

#### **4.3.5.2. Model Management**

DWR and Reclamation will also seek new opportunities and avenues, both private and public, to broaden the management base for the existing and future model developments. Currently there is an interagency team coordinating this effort.

#### **4.3.5.3. Peer Review**

DWR and Reclamation believe that peer review enhances the acceptability of the modeling tool. The agencies may suggest peer reviews of modeling components it deems necessary.

#### **4.3.5.4. Public Involvement**

DWR and Reclamation will work with all interested parties, both public and private, to seek technical input in developing and enhancing the current and future modeling components.

#### **4.3.5.5. Sustainability**

The proposed Model Management Team (DWR, Reclamation and others) will work to develop a strategy in this important area.

#### **4.3.5.6. Training and Education**

The agencies modelers will continue to support, to the extent resources permit, to broaden the model users' base for appropriate use of models. The Proposed Model Management Team may also be charged with this responsibility.

### **4.4. Model Testing**

#### **4.4.1. Calibration and Validation**

Model calibration is the process of fine-tuning the value of various model parameters, so that model results match the observed data. Validation is the subsequent testing of the model against data that has not been used in the calibration to obtain an independent assessment of the model's accuracy.

The need for testing, calibration and validation of CalSim-II is one of the most controversial issues raised in the Strategic Review. Some of the peer review panel recommended that further validation of the model is required through the comparison of model results to recent historical data. However some in the modeling community express their doubts on the usefulness of such a comparison (CalSim-II in California's Water Community – Musing on a Model, p158). The Strategic Review (p129) notes that for the Murray-Darling Basin model, validation is considered to be less important. The Murray-Darling Basin model is calibrated using a long period of data. In contrast validation is carried out using only two to three years of data.

In discussing the merits of calibration it is important to distinguish between physical parameters that remain essentially constant (e.g. stream-bed conductance), and behavioral parameters that may change and adapt (e.g. reservoir operating policy). Water use parameters such as irrigation efficiency may fall somewhere in between these two extremes. Where possible the value of parameters should be determined from direct observation. This may not be possible for some parameters such as regional scale reuse of water.

DWR and Reclamation believe that model calibration to determine the value of physical parameters, and parameters such as irrigation efficiency, is a valuable exercise, and benefits model accuracy and model credibility. However, DWR and Reclamation suggest that a more reasonable approach to defining behavioral parameters is through discussions with system operators to define *current* operational policy or rules. California's water system, especially with regard to the Delta, has undergone many changes in the 1990s (Delta Water Quality Control Plan, CalFed, ESA actions, CVPIA (b)(2), Environmental Water Account) so that calibration to historical practice has limited value. It would appear more reasonable to define operating rules in conversations with operators and subsequently use a recent wet, normal and dry year in a validation exercise.

The debate on calibration stems partly from a misunderstanding of the hydrology development. The CalSim-II hydrology is tied to historical stream gage data. The following points explain what calibration has been undertaken for the Sacramento Valley:

- The accretions and depletions between the project reservoirs and the Delta *are* calibration terms. They have been determined so that at a historical level CalSim-II will exactly match historical gage data if reservoir releases are fixed at their historical level and groundwater pumping and stream-aquifer interaction are fixed at their assumed historical values.
- Calibration of groundwater use has not been carried-out due to the lack of historical data.
- The stream-aquifer model in CalSim-II is calibrated to the more sophisticated Central Valley Groundwater Surface Water Model (CVGSM).
- The CalSim-II hydrology is calibrated to net consumptive use rather than stream diversions and return flows. CalSim-II may therefore not simulate well diversions to particular irrigation districts.
- The hydrology adjustment to account for the impact of land-use change on rainfall-runoff has not been calibrated or validated.
- Calibration or validation of district-scale diversions in CalSim-II cannot be undertaken without increasing the resolution of the model.

DWR and Reclamation recommend the following approach to CalSim-II calibration and validation:

- DWR and Reclamation modeling staff continue to work with project operators to define operating rules that correctly capture current (rather than historical) operational policies.
- Following re-calibration of CVGSM<sup>1</sup>, the CalSim-II groundwater model is refined and re-calibrated.
- DWR and Reclamation develop methods to validate assumptions regarding land use change impacts on rainfall-runoff.

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<sup>1</sup> Major revisions to the underlying IGSM software and the input data sets to CVGSM have been made by DWR since the development and calibration of the CalSim-II groundwater module.