

CalSim-II Allocations Module for State Water Project Simulation

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Ryan Wilbur, P.E.

California Department of Water Resources



Background

- DWR SWP Operations Control Office Requested analysis of water supply guidelines used to develop SWP allocations
- WSI-DI/Del-Car procedure used in CalSim-II was determined to be insufficient for analysis
- Worked extensively with SWP OCO, SWC and USBR CVO
- Developed CAM – mimics DCO tools used by SWP OCO
- Established thorough testing of CAM with DCO
- Developed data set of forecasted system inflows
- Linked CAM w/ CalSim-II
- Updated CalSim-II SWP Allocation Procedure
- Performed 25 simulations with various rules

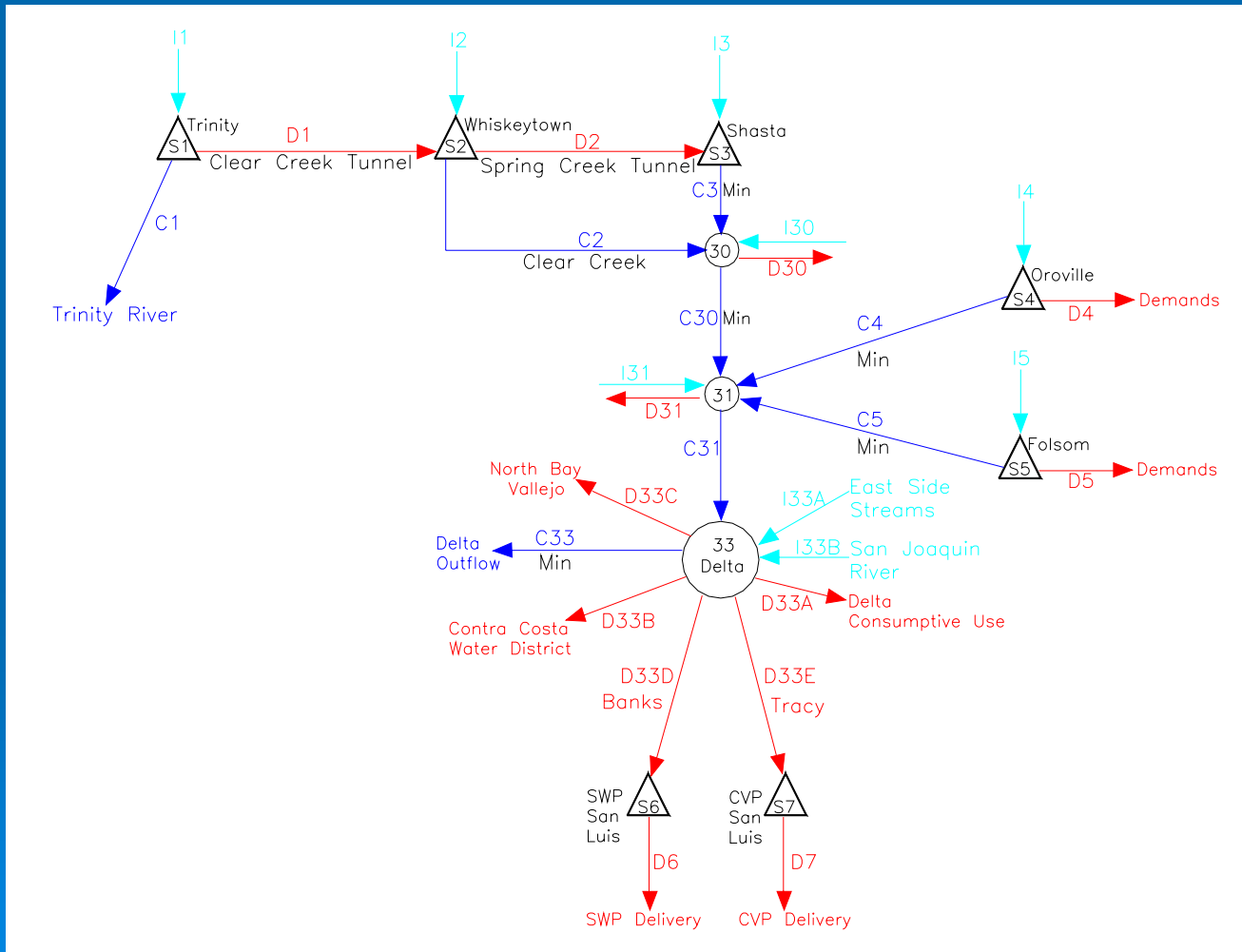


CalSim Allocation Model (CAM)

- Independent “cycle”
- Monthly time step
- One year time horizon
- Mimics SWP DCO tools
- Maximize deliveries subject to:
 - Physical system connectivity & capacities
 - Forecasted system inflows
 - D1641 regulations
 - Operating rules



CAM Network



CAM – CalSim-II Link

- CAM determines SWP allocations
- WSI-DI determines CVP allocations
- CalSim-II uses the annual project allocation (from CAM or WSI-DI) and distributes it to each contractor for that month of simulation



