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Simulation of Sites Reservoir Delta and Storage Exchange Operations in CalSim 3

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Tom FitzHugh (Stantec)
Puneet Khatavkar (Stantec)
Shankar Parvathinathan (MBK)

Disclaimer

This is a work in progress. All slides, figures, tables, and information is draft and pre-decisional but is presented with permission from the Sites Project Authority.

Outline

- Level 4 Refuge South of Delta Deliveries
- PWA South of Delta Deliveries (including Oroville Exchange)
- Shasta Exchange
- PWA and Level 4 Carriage Water Operations

Cycle Structure

Implemented in later cycles in CalSim 3:

- ….
- WHEELCVC cycle
- WHEELJPOD cycle
- STOREXCH cycle (Shasta storage exchange)
- SITES_EXPORT cycle (RL4 and PWA exports)
- ITP cycle

Level 4 Refuge South of Delta Deliveries

- Highest priority Sites SOD export operation
- Meets additional CVP Refuge demands above Level 2 demands already simulated in CalSim 3
- Deliveries to:
  - Refuges off lower DMC and Mendota Pool (exported through Jones Pumping Plant)
  - Kern and Pixley National Wildlife Refuges (exported through Banks Pumping Plant)

Level 4 Refuge South of Delta Deliveries

- Deliveries in all SJR 60-20-20 water year types except Wet
- Deliveries July-December using remaining export capacity after SWP/CVP/wheeling/ transfer operations
- Annual delivery target based on storage in Sites Refuge Level 4 account (after providing for NOD refuges)
- Monthly Level 4 demands
- Releases also include carriage water

PWA South of Delta Deliveries

- Provides deliveries to 14 SWP Table A contractors
  - 1 on North Bay Aqueduct (American Canyon)
  - 13 along California Aqueduct
- Deliveries split between contractors based on fixed assumed participation

PWA South of Delta Deliveries

The following are the South of the Delta participants receiving water from Sites Reservoir:

1 - Antelope Valley East Kern Water Agency
2 - Coachella Valley Water District
3 - Desert Water Agency
4 - Irvine Ranch Water District
5 - Metropolitan Water District of Southern California (West Branch)
6 - Metropolitan Water District of Southern California (East Branch)
7 - Rosedale-Rio Bravo Water District
8 - San Bernardino Valley Municipal Water District
9 - San Gorgonio Pass Water Agency
10 - Santa Clara Valley Water District
11 - Santa Clarita Valley Water Agency
12 - Wheeler Ridge-Maricopa Water Storage District
13 - Zone 7 Water Agency

PWA South of Delta Deliveries

- Deliveries July-November using remaining Banks export capacity after SWP/CVP/ wheeling/transfer/Sites RL4 operations
- Integrates releases from Sites PWA Export account and also from storage exchange accounts in Oroville and Shasta

