maintain model concordance, run the full simulation with all cascading models and organize and access scenario simulations

Technical Team Members

- Division of Water Resources: Jake Serago
- Division of Water Resources: Clay Lewis
- Reclamation: Maribeth Kniffin
- University of Utah: Jeff Horsburgh

Special Considerations

Design specifications and particulars of the data storage system can not be identified without first inventorying all the data inputs and types which will be used by the various models. The data storage and digital modeling infrastructure will need to allow for users from different locations to work on the model simultaneously. As the model is intended to be run only by those with permission to do so, it will not be part of this task to design a public facing platform.

Deliverable

A system for running the different models together, reading input data from a database(s) and writing the model output to the database(s) will be developed.

7. DATA VISUALIZATION AND MAPPING

Description

Communication of climate data, water supply data, water demand data, the structure of the models and the model results. Initial mapping supports modeling approaches and decisions by providing a visual, spatial format of what is represented by the models. This will allow the model teams to identify which areas of the basin are represented in the models and which areas are deemed too important to exclude. Such efforts will identify inflow points in the RiverWare model so that they can be spatially communicated to the technical service center to extract the VIC model outflow at those locations.

Additionally, this task creates tools for communicating data and modeled scenarios. This determines in large part how effective the modeling effort is because the way that results are communicated is just as important as how the system is modeled. The task includes identifying which data and exactly how they are presented, providing support for how the visualizations and maps are published or displayed to the public, decision-makers and partners.

Tasks

- Map domains and structural components of each model
- Utilize those maps in conjunction with available spatial layers, water user list and spatial data derived with or by the partners to identify areas of the model that need to be added to the models
- Map the following for each major water user:
  - Major hydraulic infrastructure
  - Key hydrography
  - Major production wells
  - Points of diversion
  - Places of use corresponding to the of points of diversions
  - Land use in the places of use
  - Return flow points, including wastewater treatment plants
- Identify the audiences for different types of information available from the model
- Coordinate partner workshops to support their development of key indicators
- Design statistics, graphs, infographics and maps to communicate results
- Build visual aids of quantities and qualities (key indicators or key performance measures) which are important to the various audiences. Determine how best to share and display those key indicators, some ideas include:
  - Report
  - Story map
  - Web interface to access the data and post-processed data from the storage system
  - An online decision support dashboard
  - Distributable GUI connected to transferable database

Technical Team Members

- Division of Water Resources: Tom Moore
- Division of Water Resources: David Gunther
- Division of Water Resources: Summer Dawn Shumway
- Central Utah Water Conservancy District: Derek Bruton
- Reclamation: Brennan Young

Special Considerations

Visual aids such as graphs, infographics and maps can be presented using various software tools but are limited by the data available. Particulars about how the available data are communicated will be dependent upon what partners wish to see. Information content such as water user trade-offs can not be communicated in any format unless those trade-offs are quantified or qualified by committee members, project partners or water users.

Deliverable

A GIS map with pertinent model and analysis data, including the key spatial information from the models will be created. A story map utilizing the GIS map in conjunction with data from the data storage system, including the scenario analysis to communicate important information, key indicators and tradeoffs necessary to support development of a basin-wide water resource strategy will also be developed. In addition, there will be a data display tool tailored to the preferences of water users, the advisory group and steering committee.