

# CalSim-II Allocations Module for State Water Project Simulation

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Ryan Wilbur, P.E.

California Department of Water Resources



# Background

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- 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



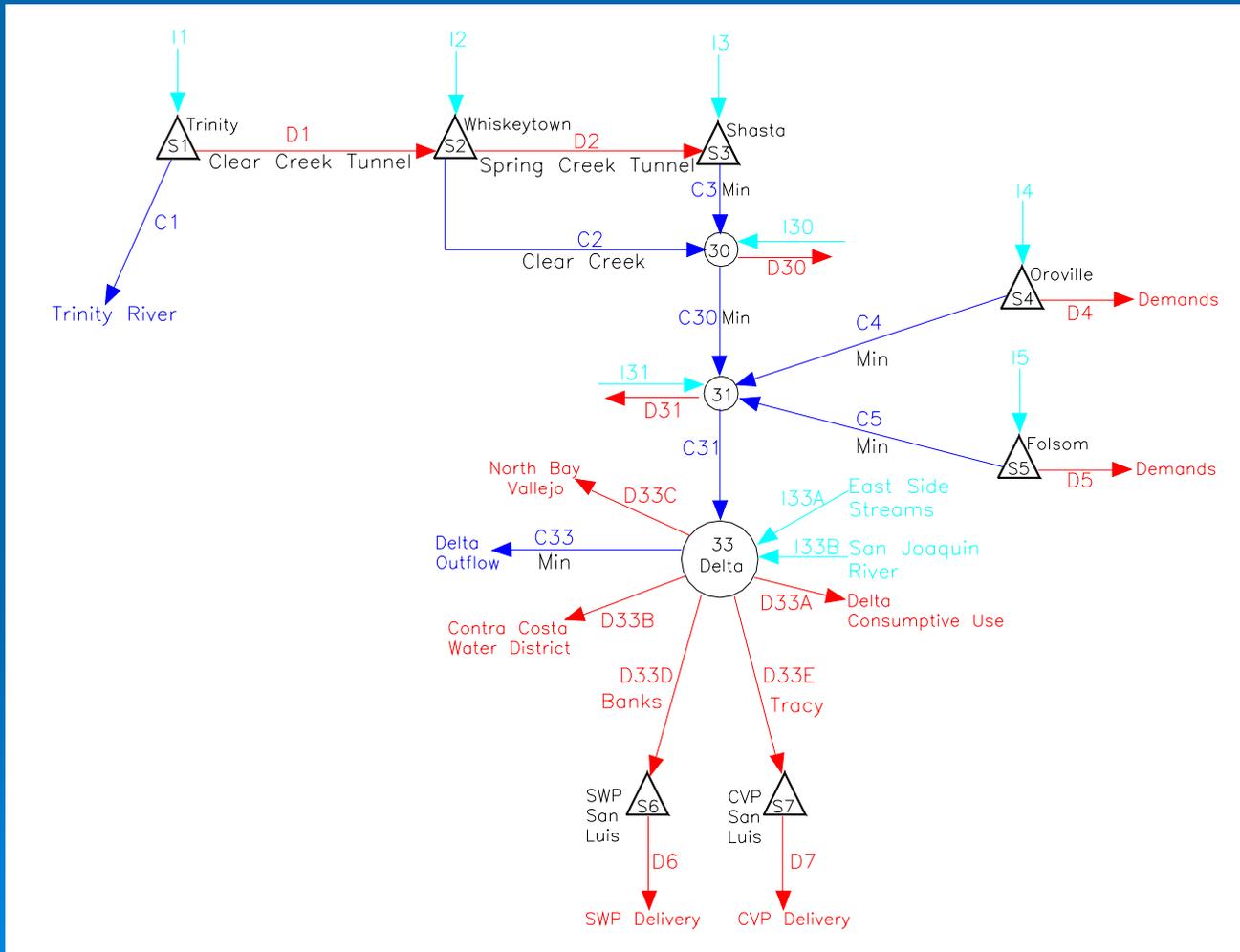
# CalSim Allocation Model (CAM)

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- 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

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- 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

