Appendix E – Attachment 1

Attachment E.1 DRAFT Expanded Clifton Court Forebay State Water Project Diversion Window Sensitivity Analysis

E.1.1Introduction

This document summarizes key findings from a sensitivity analysis of operational changes to Alternative 2v2 with and without an expanded Clifton Court Forebay State Water Project (SWP) diversion window. Operations results from these simulations were analyzed to understand if changes between Alternative 2v2 and the No Action Alternative (NAA) remain similar with the expansion of this window. The CalSim 3 model was used for quantifying the changes in river and delta channel flows and reservoir storage at key locations noted below. The following sections summarize key CalSim 3 output parameters for these scenarios.

E.1.1.1 Clifton Court Forebay State Water Project Diversion Window

Banks Pumping Plant has an installed diversion capacity of 10,300 cubic feet per second based on the downstream capacity of the California Aqueduct. SWP water rights for diversions specify a maximum of 10,300 cfs, but the U.S. Army Corps of Engineers permit for SWP Banks Pumping Plant allows a maximum pumping of 6,680 cfs. From December 15 through March 15, SWP Banks diversions may increase up to one-third of the rate of San Joaquin River flow at Vernalis or 10,300 cfs (whichever is lower) when the San Joaquin River flow at Vernalis exceeds 1,000 cfs. Additional capacity of 500 cfs (pumping limit up to 7,180 cfs) is allowed to reduce impact from previous export reductions to protect fishery resources. With the expanded diversion window, the period where SWP Banks diversions may increase based on the conditions described previously is expanded from December 15 through March 15 to December 1 through March 31.

E.1.2 Sensitivity Analysis

Figure E.1-1 through Figure E.1-29 show CalSim 3 simulation results for the NAA (black lines), Alternative 2v2 (ALT2 v2 wo TUCP; tan lines), and Alternative 2v2 with the expanded Clifton Court Forebay SWP diversion window (ALT2 v2 CCFB; green lines). The changes analyzed in this document are relevant to assessing whether conclusions related to hydrology, water quality, and aquatic biological resources hold with the expansion of the Clifton Court Forebay SWP diversion window. Incremental changes between the NAA and each of the Alternative 2v2 scenarios were assessed at the following locations and parameters:

- Sacramento River below Keswick
- Sacramento River at Bend Bridge
- Sacramento River near Wilkins Slough
- Sacramento River at Verona
- Clear Creek below Whiskeytown
- Spring Creek inflow to Keswick Reservoir
- American River below Nimbus Dam
- Stanislaus River below Goodwin Dam
- San Joaquin River at Gravelly Ford
- San Joaquin River at Merced Confluence
- Sacramento River at Freeport
- San Joaquin River at Vernalis
- Flow though Yolo Bypass
- Mokelumne River
- Old and Middle River Combined
- Delta Outflow
- Delta Exports
- Shasta Storage
- Folsom Storage
- New Melones Storage
- Millerton Storage
- San Luis Storage
- San Luis CVP Storage
- San Luis SWP Storage

Due to the nature of the expanded Clifton Court Forebay SWP diversion window, long-term monthly average Sacramento River, Clear Creek, American River, Stanislaus River, and San Joaquin River watershed flows as well as Delta outflow are largely identical under both Alternative 2v2 conditions. Furthermore, total annual Shasta, Folsom, New Melones, Millerton, and San Luis storage display little to no change under the expanded Clifton Court Forebay SWP diversion window. Monthly long-term average Delta exports and simulated annual export exceedances also show similar patterns in incremental changes between the NAA and each of the

Alternative 2v2 scenarios. Simulated export exceedances for Alternative 2v2 with the expanded Clifton Court Forebay SWP diversion window show incremental increases, relative to Alternative 2v2, roughly 8 percent of the time in December and 5 percent of the time in March (Figure E.1-19 and Figure E.1-22, respectively). No observable changes are noted in January and February as a result of this action.

Overall, the changes due to the expansion of the Clifton Court Forebay SWP diversion window in Alternative 2v2 are minimal and are limited to minor changes in exports rather than riverine or Delta flows or storage volumes. Increases in Delta exports are also limited to December and March and occur only in high flow years where the additional export conditions described previously are met.