Updated CalSim-II SWP Allocation Logic

- 3 demand patterns (30, 50, & 100%)
- Article 56 “Extended Carryover” explicitly modeled
 - Storage account in San Luis
 - Rules for “spilling” Art. 56 storage
 - Water stored at end of year
 - Art. 56 deliveries
- Contractor-based allocations
 - Table A and Article 56



Sample Simulations

- 2001 OCAP “Today” D1641
- Monterey EIR Demands
- Improved Feather River Minimum Flows

Ex.	Forecasted Hydrology	Oroville Carryover Target Rule	Description
A	Jan-Mar 99% Apr-May 90%	$1+0.5*(\text{Sep-1}) \text{ MAF}$	WSI-DI
B	Jan 95% Feb-May 99%	$1+0.5*(\text{Sep-1}) \text{ MAF}$	Pre-2005 Rules
C	Jan-May 90%	$1+X*(\text{Sep-1}) \text{ MAF}$ $X=0.5*\text{Allocation}\%$	2005 Rules



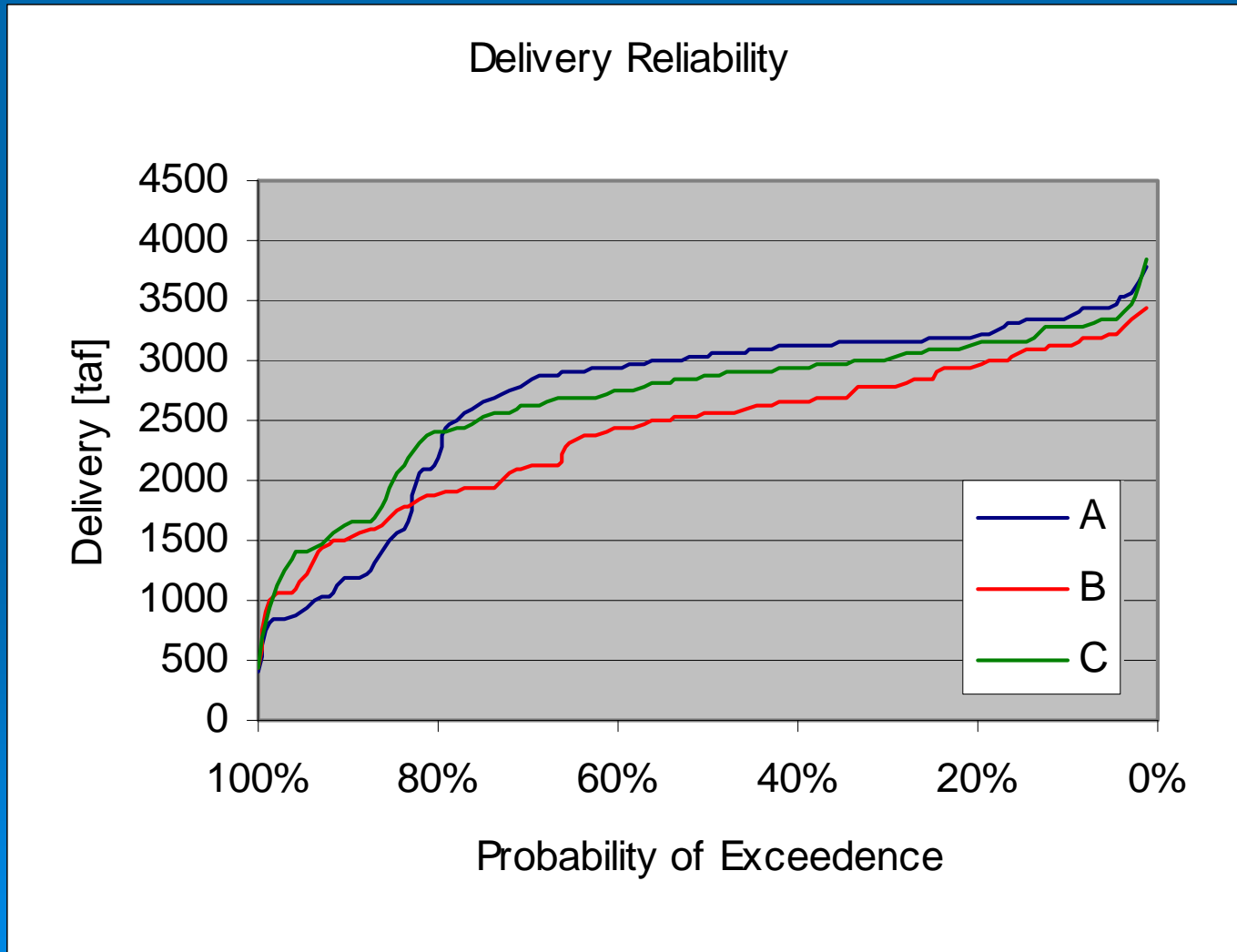
Sample Results – Summary

Alternative	SWP Deliveries						
	Table A w/Art 56				Art. 21		
	1922-1993	1928-1934	1977	1988-1992	1922-1993	1928-1934	1988-1992
A	2703	1559	420	1804	273	242	97
B	2394	1740	442	1623	339	198	92
C	2666	1836	426	1897	276	176	54