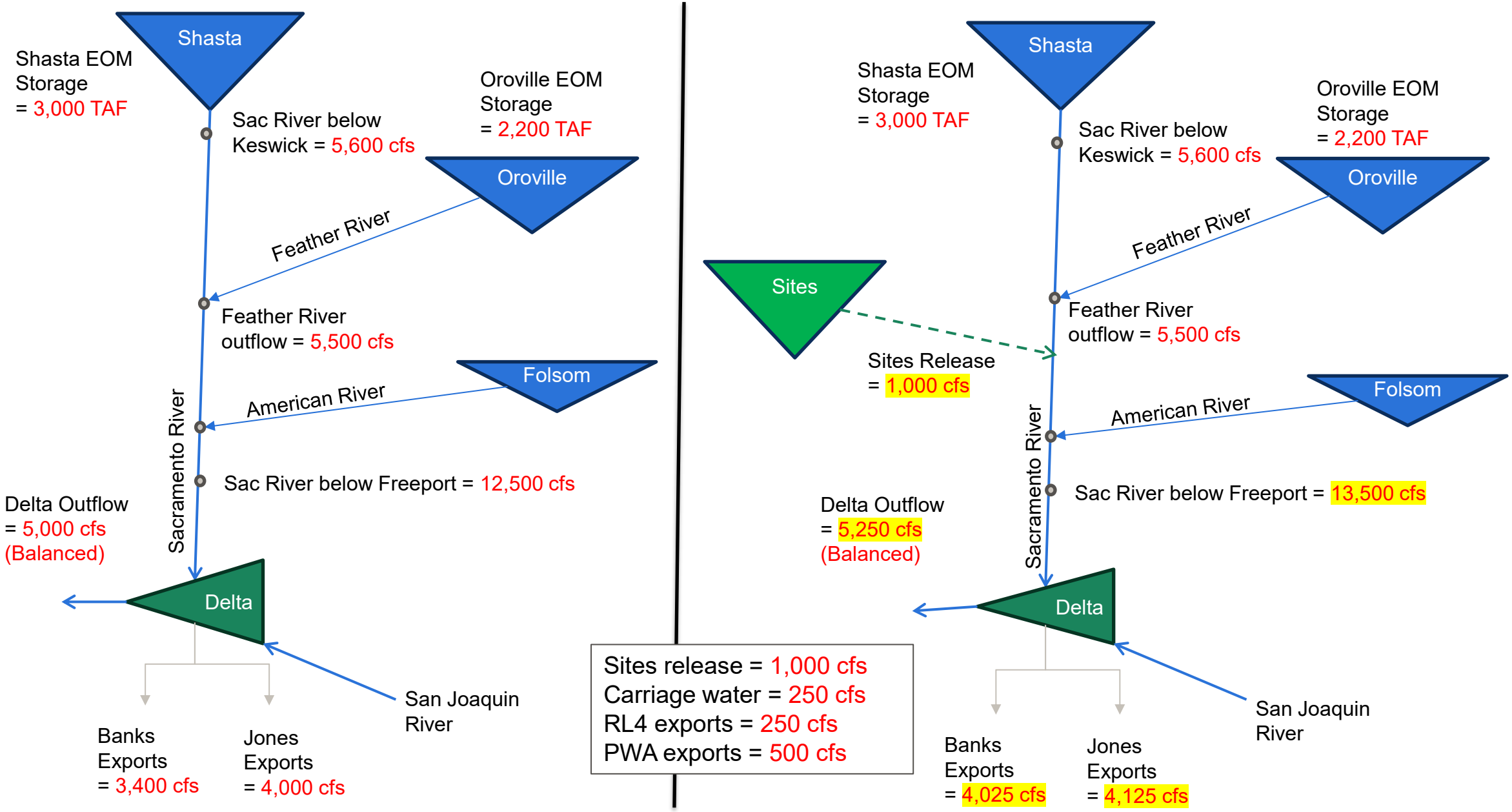
PWA South of Delta Deliveries

Annual PWA delivery target is minimum of:	
Table A allocation-based target	**Target value (taf)**
Allocation < 65%	PWA export account storage in Sites and Shasta exchange account
Allocation 65% - 85%	Half of PWA export account storage in Sites and Shasta exchange account
Allocation > 85%	0
Water year target	
Wet/AN	40
BN	300
Dry/Critical	550