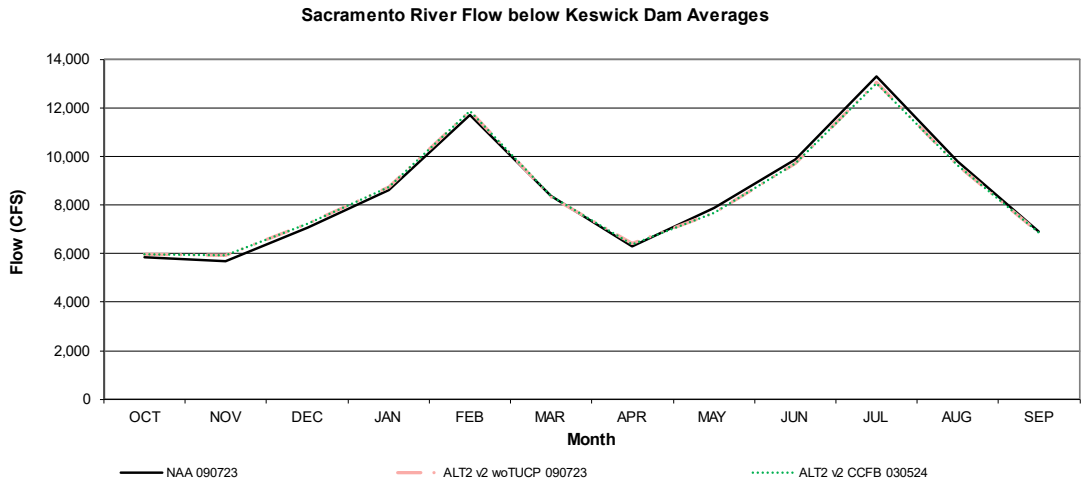

Figure E.1-1. Monthly Long-term Average Flow for Sacramento River below Keswick

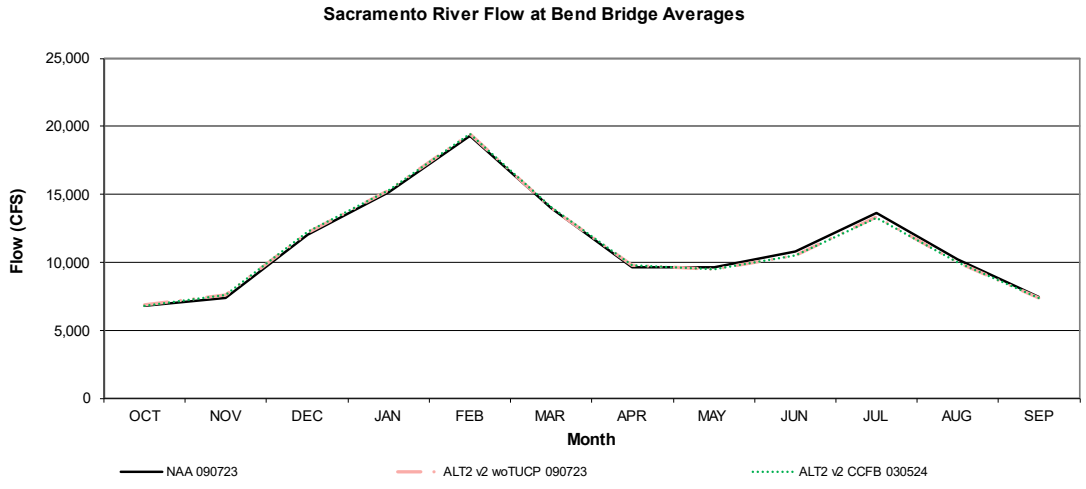

Figure E.1-2. Monthly Long-term Average Flow for Sacramento River at Bend Bridge

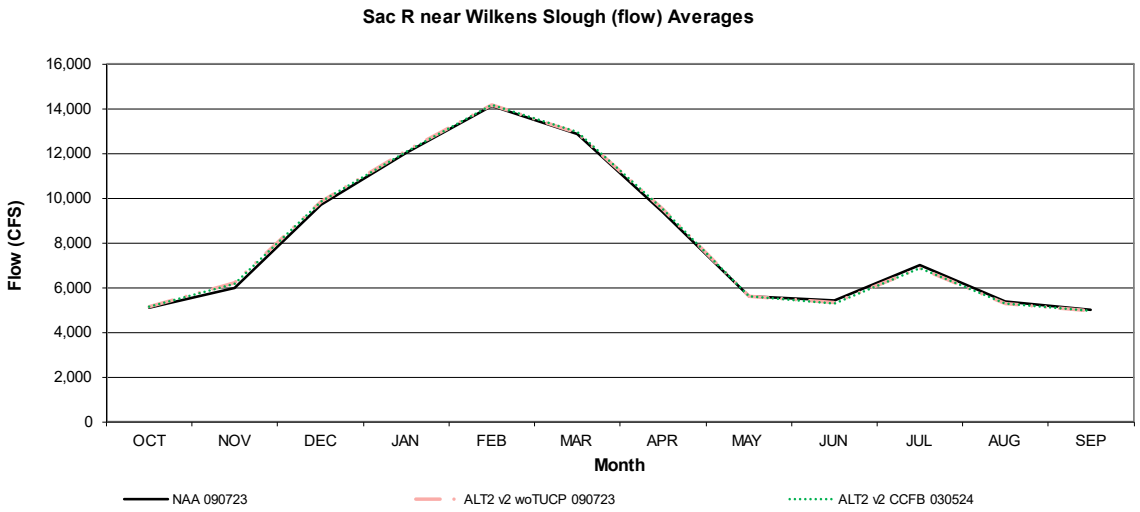

Figure E.1-3. Monthly Long-term Average Flow for Sacramento River near Wilkins Slough

