# Considerations in Defining Climate Change Scenarios for Water Resources Planning

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## Abstract

During the past several years, there has been considerable growth in the amount of climate projection information available for resources impacts assessments. This growth has stemmed largely from the coordination efforts of the World Climate Research Programme's Coupled Model Intercomparison Project–phase 3 (WCRP CMIP3) and the data hosting services of the Lawrence Livermore National Laboratory's Program for Coupled Model Diagnosis and Intercomparison (PCMDI). Through these efforts, resource planners now have access to well over a hundred projections of 21st-century climate, collectively produced by more than 20 coupled ocean-atmosphere climate models. Each model simulates climate response to multiple future trajectories of greenhouse gas emissions, and each model-emissions pairing is used for potentially repeated simulations to factor in the influence of climate-state initial conditions. Extending from this effort, a 112-member subset of statistically downscaled WCRP CMIP3 climate projections has been developed over the contiguous United States and is publically available at http://gdo-dcp.ucllnl.org/downscaled_cmip3_projections/. Given the availability of this amount of information, the following questions arise:

- Rather than consider all available climate projections as equally plausible, should planning initially involve an analysis to determine and identify a more "credible" subset?
- Focusing on the set of climate projections considered (culled or not), how might we select a smaller set of projections that encapsulate the collective and represent a range of future climates?

The Bureau of Reclamation has recently conducted research and demonstrations in both of these question areas. For the first question, findings will be shown to illustrate the challenges of choosing a "correct" set of metrics for which projections can be reliably rated as more or less credible. Findings will also be shown on how doing so still may not reduce perceived climate projection uncertainty. For the second question, a recent planning application in California's Central Valley will be highlighted where projections from the statistically downscaled projections archive mentioned above were surveyed in order to select a set of bracketing climate projections that encapsulated the whole and represented a plausible set of future climates for the given planning application. Four factors drove projection selection: (1) climate periods between which changes are assessed, (2) climate metrics relevant to the resources being studied, (3) geographic location of climate change relevant to resources being studied, and (4) metrics' change ranges of interest within the collective of projections surveyed. Strengths and weaknesses of this projection selection approach will be highlighted.


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