Available capacity through July-November	Minimum of estimated Sites release capacity and Delta export capacity

PWA South of Delta Deliveries

- Monthly PWA exports determined based on:
  - Remaining volume of annual delivery target not met yet
  - Available PWA export storage
  - Available Sites release capacity
  - Available capacity at Banks
- Releases also include carriage water

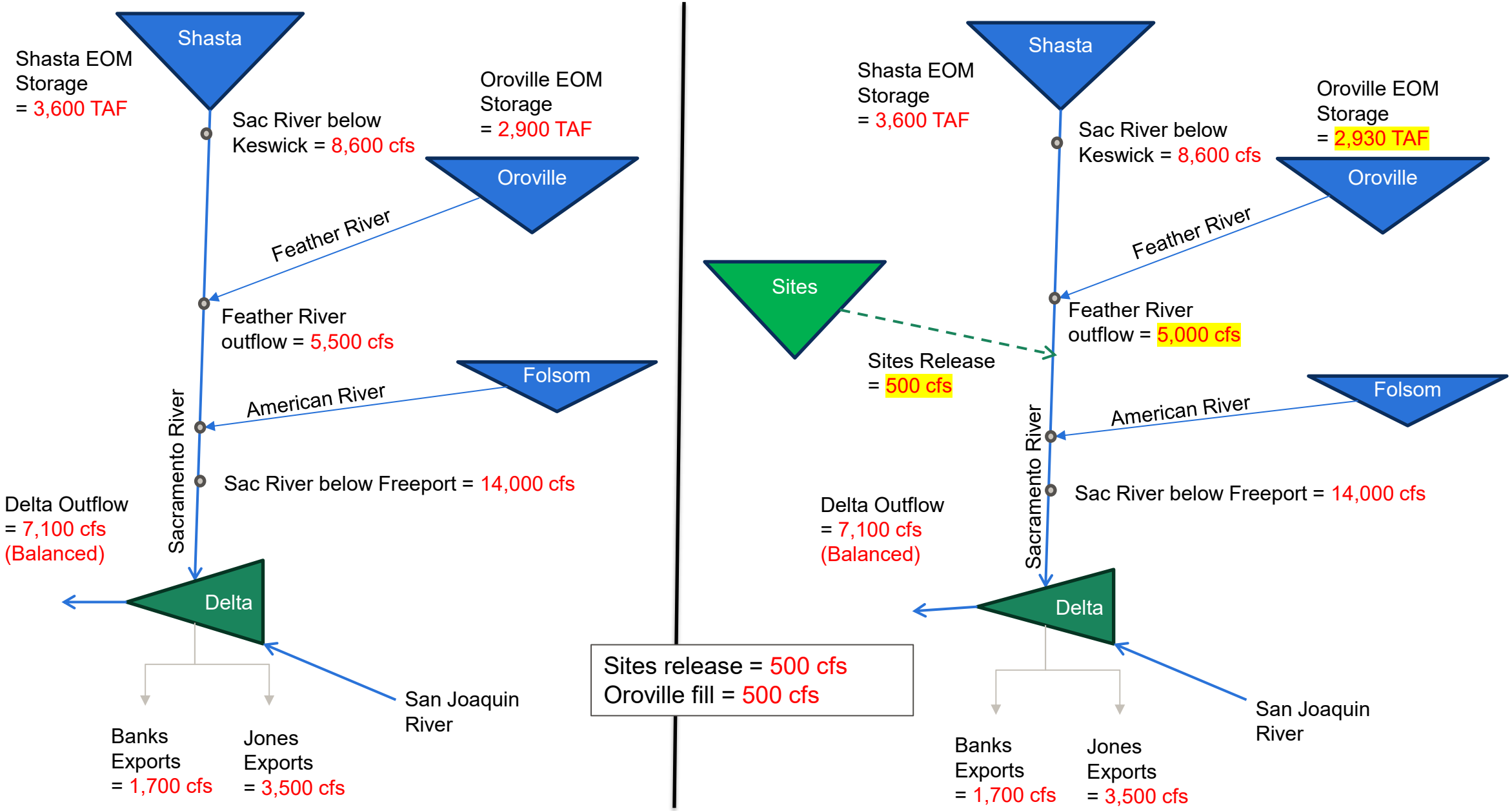
Example Operation: Level 4 Refuge and PWA South of Delta Deliveries



