

Agenda Item: 8-10
Meeting Dates: December 8 and 9, 2004

ANNUAL JOINT MEETING WITH BAY-DELTA PUBLIC ADVISORY COMMITTEE

CLIMATE-CHANGE UNCERTAINTIES AND CALFED PLANNING **What are current observations and models saying?**

- *Michael Dettinger, U. S. Geological Survey/Scripps Institution of Oceanography, La Jolla, California (mddettin@usgs.gov)*

In recent decades, snowmelt and streamflow timing in the rivers of the Sierra Nevada, along with rivers all over western North America, have changed in response to warmer winters and springs. The observed hydrological trends toward smaller snowpacks and earlier runoff are widespread and significant. Although these trends partially reflect natural interdecadal regimes of the Pacific-North American climate system, a large component of the recent changes can be attributed to even broader global-warming trends. Unfortunately, the future of these temperature, snowpack, and streamflow trends in California are uncertain and some key uncertainties at this regional scale are unlikely to be eliminated soon. Nonetheless, long-term planning and decisions undertaken by the Bay-Delta Authority will need to consider the likely hydrologic changes soon because decisions are being made already and because the changes are already underway. To date, climate-change uncertainties typically have been addressed by projecting the impacts of one or two climate-change projections, chosen based on availability or to capture the extremes among available projections. However, characterizing the overall statistical distributions of changes in a moderately large projection ensemble provides new insights into the projections:

(i) uncertainties associated with future emissions are comparable with the uncertainties due to model differences, so that neither source of uncertainties should be neglected or underrepresented;

(ii) projections of 21st Century California temperatures are broadly in consensus but spread and change more overall than do future-precipitation scenarios, so that assessments of the performance of water-resource and other natural-resource systems under near-term temperature changes is particularly pressing;

(iii) projections of 21st Century precipitation are centered around no precipitation change (some project wetter, some drier conditions) and, indeed, previous projections of extremely wet futures for California are statistical outliers among current projections; and

(iv) projections of 21st Century precipitation share a tendency toward greater precipitation intensities and variability, especially at day-to-day time scales

- *Francis Chung, Chief of Modeling Support Branch, California Department of Water Resources*

Impacts of future climate change on water resources management in California will be discussed. Existing mathematical tools that are widely accepted and currently used in California will be utilized to assess impacts of precipitation changes, earlier snowmelts, sea level rise, atmospheric temperature changes, or water quality variations resulting from future climate change. Causes of uncertainties associated either with future climate predictions or with future water resources planning will be examined and potential means to deal with these uncertainties will be discussed.