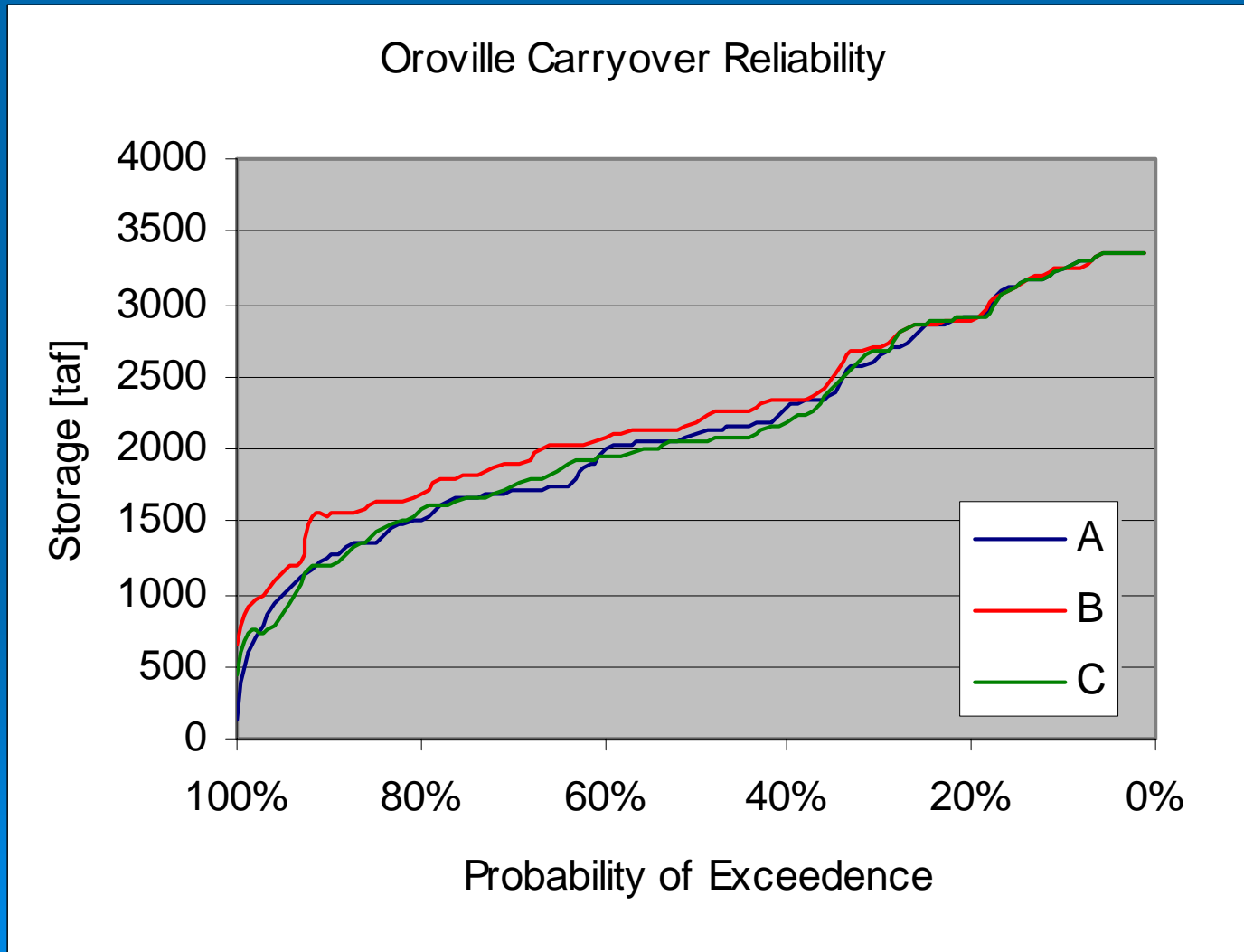
Alternative	Carryover Storage				
	Oroville			San Luis	Oro + SL
	1922-1993	1928-1934	1988-1992	1922-1993	1977
A	2137	1299	1487	524	340
B	2258	1417	1745	599	1071
C	2139	1155	1560	527	843



Sample Results – Delivery Reliability



Sample Results – Carryover Storage Reliability



Conclusions of Analysis

- CalSim-II w/ CAM & new allocation procedure provides a better representation of actual SWP operating practices
- The effects of hydrologic uncertainty, reservoir operating rules and timing of allocations (not shown) may be analyzed in terms of their impacts on SWP allocations
- The pre-2005 operating guidelines are very conservative and provides room for improvements in delivery capability with little risk of lower reservoir storages
- This analysis provided the basis for the 2005 SWP water supply guidelines update used for determining allocations



Questions?