PWA Oroville Exchange Operation

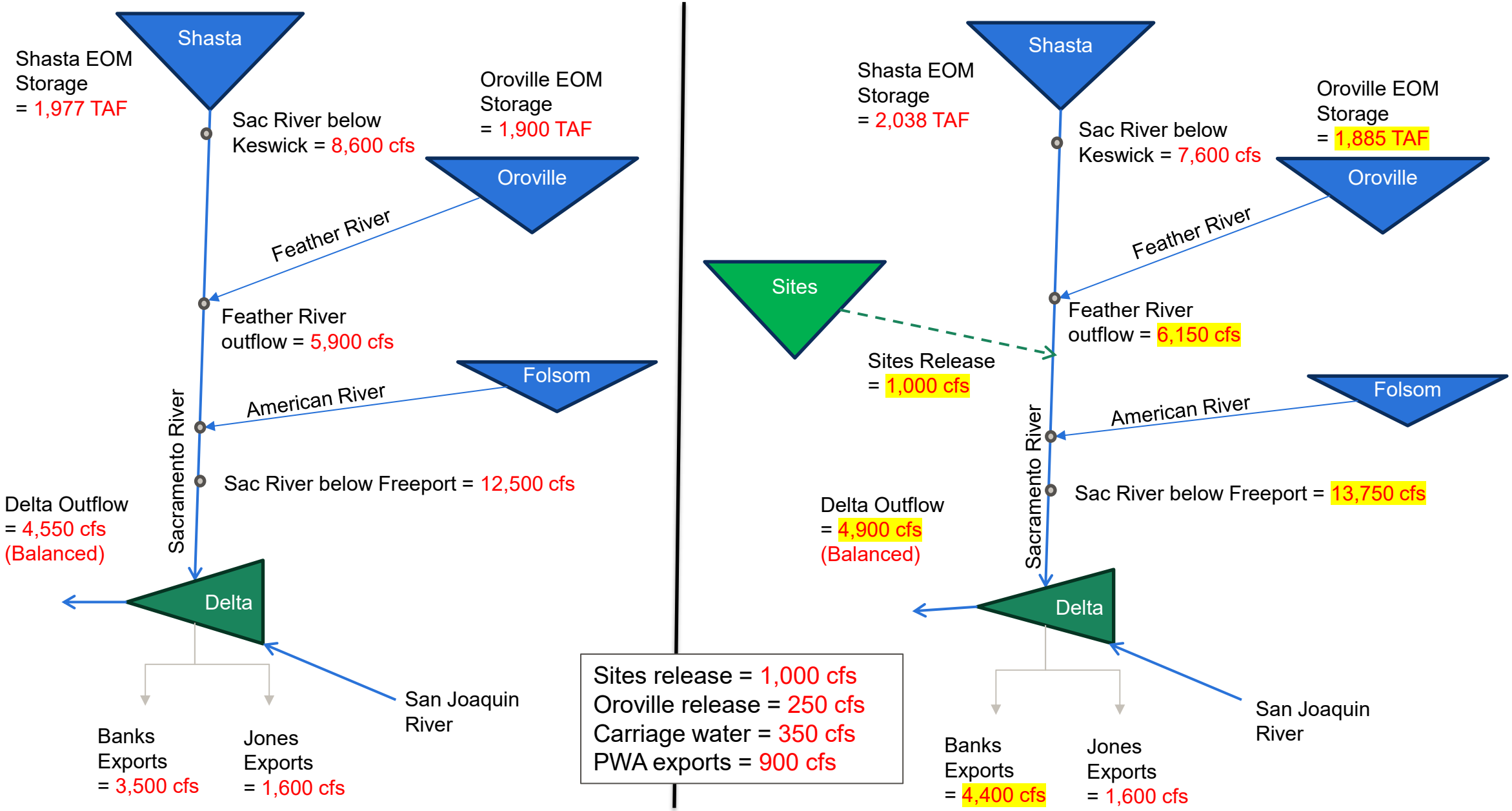
	Modeled Criteria	Notes
Exchange Period	June-July	
Exchange Constraints		
Water Year Types	Below Normal, Dry, and Critical years	
Fill target	Based on PWA annual delivery target	15% of target in June 20% of target in July
Release Period	August-November	
Release Constraints		
Max Feather River Flow	Oct: 4,000 cfs Nov: 2,250 cfs	Based on Feather River fall stability requirements, exceeding these flows triggers additional flow requirements thru March
Spills	Sites water spilled in December	