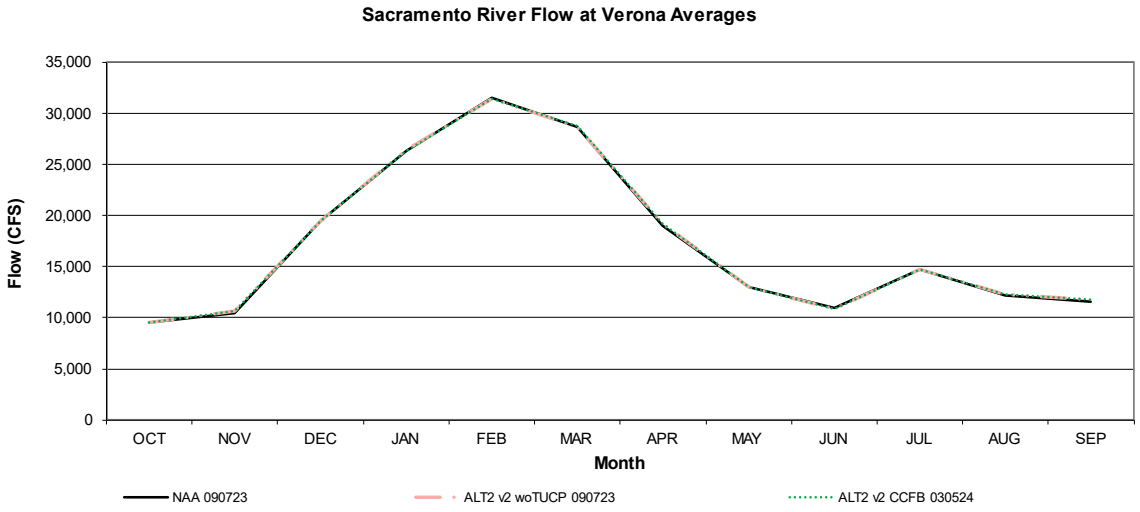

Figure E.1-4. Monthly Long-term Average Flow for Sacramento River at Verona

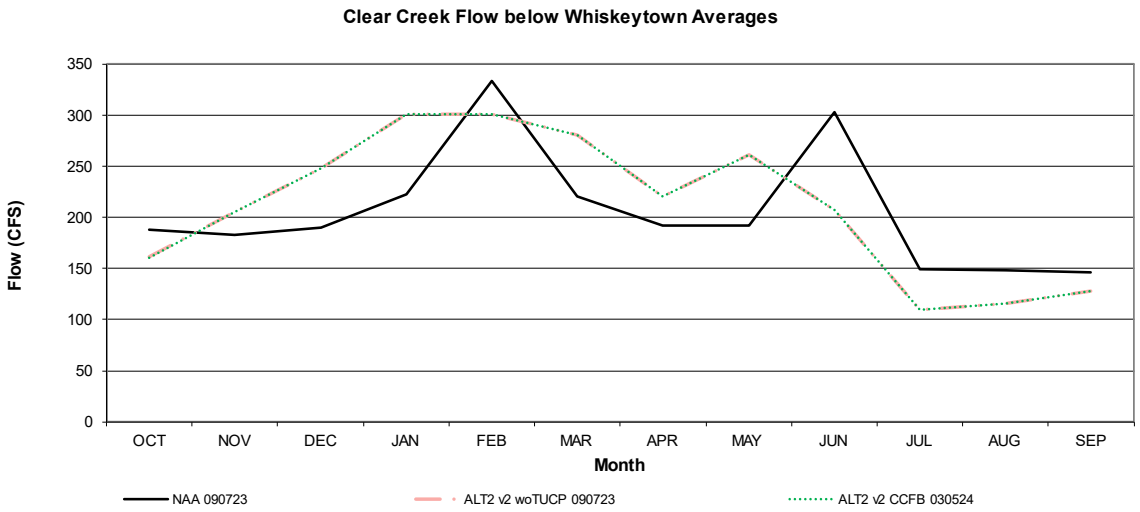

Figure E.1-5. Monthly Long-term Average Flow for Clear Creek below Whiskeytown

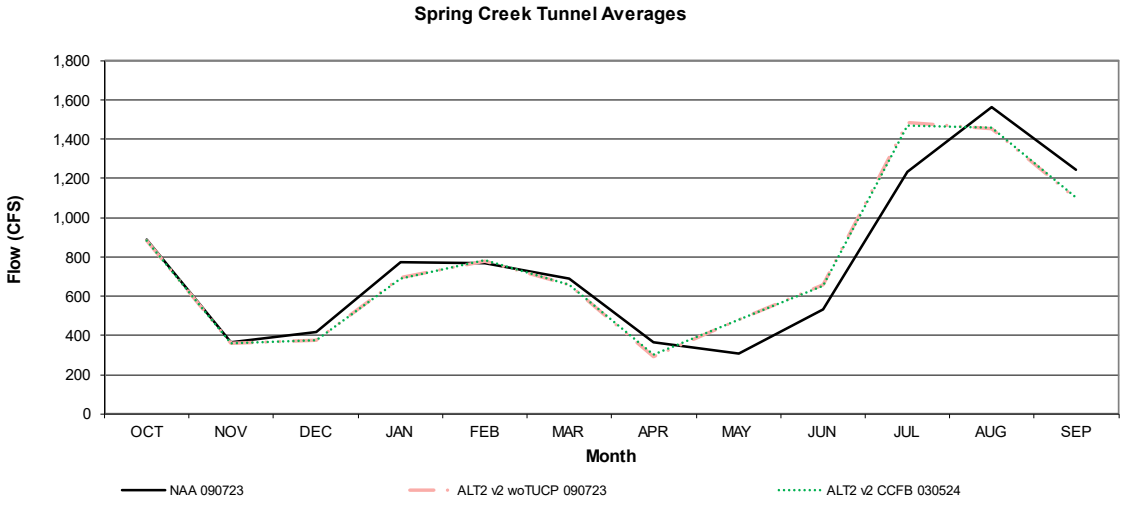

Figure E.1-6. Monthly Long-term Average Spring Creek inflow to Keswick Reservoir

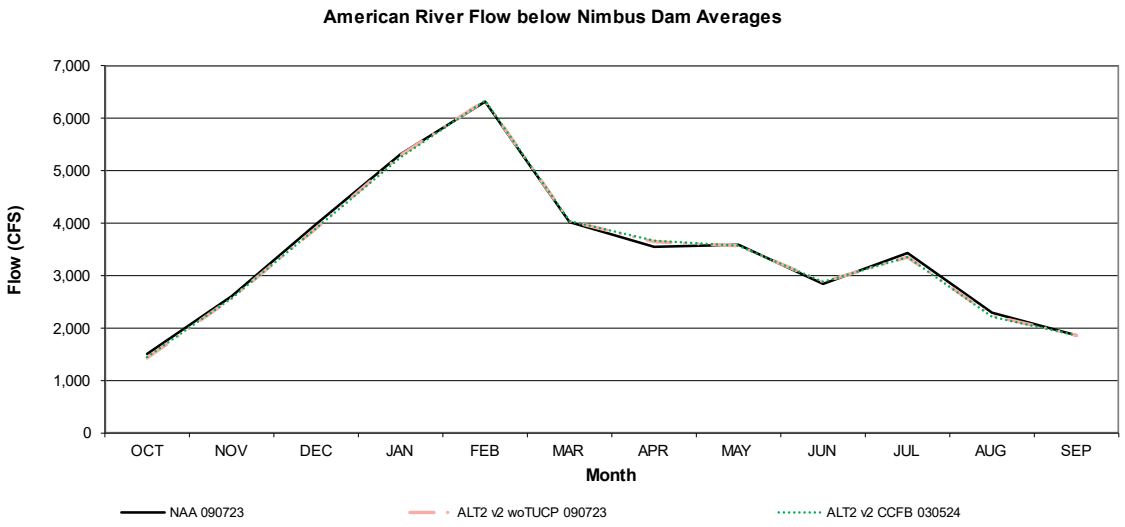

Figure E.1-7. Monthly Long-term Average Flow for American River below Nimbus Dam

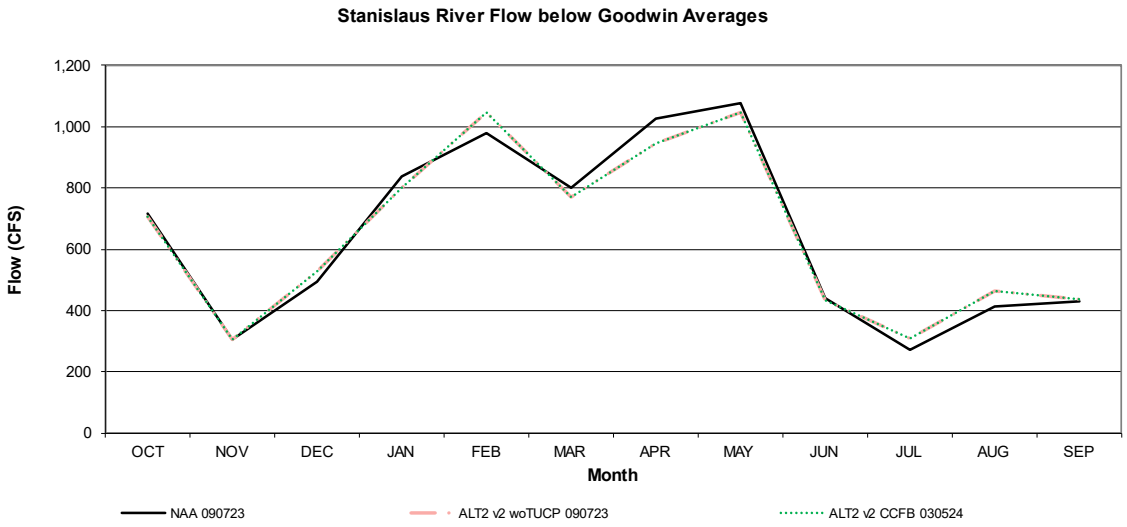

Figure E.1-8. Monthly Long-term Average Flow for Stanislaus River below Goodwin Dam

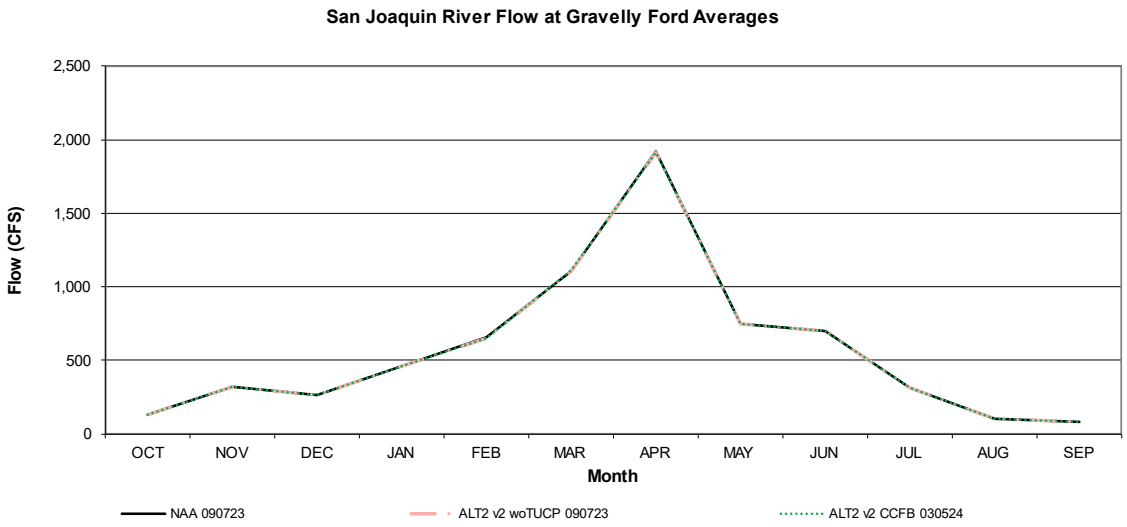

Figure E.1-9. Monthly Long-term Average Flow for San Joaquin River at Gravelly Ford

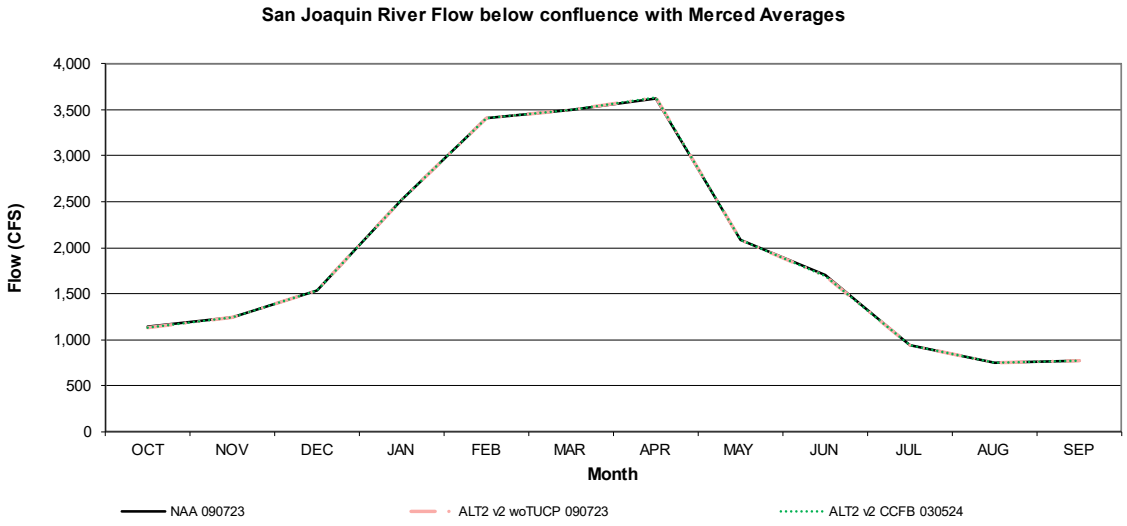

Figure E.1-10. Monthly Long-term Average Flow for San Joaquin River at Merced Confluence