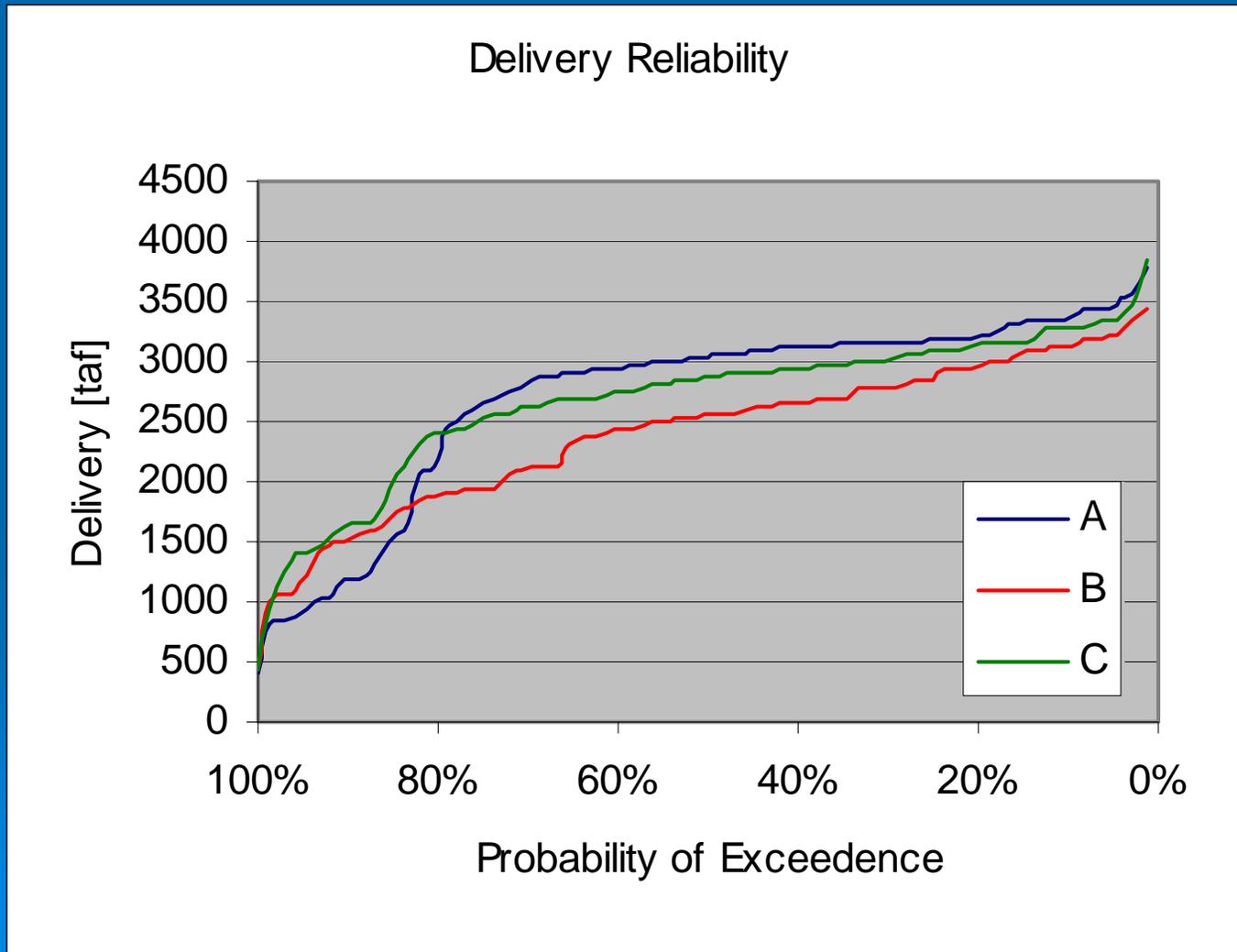
# Sample Results – Summary

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

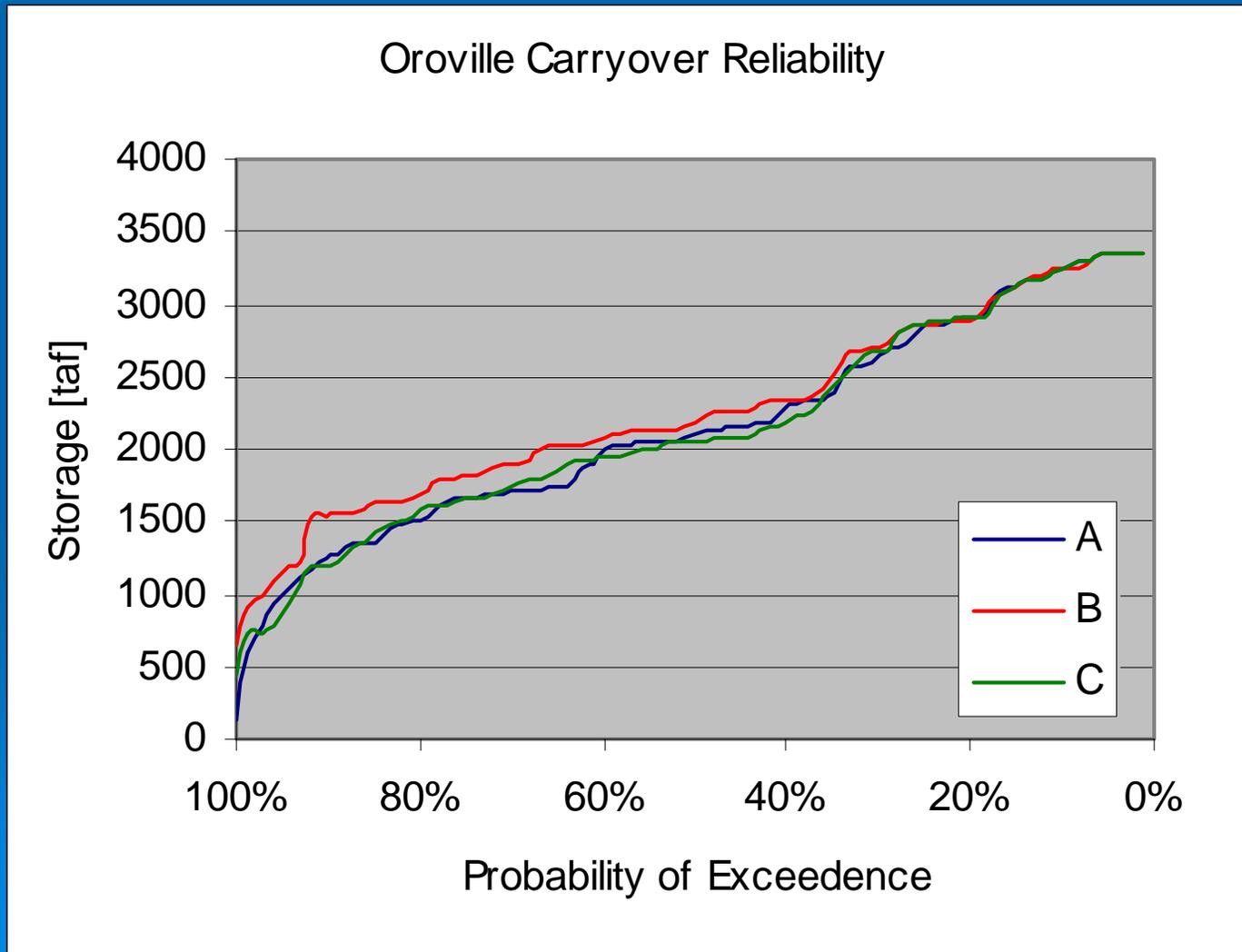
Alternative	Carryover Storage				
	Oroville			San Luis	Oro + SL
	1922-1993	1928-1934	1988-1992	1922-1993	1977
A	2137	1299	1487	524	340
B	2258	1417	1745	599	1071
C	2139	1155	1560	527	843



# Sample Results – Delivery Reliability



# Sample Results – Carryover Storage Reliability



# Conclusions of Analysis

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- 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



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# Questions?