Example Operation: Oroville PWA Fill



Sites release = 500 cfs
Oroville fill = 500 cfs

Example Operation: Oroville and Sites PWA Releases



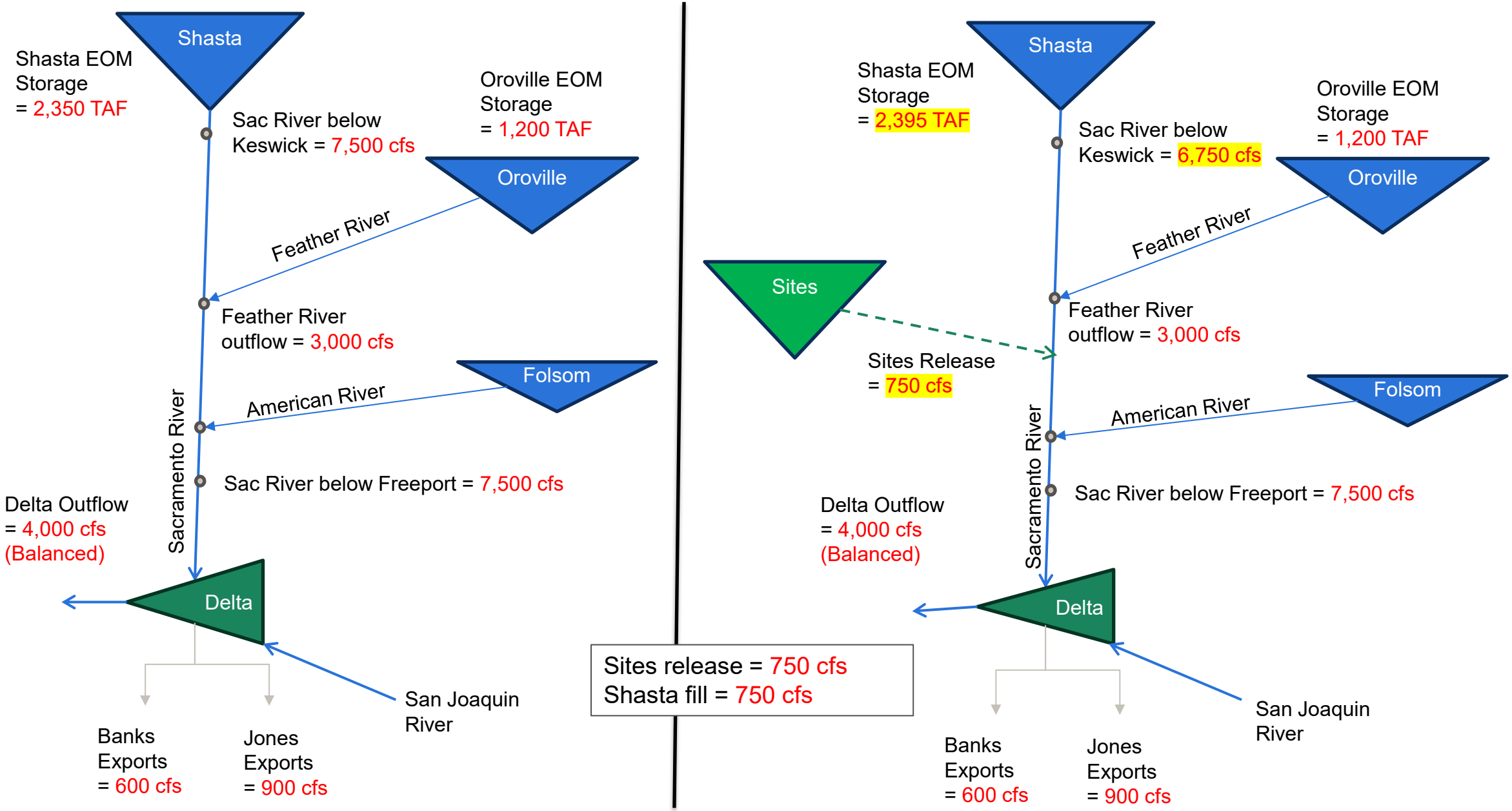
Shasta Exchange Operation

	Modeled Criteria
Exchange Period	April-June
Exchange Constraints	
Water year types	Dry and Critical
Temperature Management	Tier 3 and 4 years. Tier 3: May 1 Shasta storage 2.5 - 3.5 MAF. Tier 4 May 1 Shasta storage < 2.5 MAF.
Sacramento Valley Conditions	Only during Balanced Conditions
Sites storage availability	Sites PWA account available storage
Sites conveyance capacity	Limited to Dunnigan pipeline capacity
