

Executive Summary

The following is the final report on the review of three watershed models for Butte County. This report is a companion report to the progress report delivered to Butte County in August 2003. In the progress report, an overview of watershed modeling issues facing Butte County including the quantification of impacts related to potential conjunctive use scenarios of the State Water Project were covered along with an overview of watershed modeling. After the watershed modeling overview, the general descriptions of the three models reviewed were provided. The models reviewed include the USGS PRMS model, the MIKE-SHE model of DHI, and the WEHY model from the California Hydrologic Research Laboratory (CHRL).

This final report starts with an introduction that identifies the water resources issues and watershed processes related to those issues. A strategy for providing watershed modeling services to address these issues is then presented including a prioritization of these activities. After presenting a work plan that identifies the steps and resources for completing the modeling strategy, the three watershed models are reviewed with respect to their ability to successfully model the Butte County issues. As a further means of organizing the review, the models are compared using the processes identified in the progress report that are important to the issues in Butte County. The processes related to snow accumulation and melt are also included as they play a significant role in determining recharge and flooding potential in Butte County.

As a result of this assessment, the physically based models MIKE-SHE and WEHY possess the capabilities for simulating the important watershed processes in Butte County. The fundamental difference in the two models is their approach to handling

spatial variability within a watershed and the data required to estimate the model parameters. The MIKE-SHE model requires grid refinement to capture spatial heterogeneity which can greatly increase the number of parameters and data needed to estimate those parameters. This greatly increases the difficulty of calibrating the model and in implementing different scenario simulations. In contrast, the WEHY model has incorporated spatial variability directly into the conservation equations by using areally-averaged equations. The parameters associated with spatial variability can be computed from available data, decreasing the need to fit parameters through a calibration process. This becomes important when land-use change scenarios are investigated, as the fitting parameters are only valid for the land use condition to which they were originally calibrated. It is anticipated that land use changes will be a significant part of watershed simulation studies carried out by Butte County in their assessment of water resources development options. As a result, it appears that the WEHY model is the most appropriate watershed model to handle the water resources simulations in Butte County.