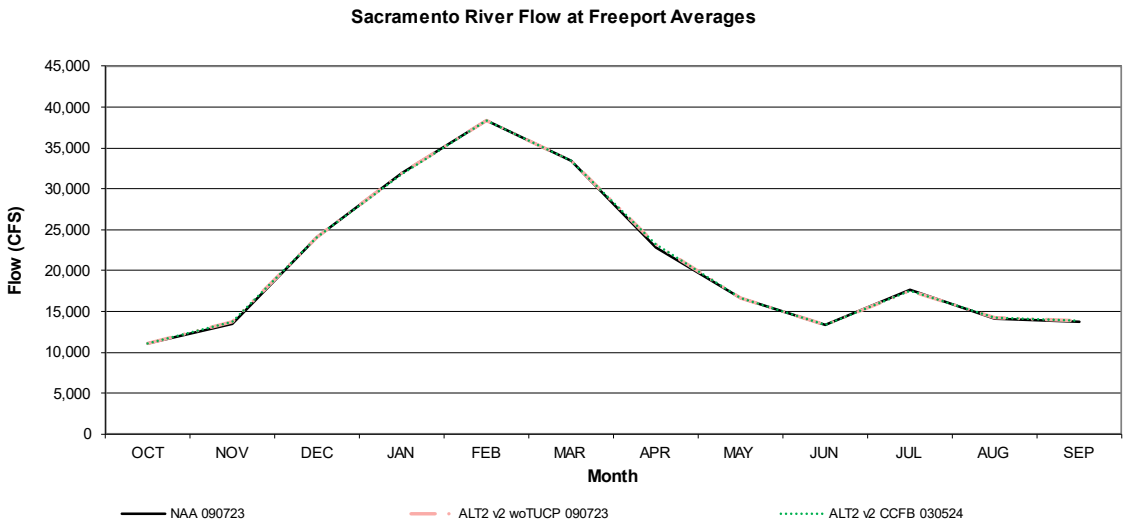

Figure E.1-11. Monthly Long-term Average Flow for Sacramento River at Freeport

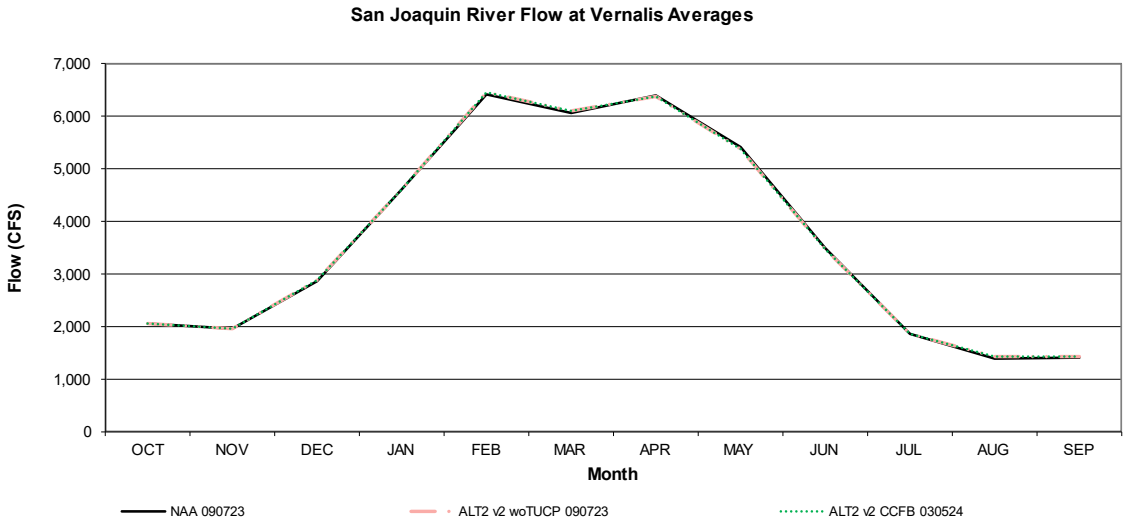

Figure E.1-12. Monthly Long-term Average Flow for San Joaquin River at Vernalis

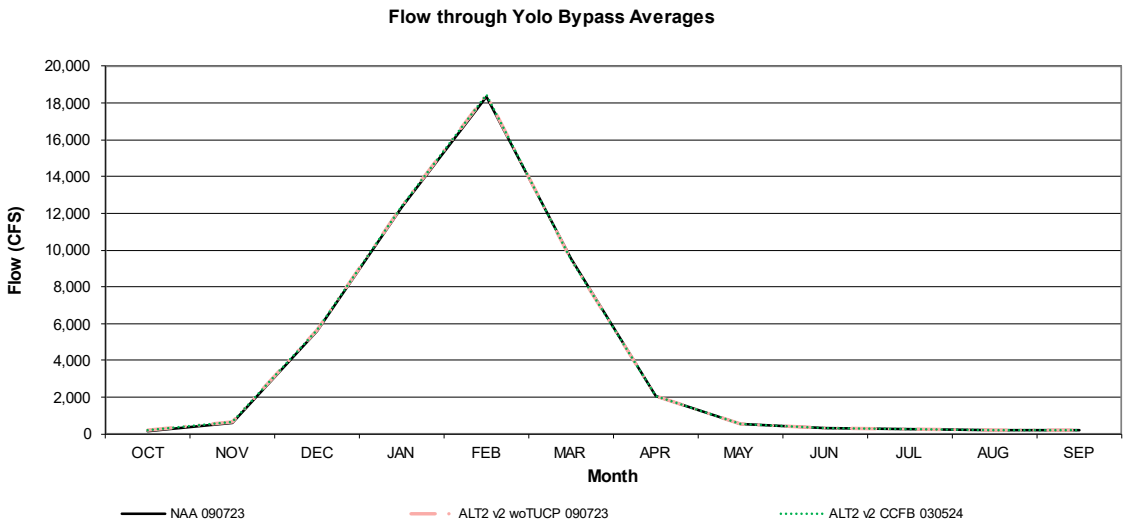

Figure E.1-13. Monthly Long-term Average Flow through Yolo Bypass

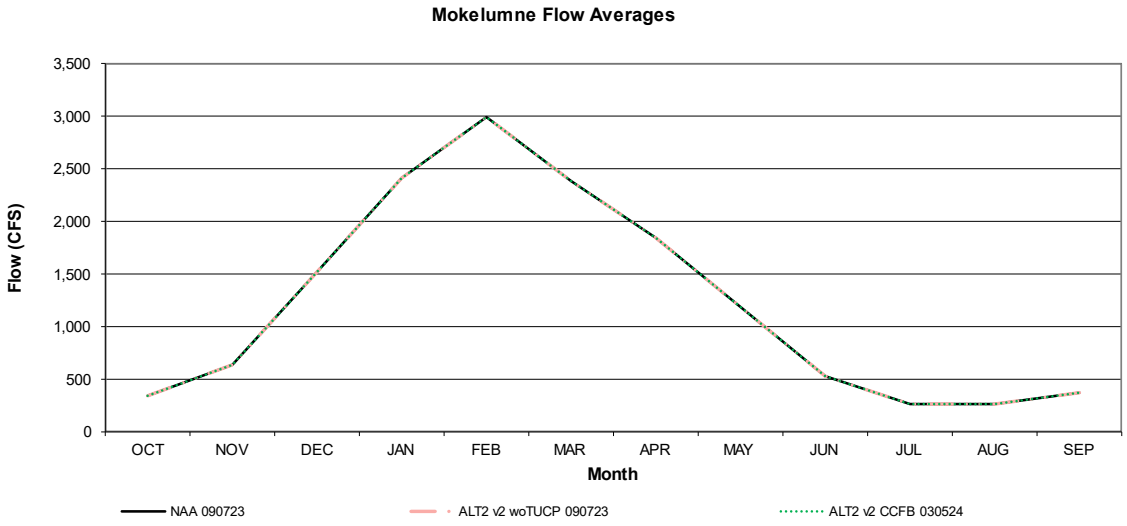

Figure E.1-14. Monthly Average Flow for Mokelumne River