Shasta storage	Limited to space in Shasta below flood curve
Sacramento river MIFs	Limited to space above Keswick and Wilkins Slough MIFs

Shasta Exchange Operation

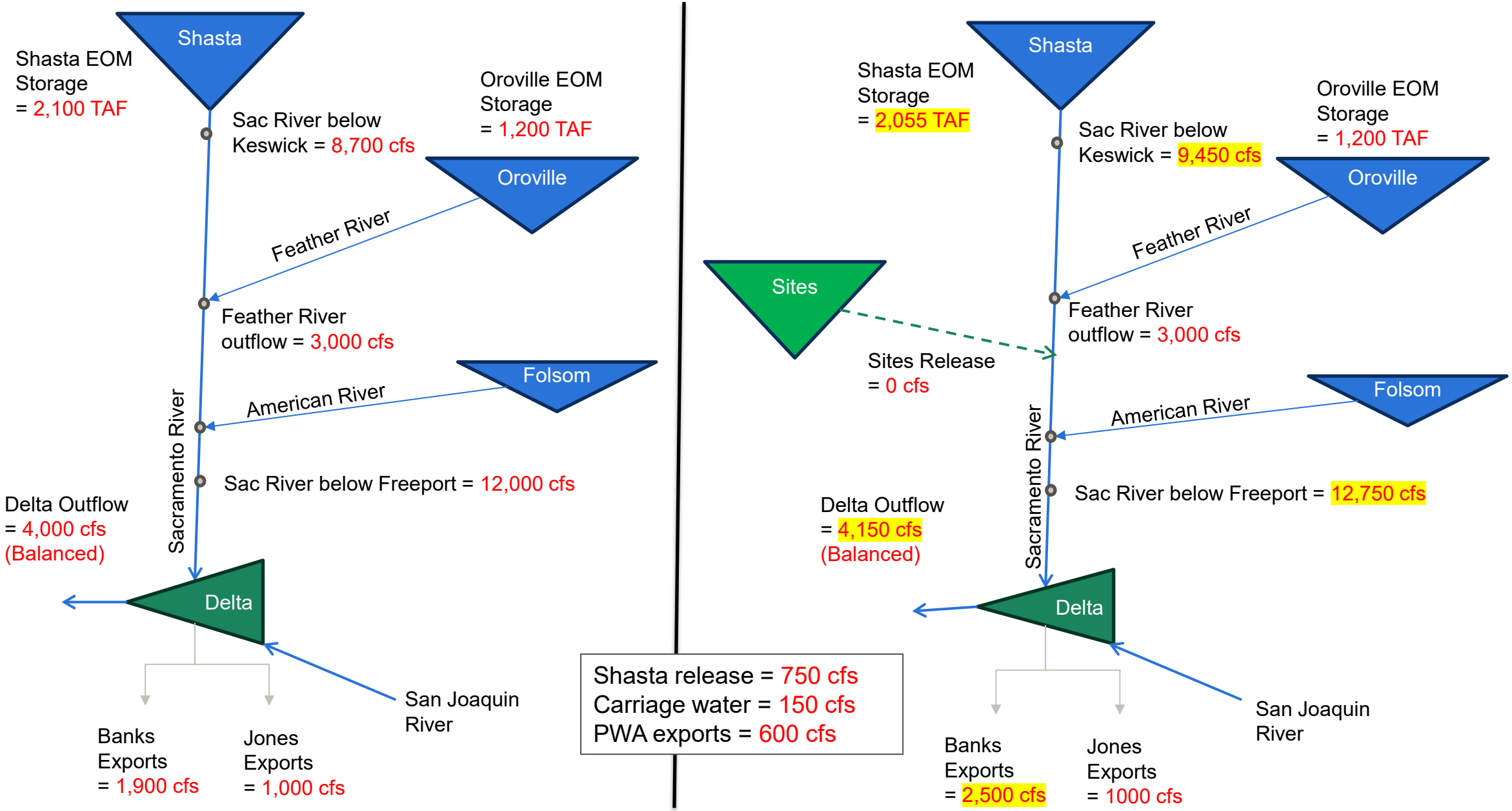
	Modeled Criteria
Release Period	July-November (primarily July-August)
Release Constraints	
Water year types	Dry and Critical
Temperature Management	Tier 3 and 4 years
Carryover	Unused exchange water held in Shasta and not released prior to February becomes CVP water
Delta Operations	
Exports	Releases are exported at Banks for SOD PWA deliveries, and used to provide applicable carriage water

