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Simulating the Voluntary Agreements in CalSim 3

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Introduction

The State Water Board is currently considering updates to the Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary (Bay-Delta Plan), including consideration of proposed Voluntary Agreements (VAs).

In a March 2022 Memorandum or Understanding (MOU), water suppliers and state and federal agencies advanced a term sheet for this partnership, initially referred to as the VAs, to improve environmental conditions in the Bay-Delta and upstream watersheds through shared investments

This presentation covers implementation of the VAs from the March 2022 MOU in CalSim 3, for Reclamation’s 2021 LTO process. Implementation was based on earlier CalSim 3 models developed by DWR, but with certain modifications.



March 2022 VA MOU

TAF contribution by WY type

Number	Tributary	Season	Source	Application	Wet (W)	Above Normal (AN)	Below Normal (BN)	Dry (D)	Critical (C)
1	Sacramento	Spring/Summer	Land Fallowing	Block	0	100	100	102	2
2	Feather	Spring/Summer	Land Fallowing	Block	0	60	60	60	0
3	Yuba	Spring	Reservoir Storage	Block	0	60	60	60	0
4	American	Spring	Groundwater substitution, Reservoir Storage	Hybrid	0	10	10	40	30
5	Friant	Feb – May	Reduction in SJRRP recapture	Flow	0	50	50	50	0
6	Mokelumne	Mar – Oct	Reservoir Storage	Flow	0	45	20	10	0
7	Putah	Nov – May	Reservoir Storage	Flow	0	6	6	6	7
8	CVP/SWP Export Reduction (Delta)	Mar-May	Export Reduction	Block	0	175	125	125	0



March 2022 VA MOU

TAF contribution by Sacramento
403030 WY type

Number	Tributary	Season	Source	Application	W	AN	BN	D	C
9	PWA Water Purchase: Fixed Price	-	-	-	27	99.5	84.5	63.5	3
9a	PWA Fixed Price: Sac Valley NOD	-	-	-	0	10	10	10	0
9b	PWA Fixed Price CVP SOD	-	-	-	0	35	24.5	12.5	0
9c	PWA Fixed Price WWD SOD	-	-	-	27	19.5	15	6	3
9d	PWA Fixed Price: Add CVP SOD	-	-	-	0	5	5	5	0
9e	PWA Fixed Price: SWP SOD	-	-	-	0	30	30	30	0
10	PWA Water Purchase: Market Price	-	-	-	0	45	45	45	0
11	Permanent State Water Purchases	-	-	-	123	52	9	108	65
12	San Joaquin River Basin	-	-	-	48	156	181	122	0



Delta VA (CVP) – CalSim 3 representation

- CVP export and delivery cuts according to schedule on next slide.
- Water year types determined using 90% exceedance forecast in Mar-Apr, 50% exceedance forecast in May.
- All year types export cuts begin March 10th.
- No export cuts when in Balanced and In-Basin Use (IBU) conditions
- Export cuts restricted to CVP Unstored Water for Export (UWFE)
- Export cuts restricted to volume of exports above 900 cfs
- Export cuts restricted to volume in CVP San Luis above dead pool
- Delivery cuts used to compensate for reduce exports, cannot be more than export cuts that have already occurred or are scheduled for current month
- Export cuts protected as Delta outflow



Delta VA (CVP) – CalSim 3 representation

Sacramento 403030 WY type	Export cuts (taf)	General delivery cuts (taf)	PWA Purchase CVP SOD (taf)	PWA Purchase Add CVP SOD (taf)	PWA Purchase WWD SOD (taf)
W	27	0	0	0	Minimum of 27 and 31.185 * Ag allocation
AN	147	87.5	35	Minimum of 5 and Del Puerto annual allocation	Minimum of 19.5 and 31.185 * Ag allocation
BN	107	62.5	24.5	Minimum of 5 and Del Puerto annual allocation	Minimum of 15 and 31.185 * Ag allocation
D	86	62.5	12.5	Minimum of 5 and Del Puerto annual allocation	Minimum of 6 and 31.185 * Ag allocation
C	3	0	0	0	Minimum of 3 and 31.185 * Ag allocation
Notes	Implemented Mar 10-May	Implemented Mar-Feb. Distributed evenly between all Ag contractors	Implemented Mar-Feb. Distributed evenly between all Ag contractors	Implemented Mar-Feb. From Del Puerto	Implemented Mar-Feb. -Max 21 taf under Contract No. 14-06-200-8092 -Max 4.695 taf under Contract No. 14-06-200-365A -Max 2.5 taf under Contract No. 7-07-20-W0055 -Max 2.99 taf under Contract No. 14-06-200-8018