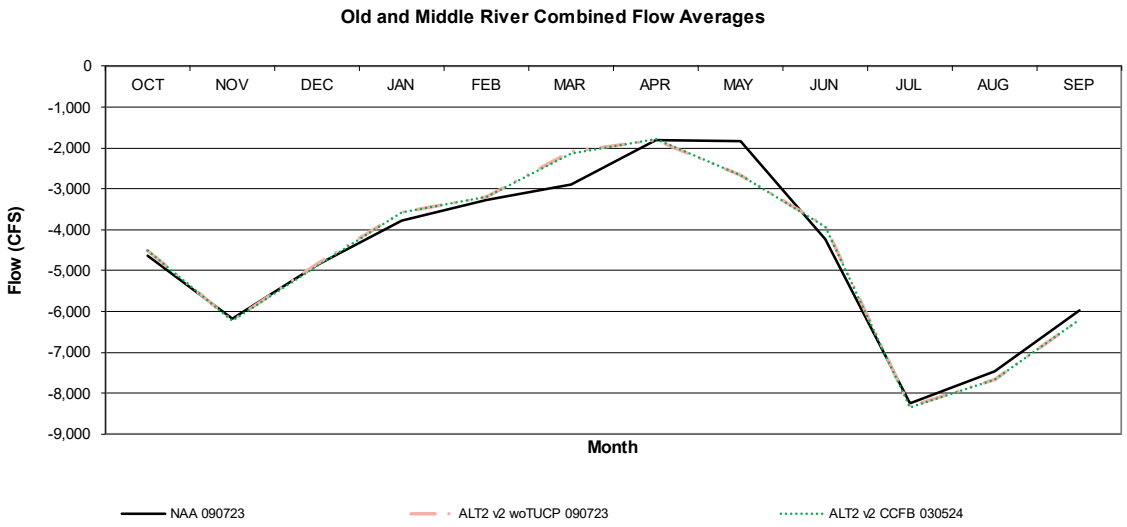

Figure E.1-15. Monthly Long-term Average Old and Middle River Combined Flow

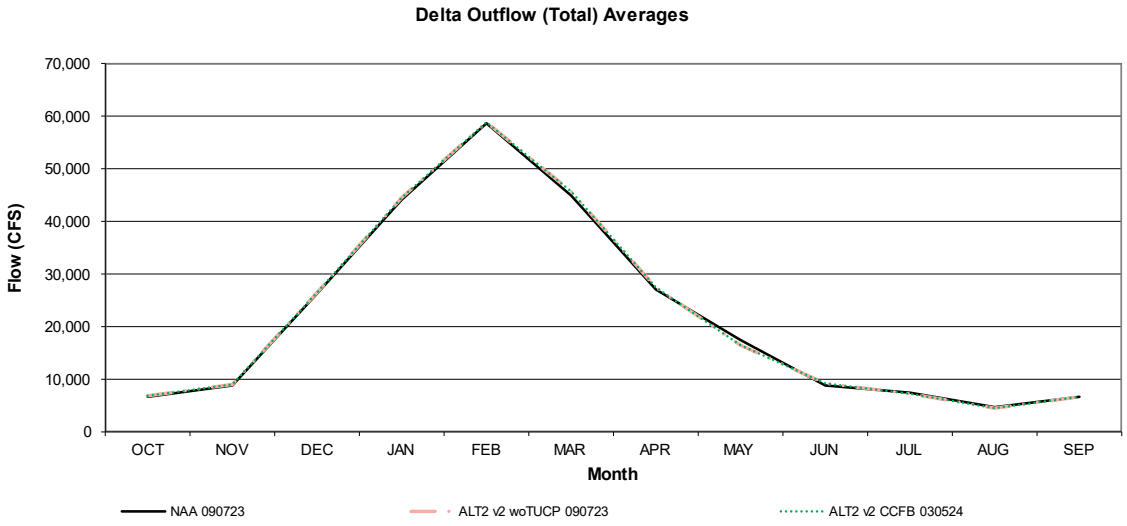

Figure E.1-16. Monthly Long-term Average Delta Outflow

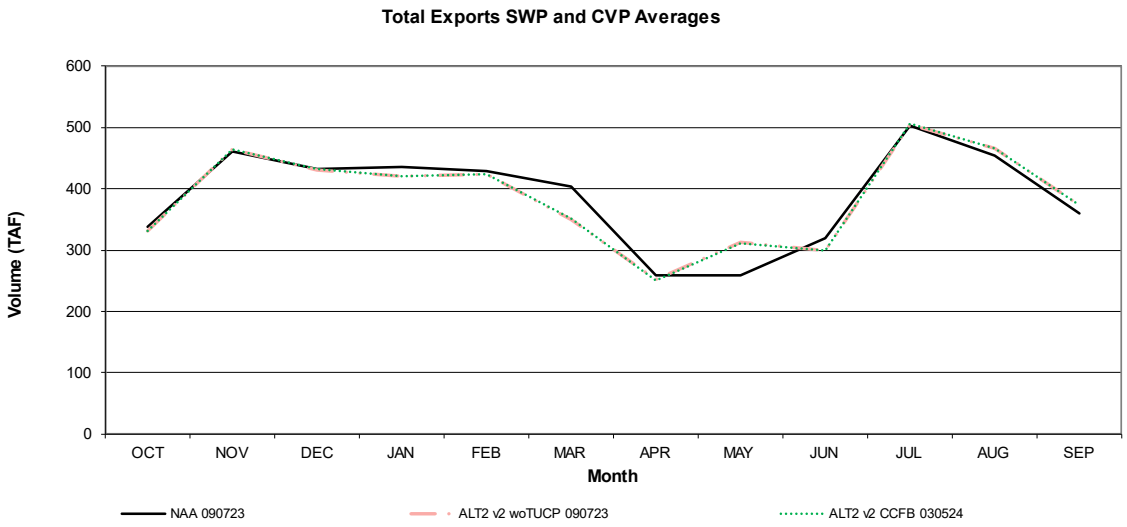

Figure E.1-17. Monthly Long-term Average Delta Exports

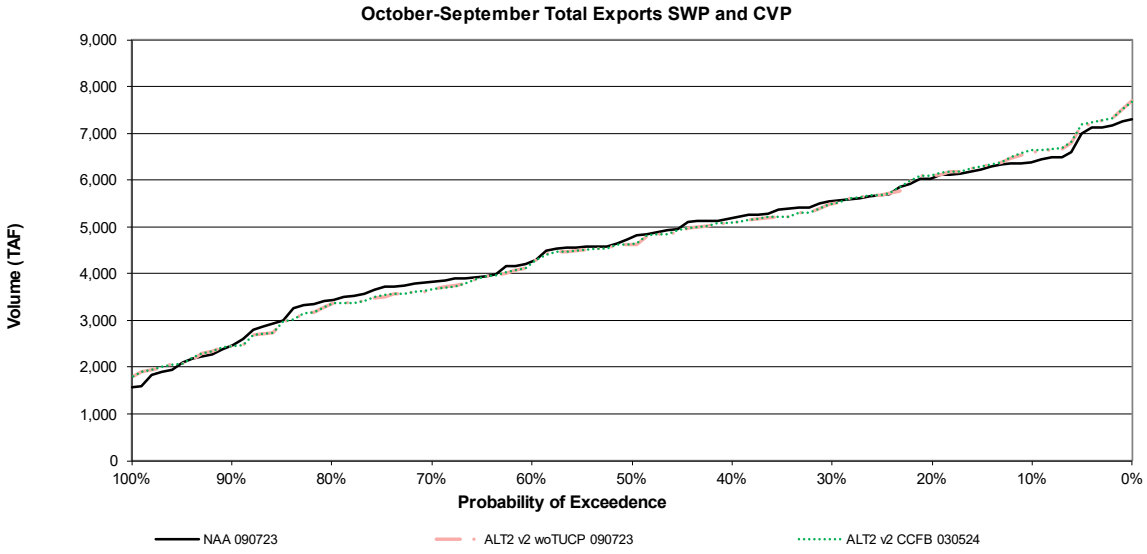

Figure E.1-18. Total Annual (October-September) Delta Exports Exceedance

