INITIAL FINAL REPORT FOR 2001 STUDIES

CALFED SJR DO TMDL DIRECTED ACTION PROJECT

Development of Upstream Water Quality Model

Through CALFED Water Management Program support, DWR extended its Delta Simulation Model (DSM2) boundaries to include the San Joaquin River between Vernalis and the Bear Creek confluence near Lander Avenue (DWR 2000). See Figure 1. The DSM2 boundary extension was calibrated and tested to simulate hydrodynamics and salt transport (DWR 2001).

The purpose of the 2001 Study "Development of Upstream Water Quality Model" was to develop a "stand-alone" version of the DSM2 model for the upper San Joaquin River (SJR). This stand-alone model, herein referred to as the San Joaquin River Simulation Model (SJRSM), was developed, tested and furnished to the Technical Advisory Committee and is much faster and easier to use than the complete DSM2 model. In addition to simulating hydrodynamics and salt transport, SJRSM allows for the simulation of dissolved oxygen, temperature, and other non-conservative constituents in the San Joaquin River upstream of Vernalis. It is anticipated that HydroQual, Inc., as part of the 2002 directed action studies, will conduct the necessary calibration and validation to simulate these water quality constituents.

As already discussed, SJRSM utilizes the numerical engine of DSM2 to simulate the portion the San Joaquin River system from Vernalis upstream to the confluence with Bear Creek near Stevinson. This model allows for broader and more stream-lined applications by parties interested in conducting modeling studies of the San Joaquin River System without interest in the Delta system. SJRSM requires less data pre-processing due the reduction in the number of boundary conditions and model run time is greatly reduced without the computationally intensive overhead of the Delta.

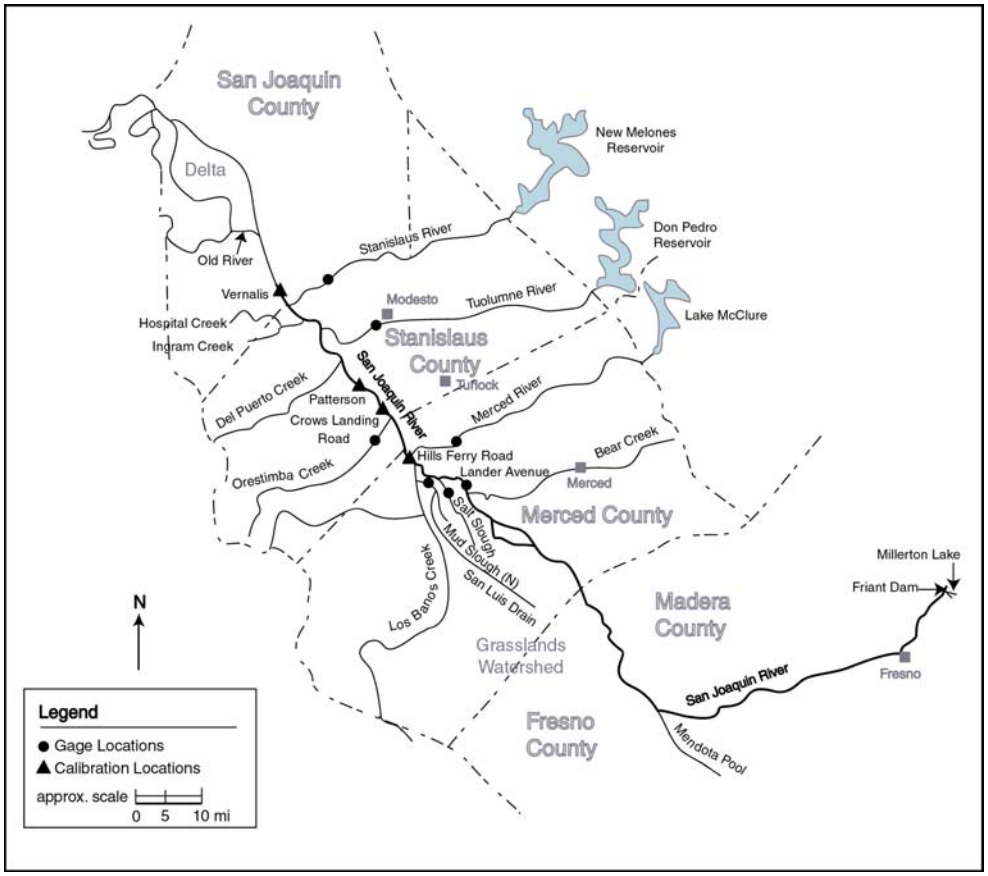

Figure 1. San Joaquin River Upstream of Vernalis

The necessary SJRSM boundary conditions for simulation of hydrodynamics and salt transport are:

- San Joaquin River near Stevinson.
- Eastside tributaries: Stanislaus, Tuolumne, and Merced Rivers.
- Westside streams: Hospital/Ingram, Del Puerto, and Orestimba Creeks.
- Mud and Salt Sloughs
- Eastside and Westside agriculture activities.
- Modesto Waste Water Treatment Plant activity.
- Natural groundwater accretions/depletions.

The complete DSM2 model with the upper San Joaquin boundary extension was calibrated for the period of May 1997 through September 1999. A more complete description of model boundary conditions and methodology and results of the calibration effort are summarized elsewhere (DWR 2001). SJRSM was also used to simulate the May 1997 through September 1999 calibration period. In general, the calibration results from SJRSM were consistent with those from complete DSM2 model. The two models did not give identical water level (stage) predictions at Vernalis; however, estimates agreed within hundredths to tenths of a foot throughout the simulated period. The highest discrepancies usually occurred during flood periods.

To validate the model and associated boundary condition assumptions, a long-term simulation was conducted for the period of October 1985 through September 1995. The results of the validation confirmed the reasonableness of the boundary condition assumptions. The validation results will be documented in DWR Delta Modeling Section's next Annual Progress Report.

REFERENCES

DWR (2000). *Methodology for Flow and Salinity Estimates in the Sacramento-San Joaquin Delta and Suisun Marsh*, 21st Annual Progress Report to the State Water Resources Control Board, June.

DWR (2001). *Methodology for Flow and Salinity Estimates in the Sacramento-San Joaquin Delta and Suisun Marsh*, 22nd Annual Progress Report to the State Water Resources Control Board, August.