3.3 MODEL INTEGRATION

Other sections of this appendix outline the specific aspects of the FRWP, as well as its broader context in relation to the CVP and SWP water supply systems, the assumptions incorporated into the impact analysis modeling, and descriptions of the modeling tools used. This section describes how these various tools interacted to provide a cohesive framework for assessing the effects of the FRWP on other CVP/SWP contractors, Delta water quality and environmental considerations. The interactions between the models used in the FRWP analysis are displayed in a general sense in Figure 2-1.

The modeling analysis for the FRWP consisted of two phases. In the first phase (the subject of Section 3), CALSIM, EBMUDSIM, and the SCWA Water Allocation Model collectively simulated FRWP, SWP, and CVP operations. In the second phase (the subject of Sections 4 and 5), results from the CALSIM II studies served as inputs for a suite of Delta water quality, temperature, and salmon mortality models.

CALSIM II, EBMUDSIM, and the SCWA Water Allocation Model each use differing platforms and algorithms. Since there is no existing interface between the models, an iterative method was applied where each model was run separately, selected data was manually exchanged between the models, and studies were re-simulated. This iterative process continued until the results of two specific data sets, CVP North-of-Delta M&I allocations and SCWA appropriated Excess Water diversions, converged with estimates. Figure 3.3-1, provides a conceptual schematic of this iterative methodology. The modeling stages for the first phase of FRWP modeling are outlined in the following steps:

1) *EBMUDSIM Alternative 1 study*

- EBMUDSIM calculates Mokelumne River flows into the Delta under No Action conditions.

2) *CALSIM II Alternative 1 study*

- Input data:
  1. Mokelumne River flows from the EBMUDSIM Alternative 1 study are directly input into the CALSIM II Alternative 1 study as an inflow into the Delta.
  2. A baseline SCWA CVP diversion schedule averaging 7.2 TAF/yr is assumed, diverted at the intake of the existing Sacramento River Water Treatment Plant**.**

3) *EBMUDSIM action alternative study/ SCWA Water Allocation Model action alternative study (first iteration)*

- Input data:
  1. CVP North-of-Delta (NOD) Municipal and Industrial (M&I) allocations from CALSIM II Alternative 1.
  2. SCWA appropriated Excess Water diversion estimated from CALSIM II Alternative 1 (SCWA Water Allocation Model only).
- CVP NOD M&I allocations are multipliers calculated within CALSIM II based upon system conditions. These multipliers determine the allocation of CVP contract water that is available in a given year to CVP M&I contractors.
- The CALSIM II Alternative 1 CVP M&I allocations are used as an initial approximation of the Alternatives 2-5 CVP M&I allocations and are input into EBMUDSIM.
- An estimate of Delta Excess Water available for SCWA to appropriate is based on either CALSIM II Alternative 1 results or an interim CALSIM II Alternatives 2-5 iteration that includes only Excess Water diversions for SCWA. Based upon estimated available SCWA Excess Water and CVP NOD M&I allocations, the SCWA Water Allocation Model generates CVP patterns for

the SCWA diversions at the Sacramento River WTP and Freeport that maximize the use of available Delta Excess Water.

4) CALSIM action alternative study (iterate as needed)

- Input data:
  1. Mokelumne Delta inflow from EBMUDSIM
  2. EBMUD diversion pattern from EBMUDSIM
  3. SCWA estimated diverted Excess Water from the SCWA Water Allocation Model
  4. SCWA CVP diversion schedule from the SCWA Water Allocation Model
  5. SCWA "Other" water diversion schedule from the SCWA Water Allocation Model
- SCWA Excess Water and CVP M&I allocation results are compared to a previous iteration. Significant variations in CVP M&I values necessitate an update of the CVP diversion schedules for EBMUD and SCWA. Significant variation of the simulated SCWA Excess Water diversions from previous estimates requires re-calculation of the SCWA CVP and/or SCWA "Other" water components.
- Initial iterations between CALSIM II and EBMUDSIM/SCWA Water Allocation Model may use only one or two of SCWA's three water supply components. For example, performing the study initially with only SCWA Excess Water diversions provides a more accurate estimate of divertable Excess Water for SCWA in calculating SCWA CVP and "Other" water diversion schedules in subsequent iterations.

5) EBMUDSIM and/or SCWA Water Allocation Model (subsequent iterations, if needed)

- Input data:
  1. CVP NOD M&I allocation from preceding CALSIM action alternative
  2. SCWA Appropriated Excess Water diversions from preceding CALSIM action alternative
- Either EBMUDSIM or the SCWA Water Allocation Model may be used to re-generate CALSIM II inputs as needed.