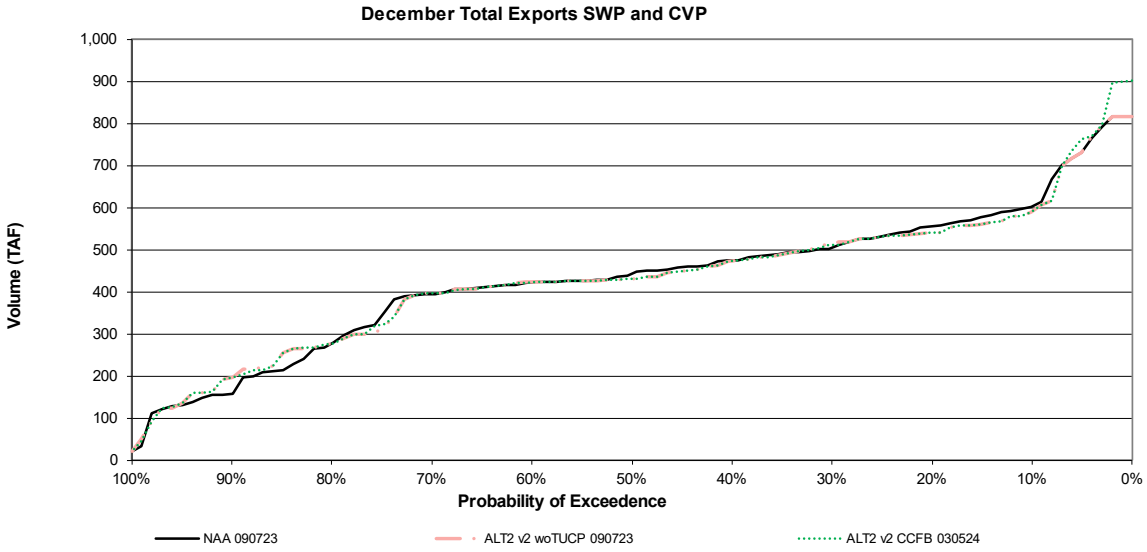

Figure E.1-19. December Annual Delta Exports Exceedance

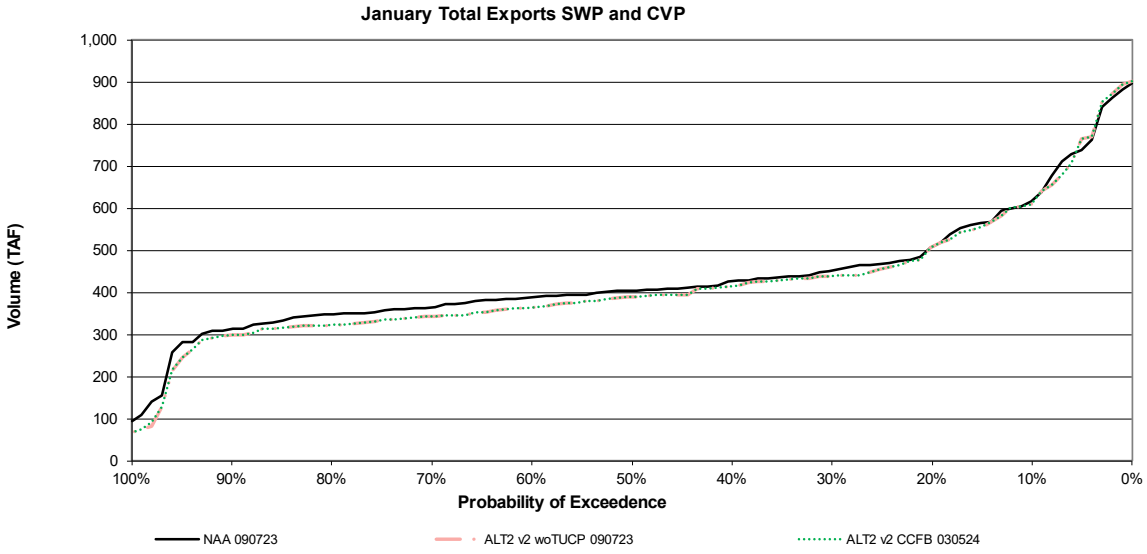

Figure E.1-20. January Annual Delta Exports Exceedance

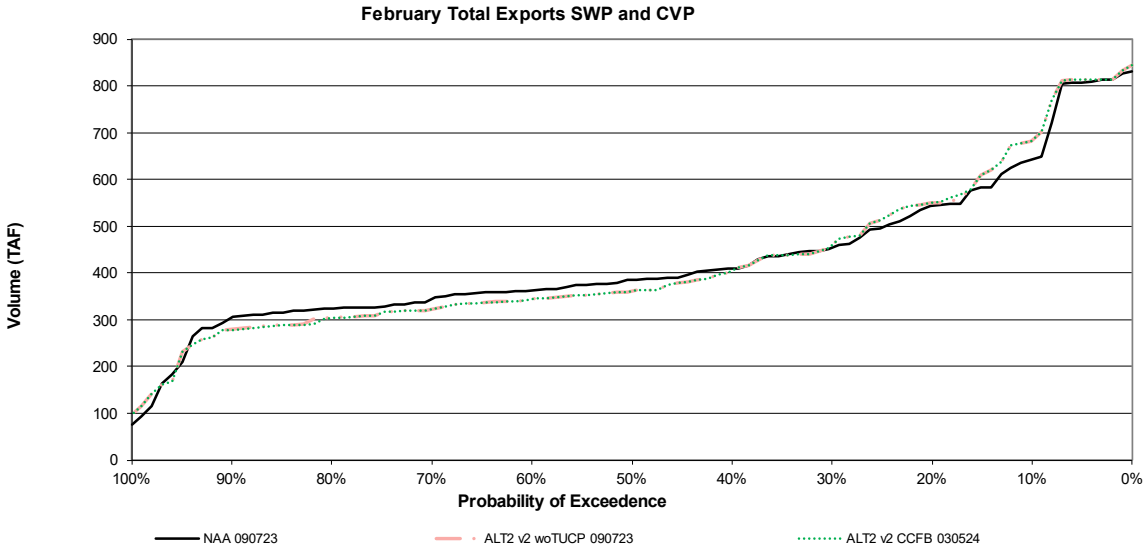

Figure E.1-21. February Annual Delta Exports Exceedance

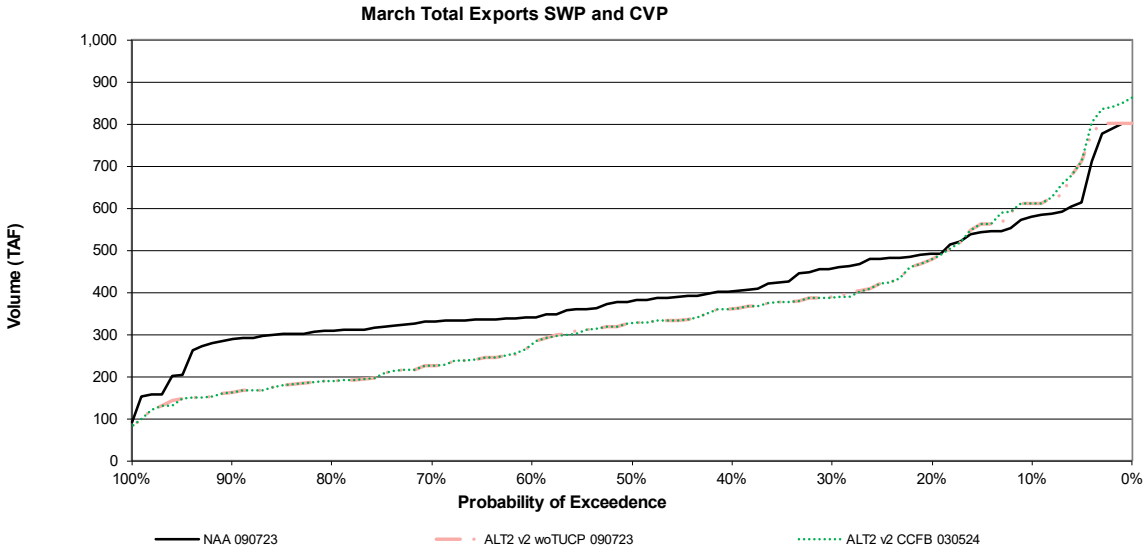

Figure E.1-22. March Annual Delta Exports Exceedance

