BUREAU OF RECLAMATION

Fiscal Year 2022 Climate Change Case Study Selections

California-Great Basin

Adoption of Climate Change within the CalSim II Water Management Model
Funding: $110,000

The Water Supply and Operations Office of the California-Great Basin Region will work with the Technical Service Center to incorporate climate change considerations within the CalSim II water resources planning model, which is used to determine water availability and allocations within the Central Valley Project (CVP) in California. CalSim II inputs are currently based on the historical period of record, going back to 1922, and only account for climate change to the extent that it is directly reflected in that historical period. To update the CalSim II inputs to incorporate future system management scenarios, the project team will develop a climate change-informed ensemble of hydrology and reservoir evaporation rates for input to the CalSim II model. The ensemble will consist of 10 Coupled Model Intercomparison Project phase 5 (CMIP5) projections under two future emissions scenarios (a 20-member ensemble). The updated model will support Reclamation's analysis of how the CVP should be managed under a changing climate and will be used to support the upcoming reinitiation of consultation for the CVP.

Simplified Salinity Estimation for Climate Change Scenario Analysis
Funding: $110,000

The Bureau of Reclamation's Technical Service Center in collaboration with California Great Basin will develop a method for estimating saltwater intrusion in the Sacramento-San Joaquin Delta (Delta) in a changing climate. The extent of saltwater intrusion into the Delta determines the amount of water that goes to meet Delta outflow requirements, which in turn reduces the volume available for water delivery and other environmental uses. This project will provide guidance for best practices when incorporating climate driven salinity changes in a water management framework, using the CalSim II and CalSim 3 models as examples. As a result, this will enable more climate scenarios to be analyzed, providing a better understanding of the possible range of Central Valley Project water operations.

Columbia-Pacific Northwest

Climate Change Pilot for the Yakima Basin
Funding: $100,000

The Columbia-Pacific Northwest Region, in collaboration with Reclamation's Lower Colorado Region and partners in the Yakima Basin Integrated Plan, will develop a climate change analysis that can inform the decision making process for several new storage projects planned within the Yakima River Basin. The project partners will use readily available data from the 2nd Edition of the River Management Joint Operating Committee Climate Change Study in the Columbia River Basin, along with various irrigation demands and in-stream flow objectives. Future climate conditions will be evaluated for hydrology representing the 2040s (2030 to 2059) and 2070s (2060 to 2089) and 18 projections of future climate selected to cover a host of metrics that have been identified (e.g., metrics for annual volume, spring, winter and summer volumes, etc.). Modeling runs through an existing RiverWare model will be used to evaluate how climate change may impact flow targets. Outcomes will be shared with study participants and the analysis will be incorporated into future decision-making processes for storage options in the Yakima Basin.

Climate Change Pilot for Scoggins Creek
Funding: $100,000

The Columbia-Pacific Northwest Region, in collaboration with Reclamation's Lower Colorado Region and Clean Water Services (CWS), will evaluate options for modification of Scoggins Dam under several projections of future climate. Reclamation has partnered with CWS to conduct a joint dam safety and potential new storage analysis at Scoggins Dam. The intent of the new storage would be to provide additional water for CWS that can be used to mitigate downstream water temperature effects resulting from the release of treated wastewater to the Tualatin River. A host of metrics have been identified to evaluate the performance of the various storage options. The team will develop a climate change analysis of future hydrology for evaluation of these metrics under potential future conditions. This project will inform the decision-making process for selecting from the potential storage options and identify potential future vulnerabilities of the project in the future.

Upper Colorado Basin

Proposal for Operationalization of Climate Change Planning and Information: Operationalization Guidance
Funding: $100,000
The Albuquerque Area Office and the Technical Service Center will update and expand existing draft guidance on evaluating the impacts of climate change to ecological resilience. The project team will incorporate knowledge gained from previous planning studies under the WaterSMART Program to create a workbook that can support application of climate change information in future planning projects involving ecological resilience. The guidance will address approaches for considering a range of future climate scenarios and the associated impacts to ecological resilience and will address uncertainty using Decision Making Under Deep Uncertainty concepts. During the project, the workbook will be tested for usability through application to the Utah Lake Climate Change Case Study, led by the Provo Area Office.

Proposal for Operationalization of Climate Change Planning and Information: Utah Lake Climate Change Analysis
Funding: $100,000
The Provo Area Office, in collaboration with the Albuquerque Area Office, will conduct a climate change analysis to evaluate potential climate change impacts to Reclamation operations at Utah Lake. The team will modify the Utah Lake Jordanelle Exchange Model (ULJEM) to provide more functionality and to incorporate climate change impacts within the modeled variables. The team will develop multiple climate change scenarios and will apply a framework of Decision Making Under Deep Uncertainty to provide quantitative impacts and analyses for future decision making. This Climate Change Case Study will add to and complement a recently selected Reservoir Operations Pilot study to evaluate the impacts to Reclamation operations from the planned Utah Lake Restoration Project, which would dredge one billion cubic yards of lake sediments over an 8-year period and use the dredge material to create 20,000 acres of islands within Utah Lake. Through this case study, the team will add capability to the modeling efforts in the Reservoir Operations Pilot, to enable the team to consider climate change impacts to Reclamation operations, in addition to the impacts from the planned restoration project.

Technical Service Center

Incorporating Climate Change into Safety of Dams Process Hydrologic Risk Analysis

Funding: $100,000

The Technical Service Center will collaborate with the Dam Safety Office to develop a methodology for incorporating climate change information into hydrologic risk analysis in the Safety of Dams evaluation process. Currently, a qualitative analysis of climate change is used in the Comprehensive Review process for high-risk dams to identify any large shifts in flow patterns. However, current methods do not explicitly consider modeled climate change information in a quantitative manner. To improve the ability to assess how climate change may alter hydrologic risks in these analyses, this project will focus on incorporating climate change information into potential failure modes for hydrology. The team will conduct a literature review of best practices for incorporating climate change information into Flood Hazard Analysis studies and incorporating projected population growth into Population at Risk studies. Based on this review, the team will develop an efficient workflow and best practices guidance for conducting these analyses.

Incorporation of Climate Change within the Precipitation Frequency Curve for Taylor Park Dam Colorado

Funding: $120,000

The Technical Service Center, in collaboration with the Niemann Research Group at Colorado State University, will build on a recently completed Dam Safety program Issue Evaluation at Taylor Park Dam in Colorado to demonstrate best practices for incorporating climate change into the precipitation frequency curve for dam safety analyses. Precipitation-frequency information is used to determine how peak flow events into a reservoir may change under future climate conditions, thereby impacting hydrologic risk at a dam. This work will consist of a literature review of best practices and other similar cases to develop an approach for incorporating climate change into precipitation-frequency analysis at Taylor Park Dam based on Global Climate Model projections of precipitation. This project complements a concurrent project planned under the Internal Applied Science Program to more broadly develop the climate analysis necessary to incorporate climate change information into precipitation frequency analysis in support of Reclamation's Safety of Dams process.