Delta VA (SWP) – CalSim 3 representation

- SWP export cuts: 117.5 AN years, and 92.5 in BN/D years
- Water year types determined using 90% exceedance forecast in Mar-Apr, 50% exceedance forecast in May.
- AN year export cuts begin March 22nd and extend through May.
- BN/D year export cuts begin March 11th and extend through May.
- No export cuts when in Balanced and IBU conditions
- Export cuts restricted to SWP UWFE
- Export cuts restricted to volume of exports above 600 cfs
- Export cut maximum in March: 50 taf in AN/BN/D years
- Export cuts restricted to volume in SWP San Luis above dead pool
- Export cuts protected as Delta outflow



Sacramento VA – CalSim 3 representation

- Land fallowing based on 25,000 acres of land. This is the CVP's portion of the 35,000 acres of land fallowing specified in the MOU.
- Water savings from land fallowing backed up into Shasta (as much as possible). Attempt to export any water that can't be backed up.
- Timing of pulse/flow release and storage accounting:
 - In AN/BN years, split 95 taf of pulse releases between April and May. This is the volume generated by fallowing 25,000 acres, but is less than the 100 taf in the MOU.
 - In Dry years, hold water in Shasta, track volume retained, and then release in the following water year split between April-May.
 - Dry year carryover can be used to increase 95 taf pulse release in AN/BN year
- 50% exceedance forecast of Sac 403030 WY type in April
- PWA for Sac Valley NOD (10 taf AN/BN/D) not modeled
- VA contribution for Critical years (2 taf) not modeled
- Releases protected as Delta outflow



Feather VA – CalSim 3 representation

- Land fallowing based on 10,000 acres. This is the SWP's portion of the 35,000 acres of land fallowing specified in the MOU.
- 50% exceedance forecast of Sac 403030 WY type in April
- No adjustment of land fallowing to account for reduction in return flows
- Pulse releases of 60 taf in AN/BN/D years
- Pulse release split between April and May, but can continue later in year depending on timing of spills
- 10,000 acres of land fallowing only generates about 40 taf of water, so the remaining water comes from Oroville storage
- This is different than prior DWR modeling, where the land fallowing acreage was adjusted to generate the needed amount for pulse flows
- Releases protected as Delta outflow



American VA – CalSim 3 representation

- VA water is released in March-May in all year types except for Wet.
- AN/BN Years: 10 TAF through additional release from Hell Hole Reservoir (7 TAF) and Caples Reservoir (3 TAF) (refill criteria applies)
- Dry Years: 35 TAF from groundwater substitution, and 5 TAF from Hell Hole Reservoir (refill criteria applies)
- Critical Years: 30 TAF from groundwater substitution
- In Dry/Critical years, MOU has 20 TAF of groundwater substitution from groundwater banking, but this is not modeled in CalSim 3
- GW substitution provided by Carmichael Water District, City of Roseville, City of Sacramento, Golden State Water Company, and Sacramento County Groundwater Agency
- Releases protected as Delta outflow



Friant VA – CalSim 3 representation

- 50 taf contribution in San Joaquin River Restoration Program Dry, Normal-Dry, and Normal-Wet years during February-May
- Friant flood releases can contribute to meeting the VA.
- After flood releases, VA is met through foregoing recapture of Restoration Flows in the Delta, and, if necessary, on the Lower San Joaquin River
- Recapture can be foregone up to a maximum of 50% during the period of February through May. If that is not sufficient to meet the 50 taf goal, then no more contribution is required.
- Restoration flows can be recaptured (and foregone) when Friant is spilling
- Any flow that is not needed to meet the VA and cannot be recaptured goes to Delta outflow
- Foregone recapture protected as Delta outflow



Yuba VA – CalSim 3 representation

Reservoir reoperation (Yuba Water Agency (YWA))

- 50 taf in AN/BN/D years
- New water measured against Lower Yuba River Accord (Baseline)
- Action evenly spread over April-June
- Implemented in CalSim 3 using timeseries provided by YWA
- Protected as Delta outflow.



Mokelumne VA – CalSim 3 representation

Reservoir reoperation (East Bay MUD)

- Normal and Above Year type: 45 taf total, Spring Block: 75%-85% Mar-May, Fall Block: 15%-25% Sep-Oct
- Below Normal Year type: 20 taf total, Spring Block: 75%-85% Mar-May, Fall Block: 15%-25% Sep-Oct
- Dry Year type: 10 taf total , Spring Block: 75%-85% Mar-May, Fall Block: 15%-25% Sep-Oct
- Based on 1998 Joint Settlement Agreement (JSA) Water Year types
- Not protected as Delta outflow.



