Climate Change Assessment

Valley Water worked with Dr. Edward Maurer, a researcher from Santa Clara University, to evaluate the impacts of climate change on local reservoir inflows, precipitation, and temperature. The climate change analysis evaluated 16 global climate models (also referred to as General Circulation Models; GCM) to determine the range of potential impacts to forecasted water demands and local water supply availability. From those 16 models, Valley Water with the support of Dr. Maurer chose a subset of five GCMs to represent the range of potential impacts Valley Water may experience from climate change. The subset includes models that best represent the range of potential outcomes for California. The choice of model in the subset were informed by the significant work completed by the Department of Water Resources (DWR) Climate Change Technical Advisory Group (CCTAG). CCTAG was a 14-member group of the leading California climate change scientists. The findings reported hereafter are based on modeling from the five GCMs plus a low impact scenario used only in the demand modeling that assumes climate change impacts do not increase from present. Valley Water also reviewed scientific studies that evaluated potential climate change impacts to the State Water Project (SWP) and Central Valley Project (CVP) supplies.

In general, climate change may increase annual demands to approximately 360,000-375,000 acre-feet (AF) by mid-century primarily by increasing outdoor irrigation needs across all water use sectors and cooling needs in the commercial, industrial, and institutional sector. While this is approximately 20,000-35,000 AF per year greater than the low climate change impact scenario, it is still within the range of historical water use. Historical water use was generally between 360,000-390,000 AF per year prior to the 2012-2016 drought (Table 1). Demands are not projected to exceed historic water use by mid-century primarily because Valley Water continues to invest in conservation and Santa Clara County residents continue to make water conservation a way of life.

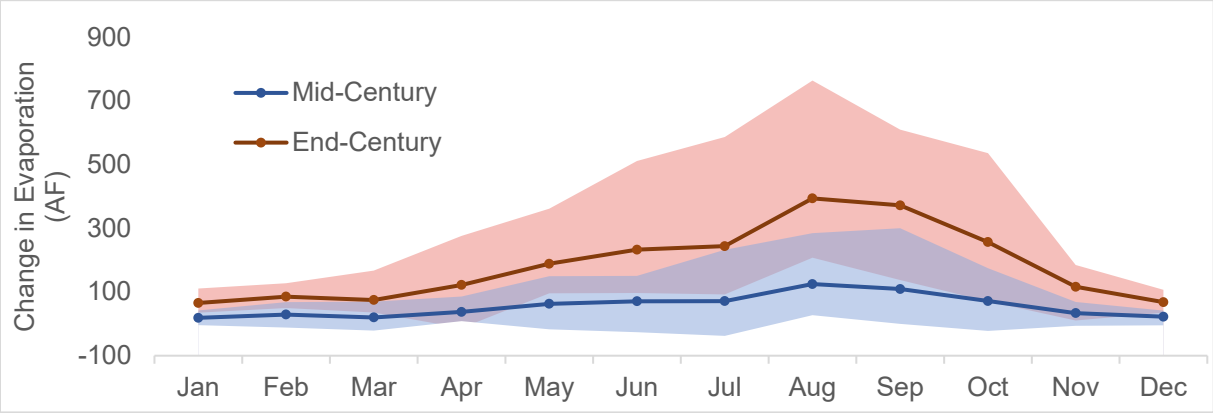
Table 1. Demands Considering Climate Change Compared to Historic Demands

Climate Change Impact	Demands (Acre-feet)
Low Impact	340,000
Moderate Impact	360,000
High Impact	375,000
Historic Demands (pre-drought)	360,000-390,000

The results of Valley Water's work with Santa Clara University show that climate change will impact water supply through changing the volume, timing, and quality of water that is available. There is high certainty that increased temperatures will shift Sierra Nevada Mountain precipitation from snowfall to rainfall and increase reservoir evaporation statewide. The Santa Clara University analysis shows the potential increases in local reservoir evaporation due to increased temperatures (Figure 1). Similar impacts of temperature on evaporation would be expected throughout the state. Groundwater storage could potentially become more important into the future to minimize evaporative losses of stored water both locally and statewide and provide large enough storage space to capture the potential increase in Sierra Nevada rainfall. In addition, increased

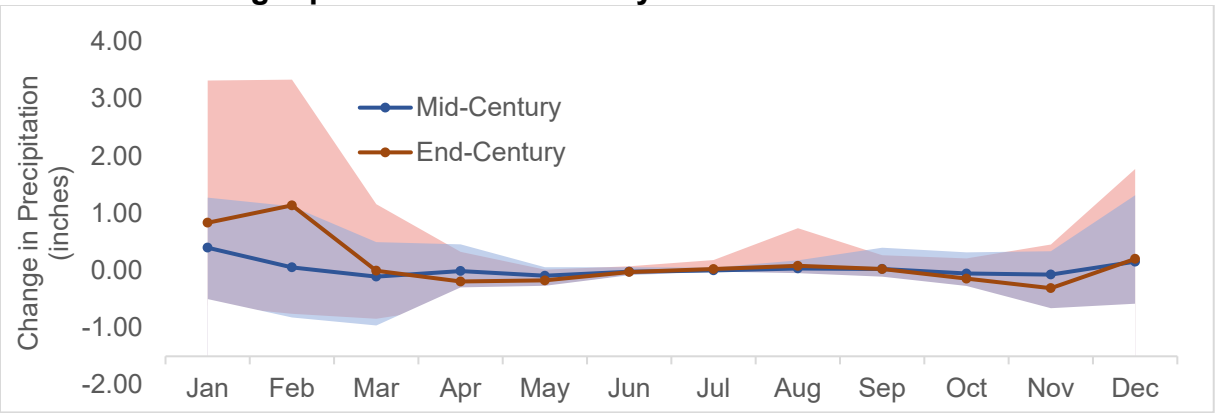
temperatures could make surface reservoir water quality management more difficult as warmer temperatures tend to support greater algal growth and create other water quality issues.

Figure 1 Projected Increase in Santa Clara County Monthly Reservoir Evaporation due to Climate Change. The bands represent the range of projected evaporation change from current based on downscaled climate models while the lines represent the average across models. Blue lines and shading represent mid-century and red lines and shading represent end of century conditions.



Per the climate change analysis, droughts and wet periods are expected to become more severe. In other words, future precipitation is likely to come as large storm events within a wet period that is punctuated by severe and potentially prolonged dry periods. There is significant uncertainty whether average precipitation is expected to increase or decrease since it will depend on the specific track that atmospheric rivers take (e.g., will they tend to track to the north and cover the Pacific Northwest or to the south and cover California more consistently). Figure 2 shows the potential change in local precipitation based on the downscaled global climate models.

Figure 2 Change in Average Santa Clara County Monthly Precipitation due to Climate Change. The bands represent the range of projected precipitation change from current based on downscaled climate models while the lines represent the average across models. Blue lines and shading represent mid-century and red lines and shading represent end of century conditions.



Valley Water input the climate change projections into its water supply planning model to evaluate how water supply and conservation projects and programs could help mitigate the impacts of climate change on water supply reliability. The modeled expected increased drought severity makes drought resilient water supplies (e.g., potable reuse and conservation) more important to mitigate the potential climate change and regulatory related decrease in existing supplies. Maintaining storage infrastructure may also help maximize the benefits of climate change-related increases in storm severity. Groundwater storage is a storage approach that could help lessen the negative impacts of increased temperatures on water evaporation and water quality. Through MAP, Valley Water will continue to evaluate projects and update climate change assumptions as more information is available to help the Board determine which reuse, conservation, storage, or other supply projects will best meet Valley Water's needs.

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