Example Operation: Shasta Exchange Fill



Sites release = 750 cfs
Shasta fill = 750 cfs

Example Operation: Shasta Exchange Release



PWA Export Sources/ Prioritization

- Shasta exchange releases always exported in Delta for PWAs
- Oroville release for PWA exports (August-November) currently prioritized over Sites release to avoid spills
- Sites releases made for exports up to remaining target/available capacity

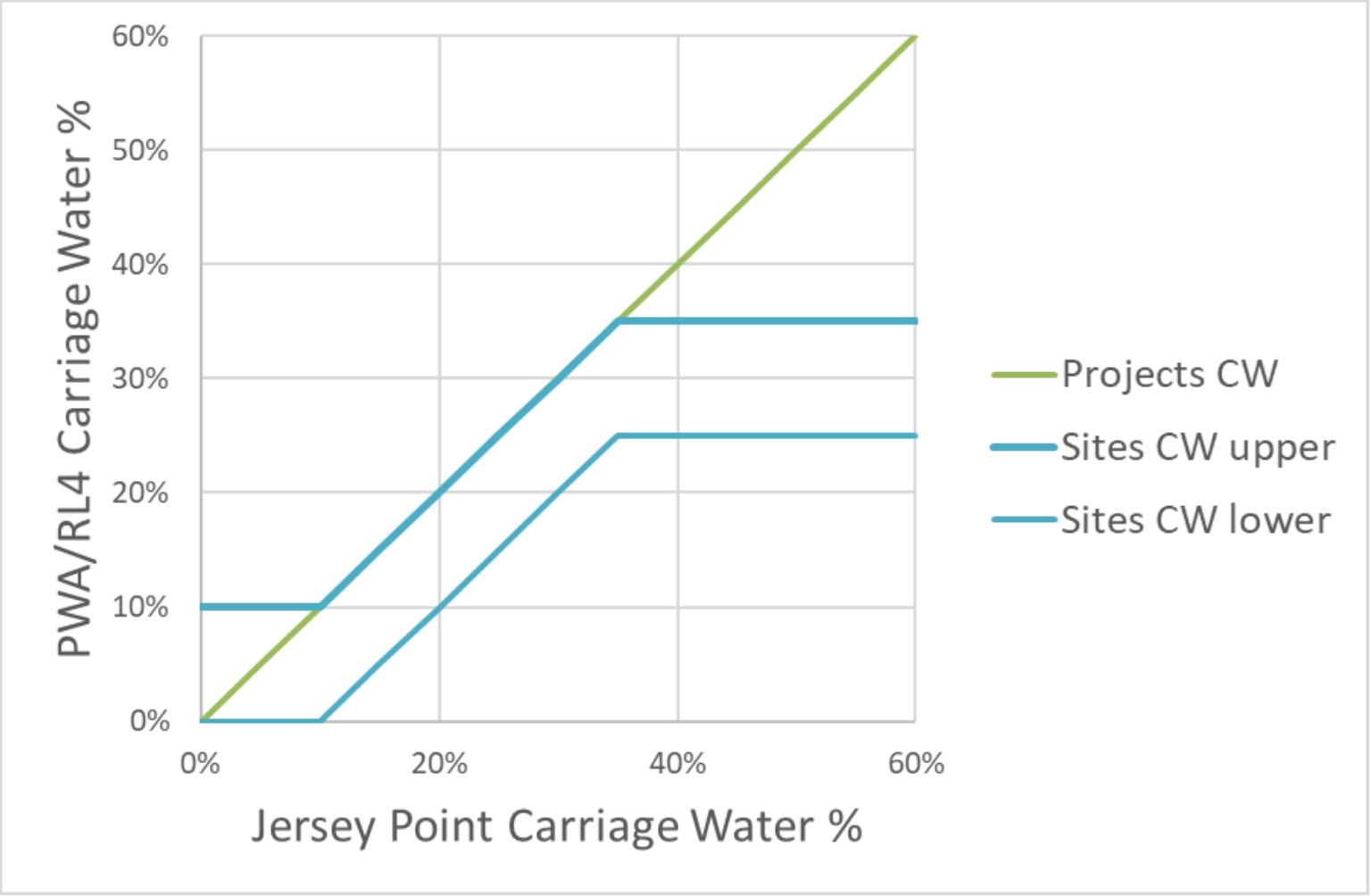
PWA and Level 4 Carriage Water Operations