The action alternative studies are complete once the simulated SCWA Excess Water diversions and CVP M&I values results from the CALSIM II iteration converge with the values assumed in generating the CALSIM II inputs from EBMUDSIM and SCWA Water Allocation Model. Convergence was generally achieved when the difference in CVP M&I allocations differed by less then one percent

The Alternative 6 study follows the same methodology as the Alternatives 2-5 study. CVP M&I values change only slightly between the two alternatives, allowing the SCWA diversion schedules to remain unchanged in Alternative 6 from those utilized in Alternatives 2-5. EBMUD diversions at Freeport are removed in CALSIM II in Alternative 6, and revised Mokelumne River inflows are generated by EBMUDSIM.

Upon completion of the first phase of modeling, CALSIM II results from each alternative are translated into input for the Delta water quality and temperature models. Details of this process are described in Sections 4 and 5 of this appendix.

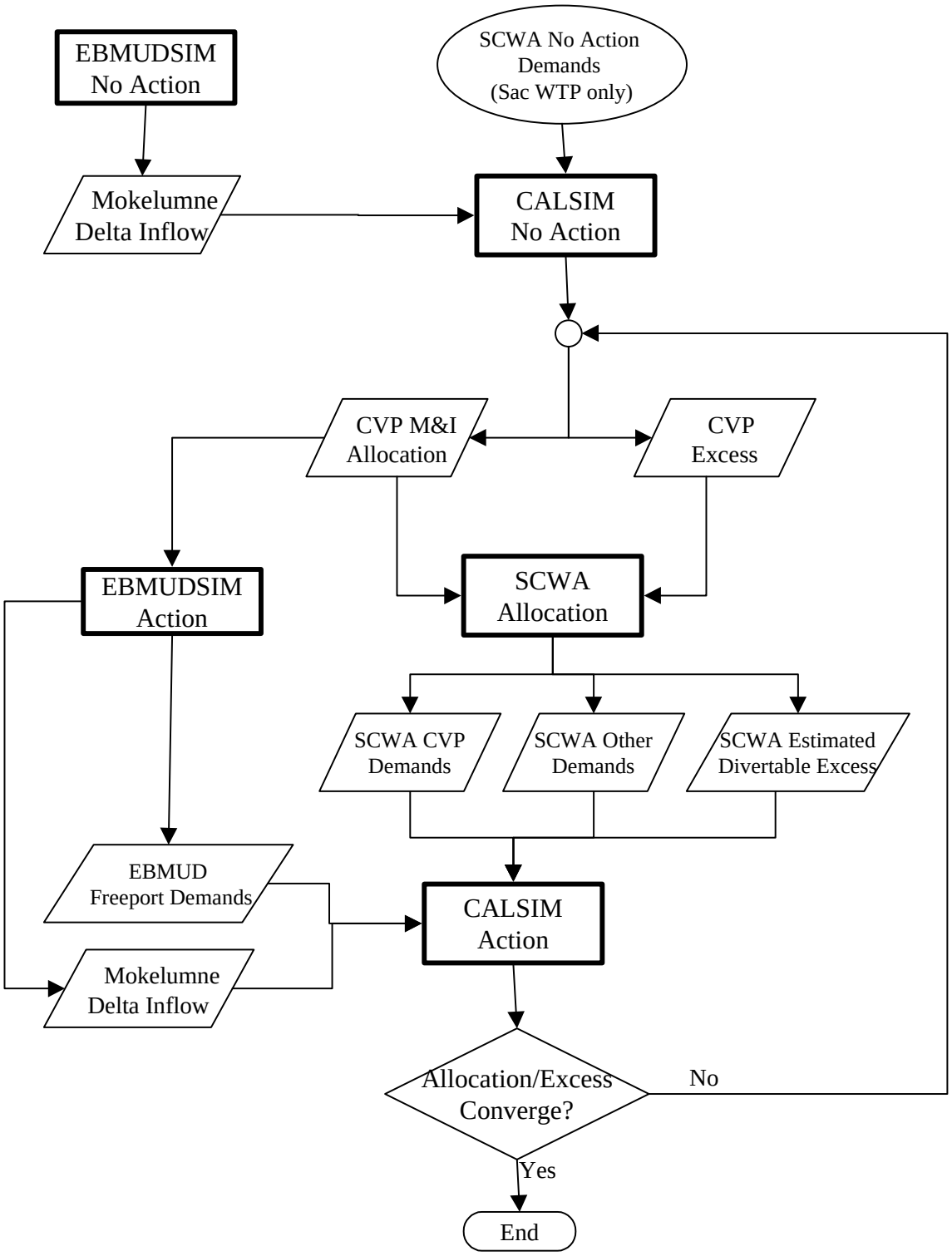

Figure 3.3-1. Model Iteration Formulation