



# 13 *Water Storage Investment Program: California Water Commission and California Department of Water Resources*

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## **Project Summary**

In 2014, the Water Quality, Supply, and Infrastructure Improvement Act (Proposition 1) was approved by voters. Proposition 1, Chapter 8, allocated \$2.7 billion to the California Water Commission (Commission) to fund public benefits associated with water storage projects throughout California. The Commission is implementing requirements of Proposition 1 through the Water Storage Investment Program (WSIP). In developing the WSIP, the Commission wanted to consider the effects of climate change in the evaluation of projects for State investment. To support the Commission in their effort, the Department of Water Resources (DWR) created detailed climate projection datasets for the entire state of California to estimate how water resources are expected to change in the future due to climate change impacts.

Through its regulations, the WSIP considers climate change in two ways, directly into the quantification of public benefits and through an uncertainty analysis. Applicants must use the WSIP-provided climate projection datasets to calculate the public benefits of their project proposals in light of climate conditions in 2030 and 2070. Additionally, the applicants must also provide an uncertainty analysis that assesses how a project's public benefits may be affected by two specified sets of extreme climate conditions. Proposals, submitted in 2017, were reviewed and scored by Commission staff and State agencies responsible for administering the public benefits. The climate data and tools development took nine months and was the collaborative effort of staff members at DWR and Scripps Institution of Oceanography, with support from consultants. For the first time, California was able to produce complex data highlighting local downscaled information on climate and water for 6 km gridded cells across the entire state, which is not currently available in other tools. The datasets will continue to be refined to serve other programs such as supporting planning for local groundwater sustainability efforts.

## **Drivers**

The driver for the tool development was the Water Commission and the public process used in developing the regulations. The Commission wanted to consider climate change while balancing the burden on the applicant and the uncertainties associated with forecasting into the future. The WSIP needed a tool and methodology that local jurisdictions could apply to their project specific operations and specific regional setting. The research and creation of datasets by DWR for WSIP were due to the level of detail that was required that was not available through any other tools or resources. The datasets produced detailed downscaled data that could be used in quantifying public benefits of proposed projects.

## Climate Impact Area

Water throughout California is projected to be impacted by climate change. Precipitation patterns are expected to change with climate change, with increases in drought but also extreme storm events. These changes will ultimately affect water storage and also soil moisture throughout the state. As temperatures increase, snow pack in the Sierra Nevada is also projected to decrease substantially. WSIP aims for proposed projects to plan accordingly for localized changes.

## Funding Source

The funding source for the climate data and tools development project was from WSIP's administrative costs (Proposition 1 allows up to 5% of funds allocated to a program for administrative costs). The WSIP climate data and tools development project cost approximately \$490,000. These funds were a key element in the success of the project as they enabled many more resources and staff to contribute to the project. This comprehensive team included consultants, modelers and staff from DWR, including experts on sea-level rise, hydrology and climate change.

## Research and Data

The datasets include downscaled (6 km gridded cell) projections for the climate conditions expected over the next 30 years (2016-2045) and at late mid-century (2056-2085). DWR also simulated State Water Project and Central Valley Project operations under future climate conditions to provide important information about future streamflow, water storage, and water delivery conditions. For project operations, DWR used the CalSim-II model (<http://baydeltaoffice.water.ca.gov/modeling/hydrology/CalSim/>), which is the standard water operations modeling tool for simulating the operations of the State Water Project and Central Valley Project. Proposals use the datasets to show how their projects will function under expected future conditions in order to show that the projects are resilient to climate impacts and will continue to provide public benefits under a range of uncertain future conditions.

## Challenges

This was the first program to require the quantitative analysis of future climate conditions and their use as part of a decision-making process to award competitive funding. Projections of future conditions including climate, population, economics, etc. are inherently uncertain. During the development of program regulations, several parties commented on issues relating specifically to the climate uncertainties. Some commenters argued that the level of uncertainty was so great that the information should not be used for decision making purposes, while other commenters argued that additional analysis needed to be completed to fully explore the uncertainties. Ultimately, the Commission decided that the datasets and tools developed by DWR provided useful information about future condition uncertainty for their decision-making process and that additional analysis to fully explore uncertainties would place undue burden on applicants.

Additional challenges were encountered with the technical development of the datasets and tools. These challenges mostly related to the need to develop a statewide dataset. Historically, DWR has focused its water operations modeling on the major watersheds of the Sacramento and San Joaquin Rivers. DWR has considerable expertise and experience in these watersheds with less expertise and experience in other watersheds throughout the state. Moving to a statewide dataset involved methodological changes to the ways in which DWR has previously created future climate streamflow projections.

## Outcome

The datasets were used by applicants for the WSIP funding. These datasets will be further developed and refined to be more user friendly for local water districts. Local jurisdictions complying with Sustainable Groundwater Management Act will be able to use this tool as a way to manage local groundwater under projected climate conditions as well.