- Carriage water approach previously used in CalSim II re-implemented in CalSim 3
- Carriage water for exports from Sites provided in all cases, with varying percentages based on ANN-derived slope to meet Jersey Point salinity standard

PWA and Level 4 Carriage Water Operations

- Carriage water provided independent of whether salinity is controlling and the CVP/SWP are providing additional outflow to meet salinity standards (NDOI_ADD_ANN)
- This is consistent with normal transfer operations
- Benefit of this approach is that it keeps salinity at Jersey Point and Rock Slough from shifting compared to the Baseline model

PWA and Level 4 Carriage Water Operations



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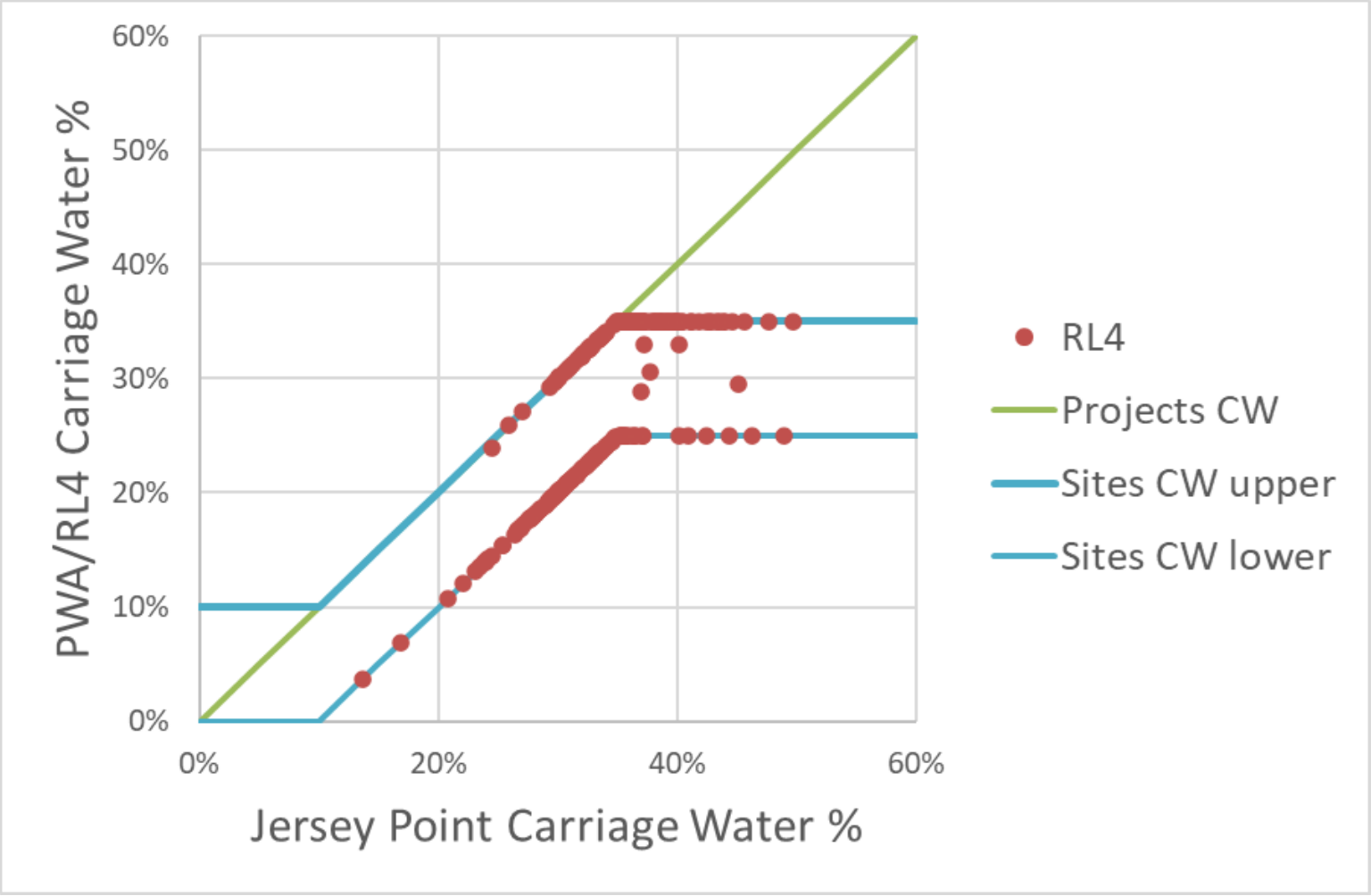
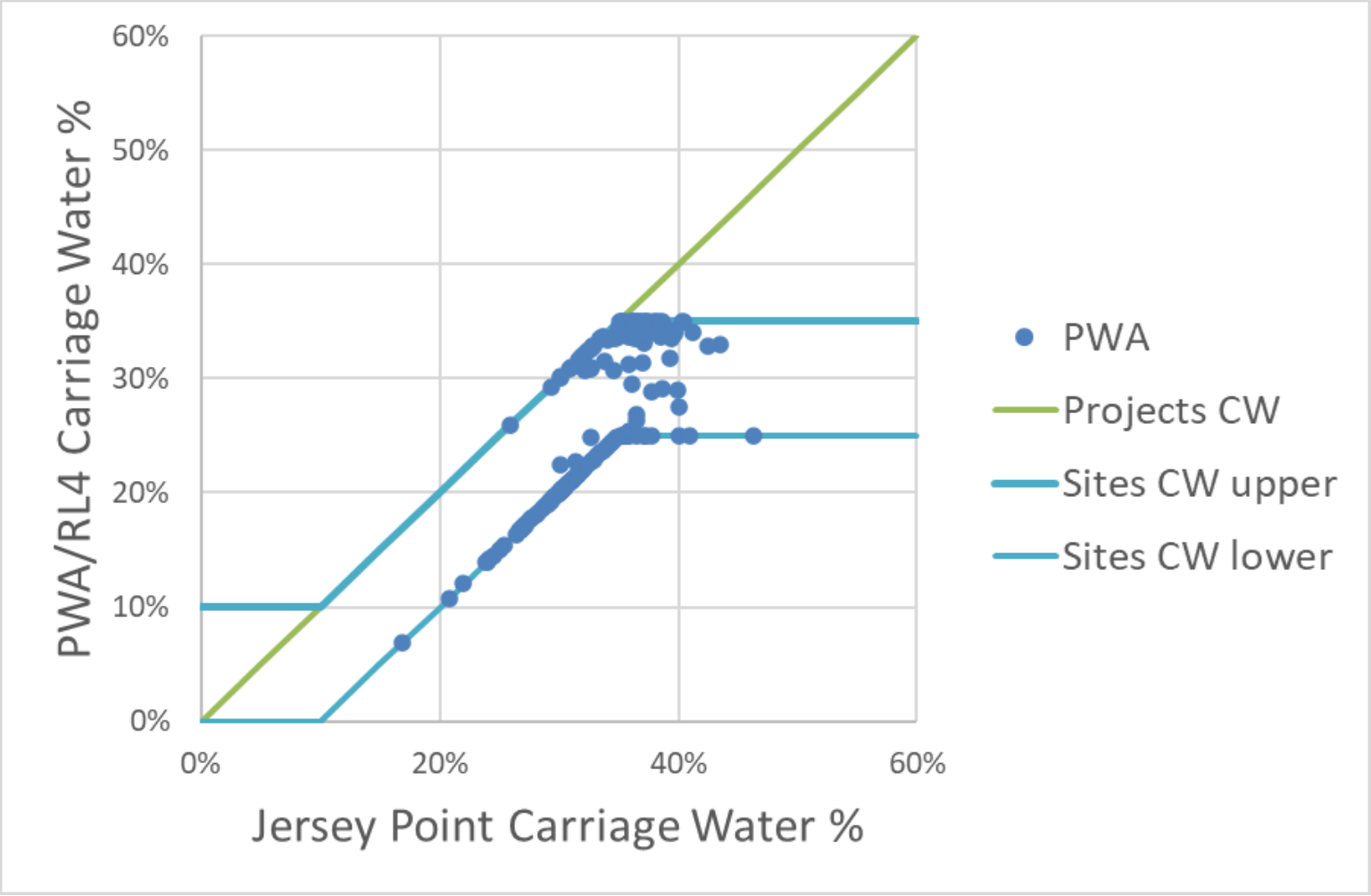


PWA and Level 4 Carriage Water Operations



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Next steps

- Ongoing QA-QC of modeled operations
- Possible refinement of operational assumptions

Thank You!