Putah VA – CalSim 3 representation

Reservoir reoperation (Solano County Water Agency)

- 6 taf in all years
- 2.5 taf “Pulse flows” between Nov 1-Dec 15
- 2.5 taf “Ramp down flows” following Baseline Pulse Flow and continuing through Mar 31
- 1 taf “Flushing flows” between Apr 1-May 31
- **Not protected as Delta outflow.**

Baseline flows (Putah Creek Accord)

- “Pulse flows” of 50 cfs for 5 days (between Nov 15-Dec 15)
- “Ramp down flows” following “Pulse flows” of 19 cfs through Mar 31
- “Flushing flows” of 5 cfs from Apr 1-May 31

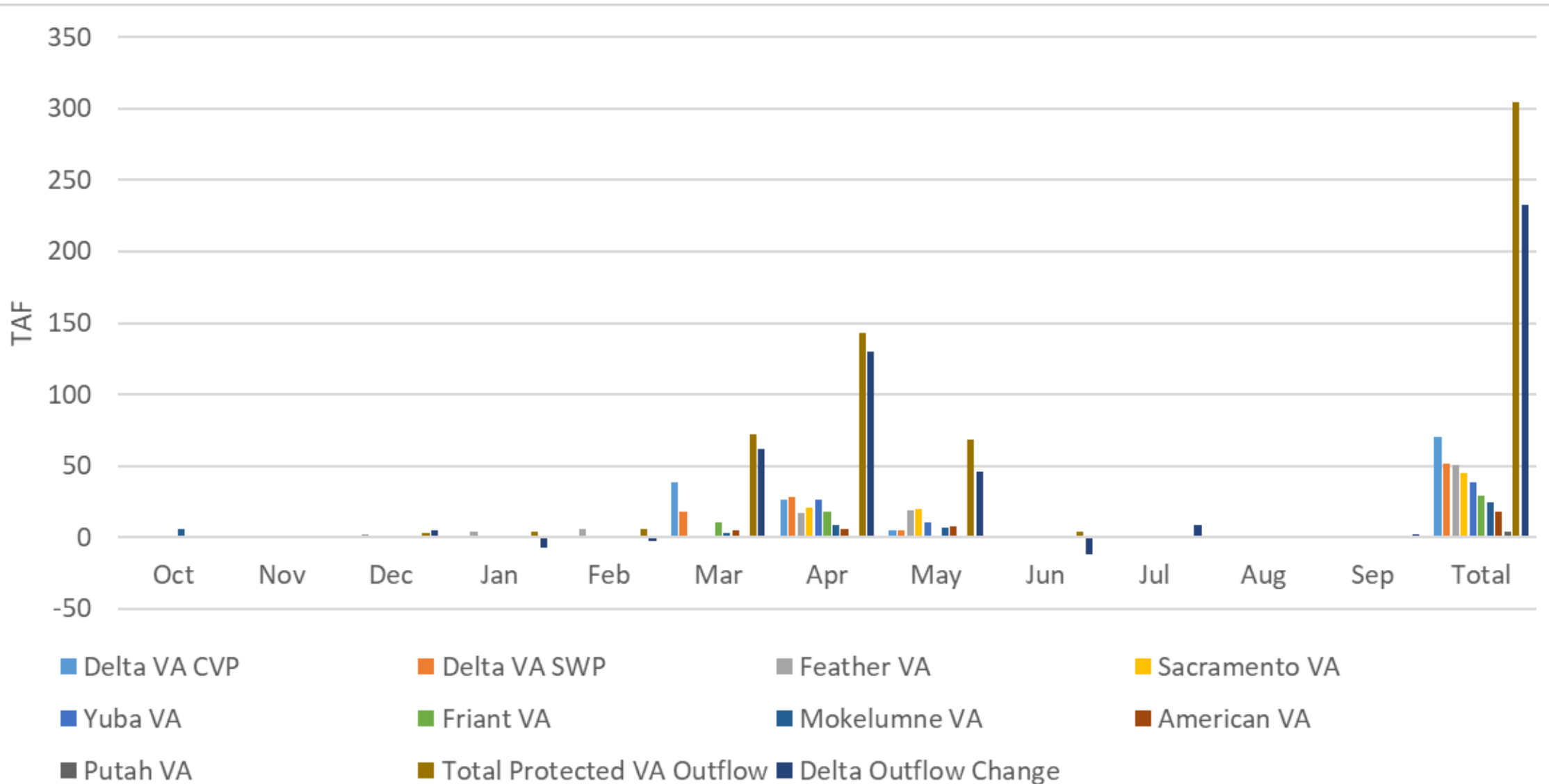


VA Implementation in CalSim 3

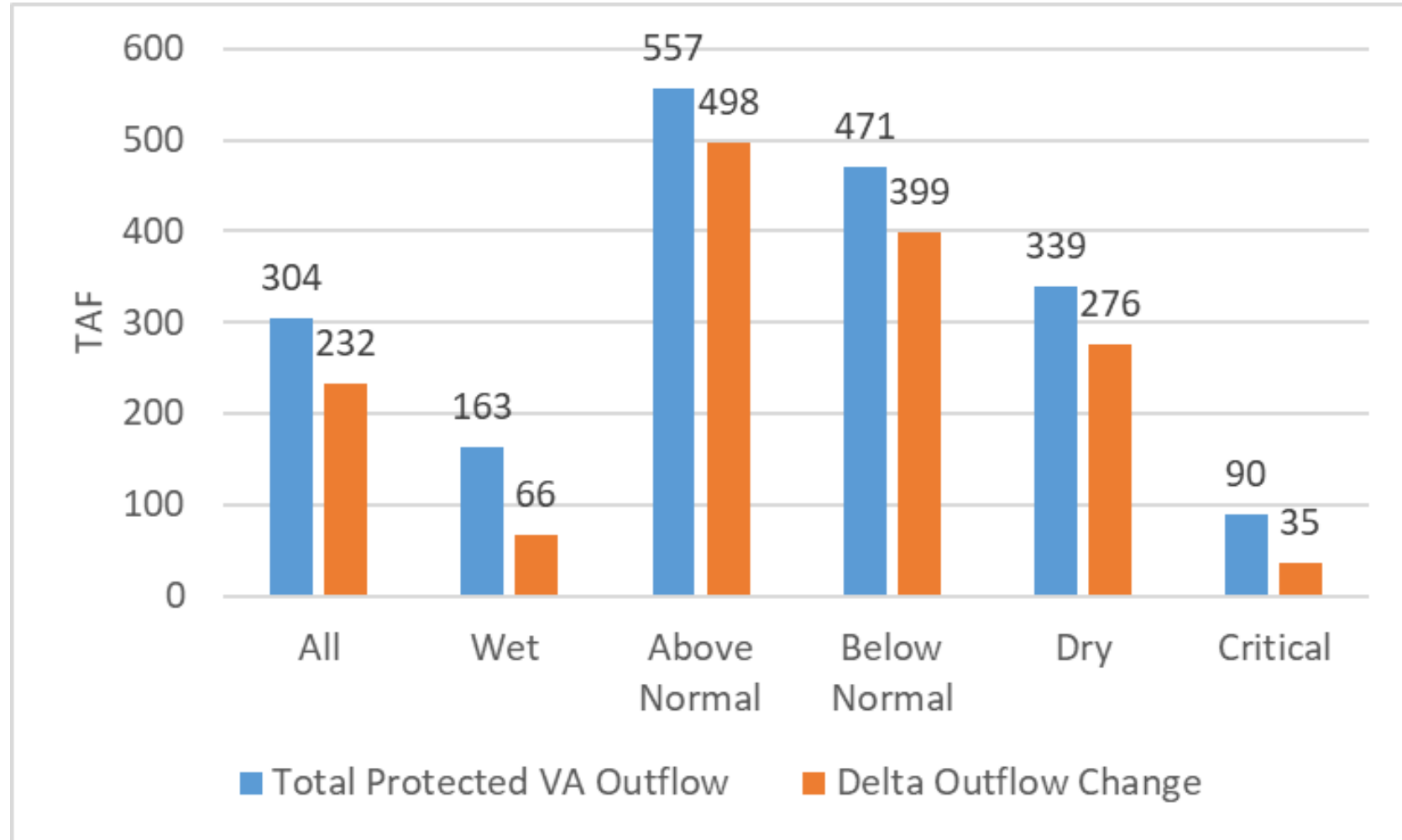
- Unprotected flows (Mokelumne and Putah) implemented in all model full system cycles
- Protected flows (Delta, Sacramento, Feather, Friant, Yuba, American) implemented in last model cycle only (ITP cycle)
 1. Flows are added directly onto to river flows and Delta Outflow from prior cycle
 2. VA-related storage changes, CVP and SWP export cuts, and CVP delivery cuts also implemented in the ITP cycle
 3. Other aspects of operations are kept the same as the prior cycle
- No ANN blinding, so VA flows freshen Delta and reduce releases for X2 and carriage water



VA Delta Outflow Contribution (by month)



VA Total Delta Outflow Contribution (by Sacramento WY type)



Questions?



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