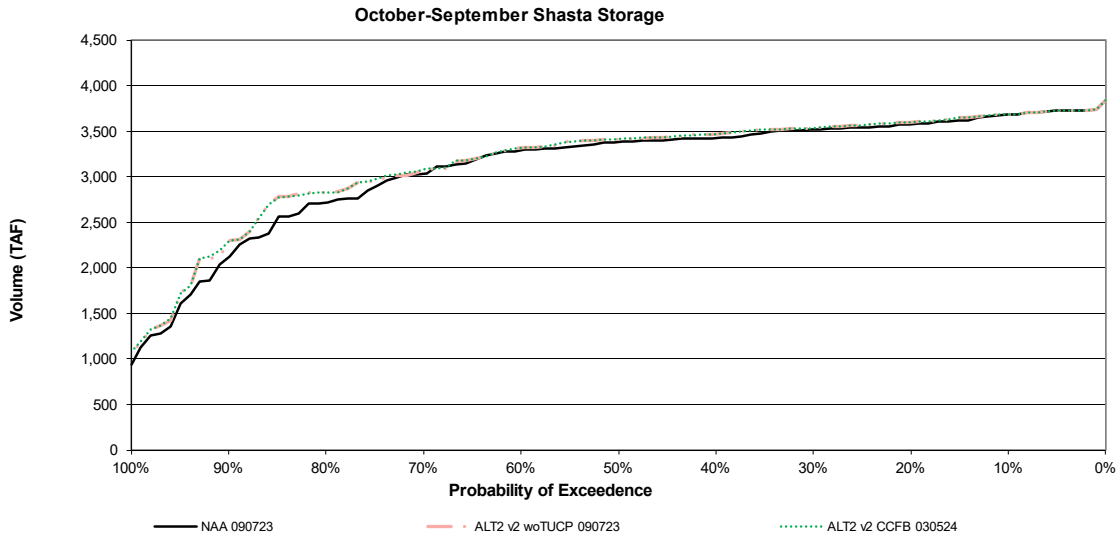

Figure E.1-23. Shasta Total Annual (October – September) Storage Exceedance

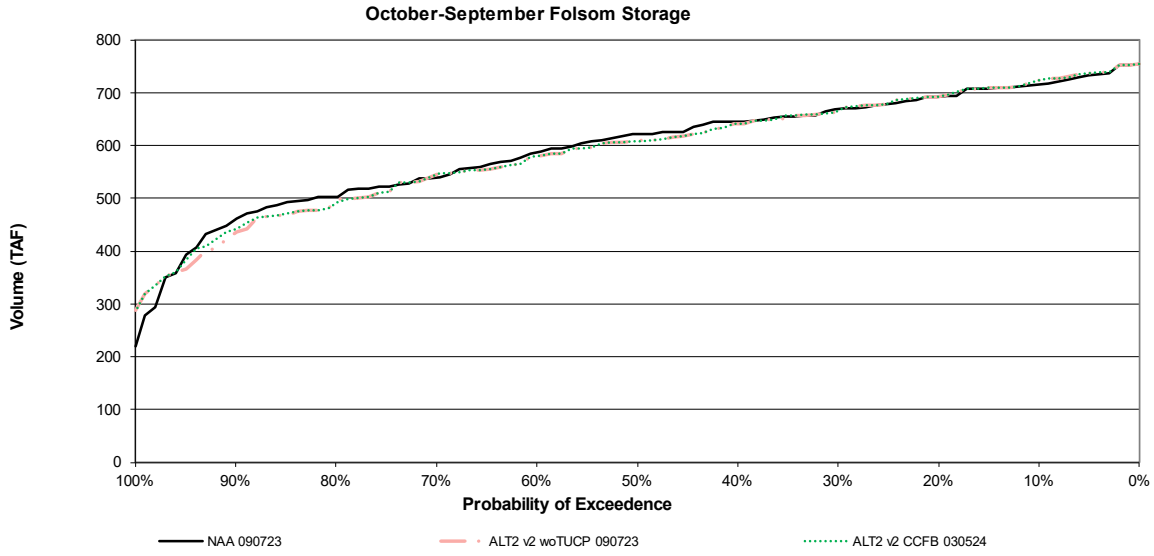

Figure E.1-24. Folsom Total Annual (October – September) Storage Exceedance

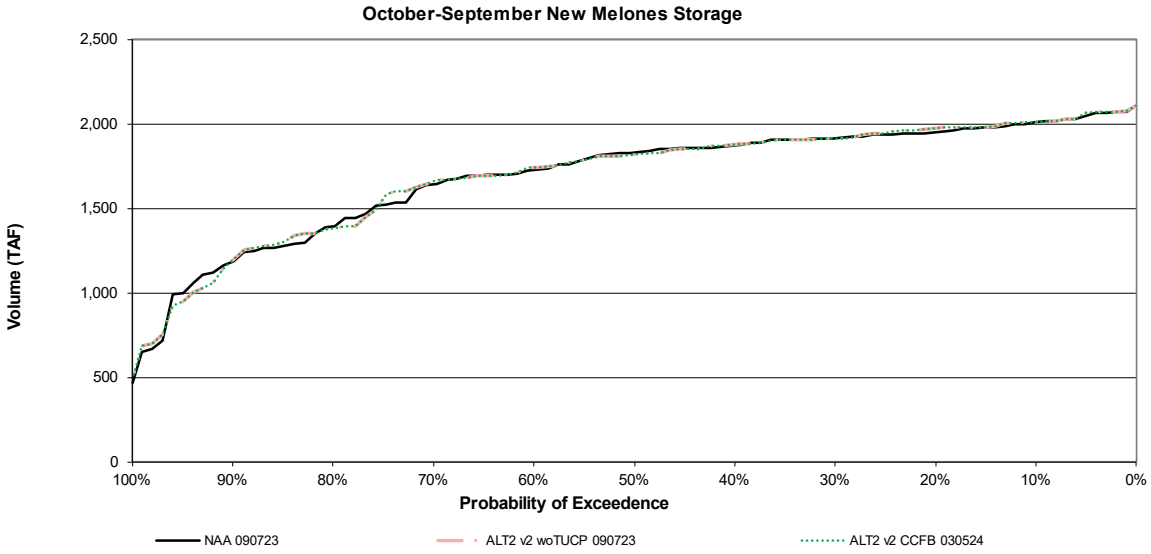

Figure E.1-25. New Melones Total Annual (October – September) Storage Exceedance

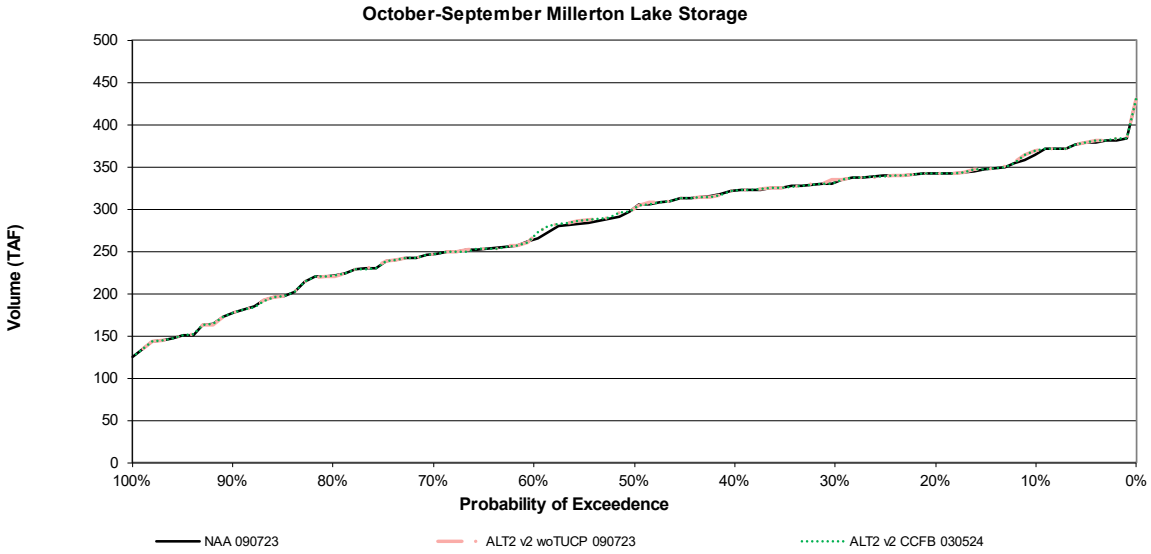

Figure E.1-26. Millerton Total Annual (October – September) Storage Exceedance

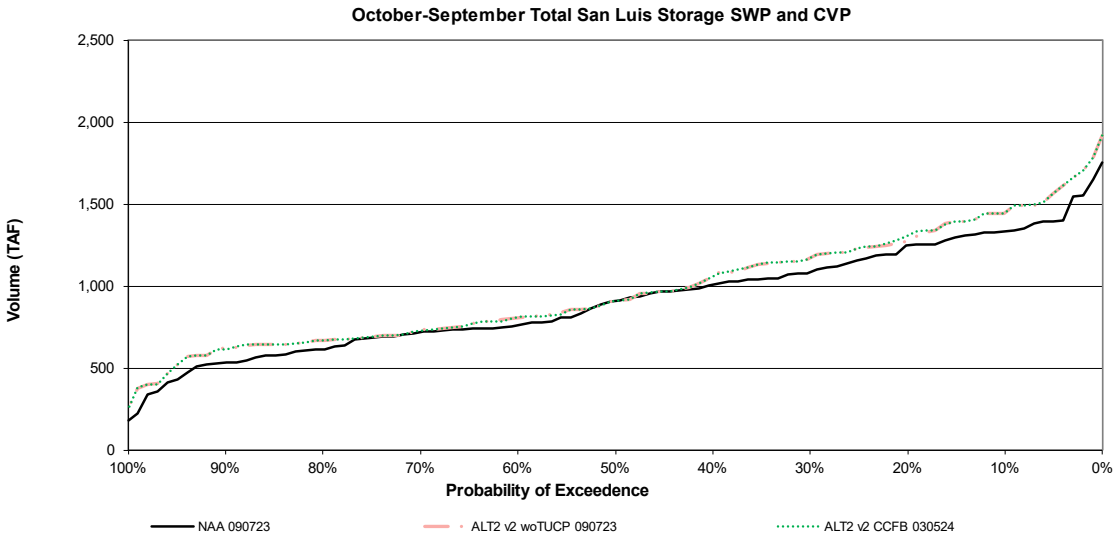

Figure E.1-27. San Luis Total Annual (October – September) Storage Exceedance

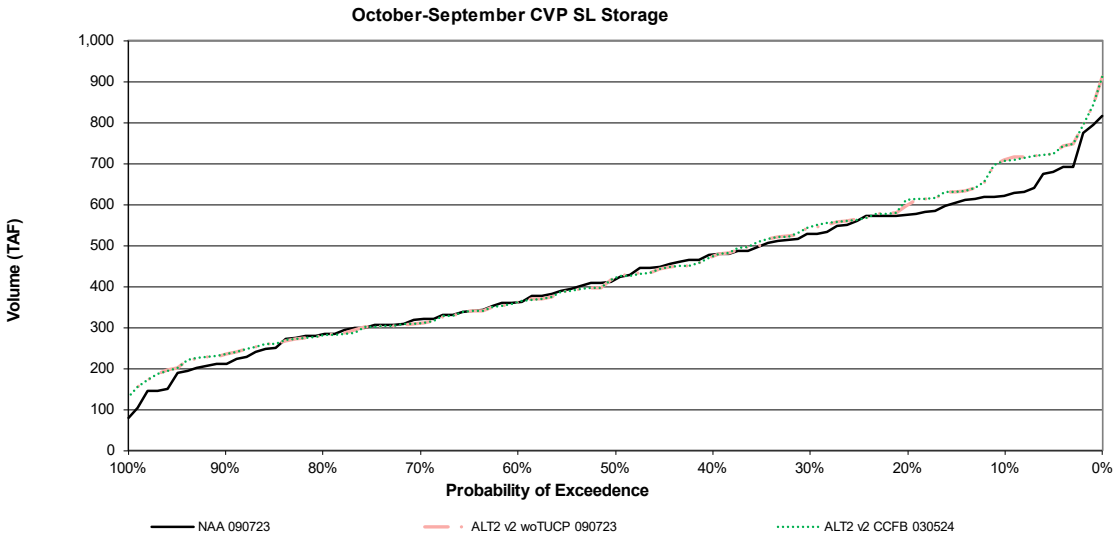

Figure E.1-28. San Luis CVP Total Annual (October – September) Storage Exceedance

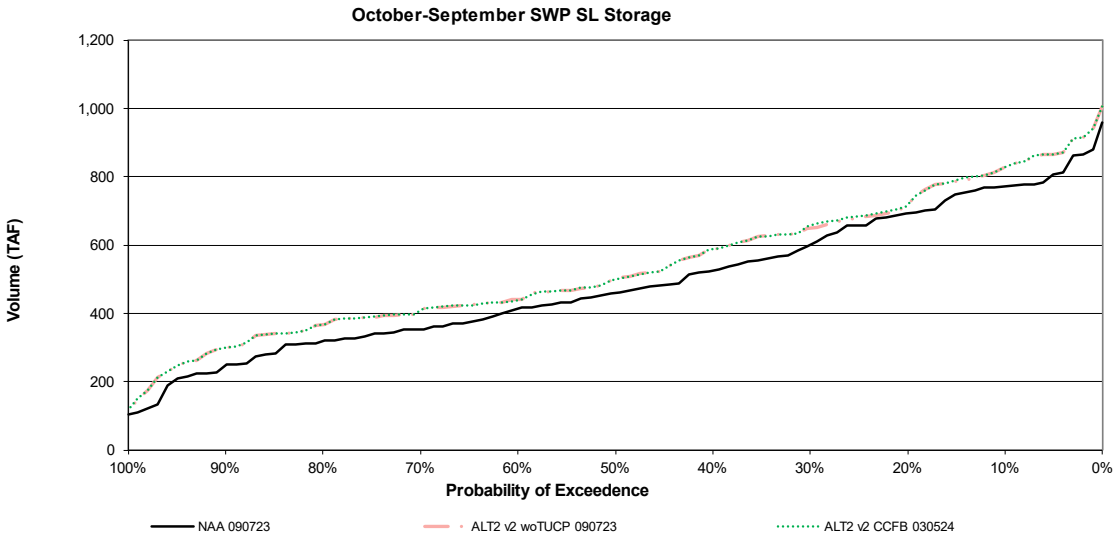

Figure E.1-29. San Luis SWP Total Annual (October – September) Storage Exceedance