REBUTTAL TESTIMONY SUMMARY
CHANDRA CHILMAKURI

Opinion 1: DCC gate operations with CWF are expected to remain consistent with current operations. Therefore, proposed permit condition in EBMUD-155 is not necessary.

Table 1. Delta Cross Channel operations criteria and CalSim II assumptions (Legend: cells filled with pattern indicate operations vary in real-time from year to year, cells with tan fill indicate fixed operations from year to year)

Month	D1641		2009 NMFS BiOp		High Sac River Flow
	Requirement	CALSIM II Input	Requirement	CALSIM II Input	
OCT	Open	Open	Based on fish catch and temperature at Knights Landing, Mill Creek, Deer Creek and Wilkins Slough flows, and Delta water quality compliance	Varies based on Wilkins Sl flow, and Rock Sl salinity	Closed when SacR flow above DCC > 25000 cfs Applied in all months in CalSim II
NOV	Closed for 45 days out of 92 days – coordinated with potential closures for experiments/ studies	Open for 20 days			
DEC		Open for 16 days		Closed from Dec 15 – Jan 31	
JAN		Open for 11 days			
FEB	Closed	Closed	Same as D1641	Closed	
MAR	Closed	Closed	Same as D1641	Closed	
APR	Closed	Closed	Same as D1641	Closed	
MAY 1st – MAY 20th	Closed	Closed	Same as D1641	Closed	
MAY 21st – JUN 30th	Closed for 14 days during May 21st - June 15th	Open for 26 days in June, rest closed	Same as D1641	Open for 26 days in June, rest closed	
JUL	Open	Open	Same as D1641	Open	
AUG	Open	Open	Same as D1641	Open	
SEP	Open	Open	Same as D1641	Open	

Table 2. Number of Years with Longer DCC Gate Opening Modeled under CWF H3+ compared to NAA

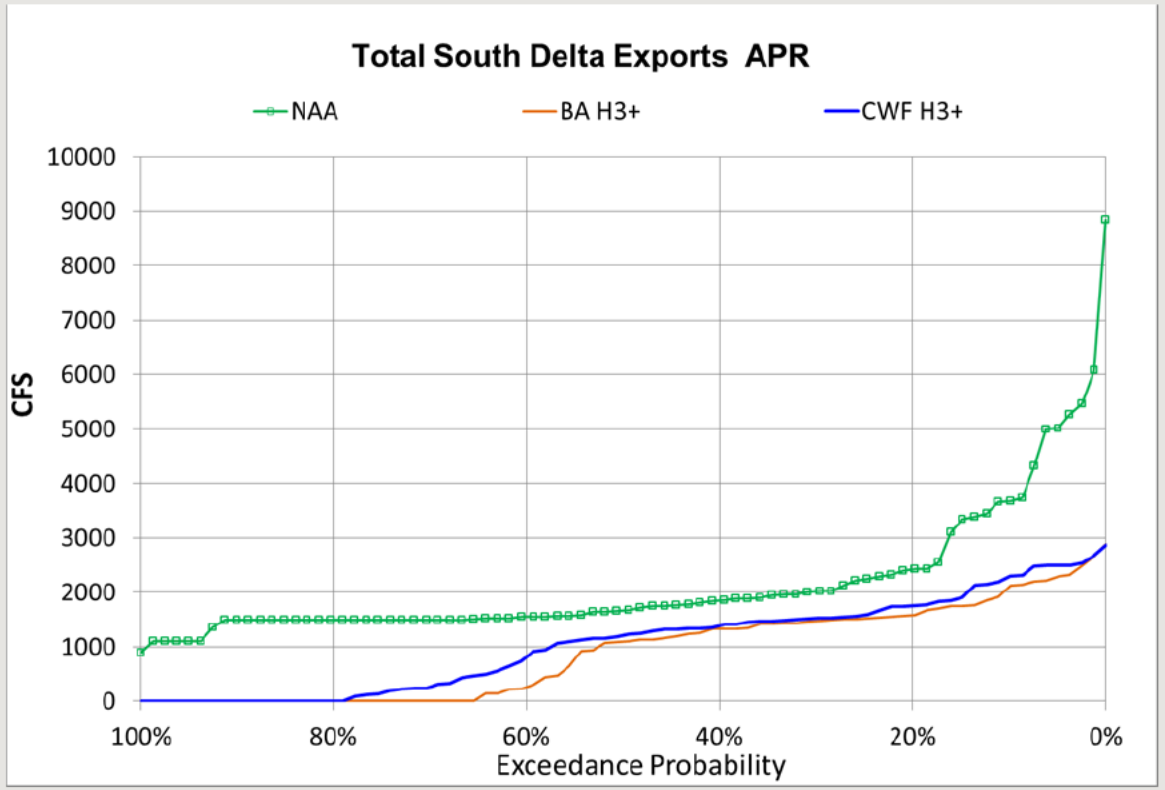
Month	Number of years with longer DCC opening in CWF H3+ compared to NAA	Factors affecting the longer DCC opening		
		Wilkins Slough Trigger	SacR 25000cfs Trigger	Water Quality Trigger
OCT	31	31	0	0
NOV	31	31	0	0
DEC	11	11	0	0
JUN	5	N/A	5	N/A
SEP	22	N/A	22	N/A

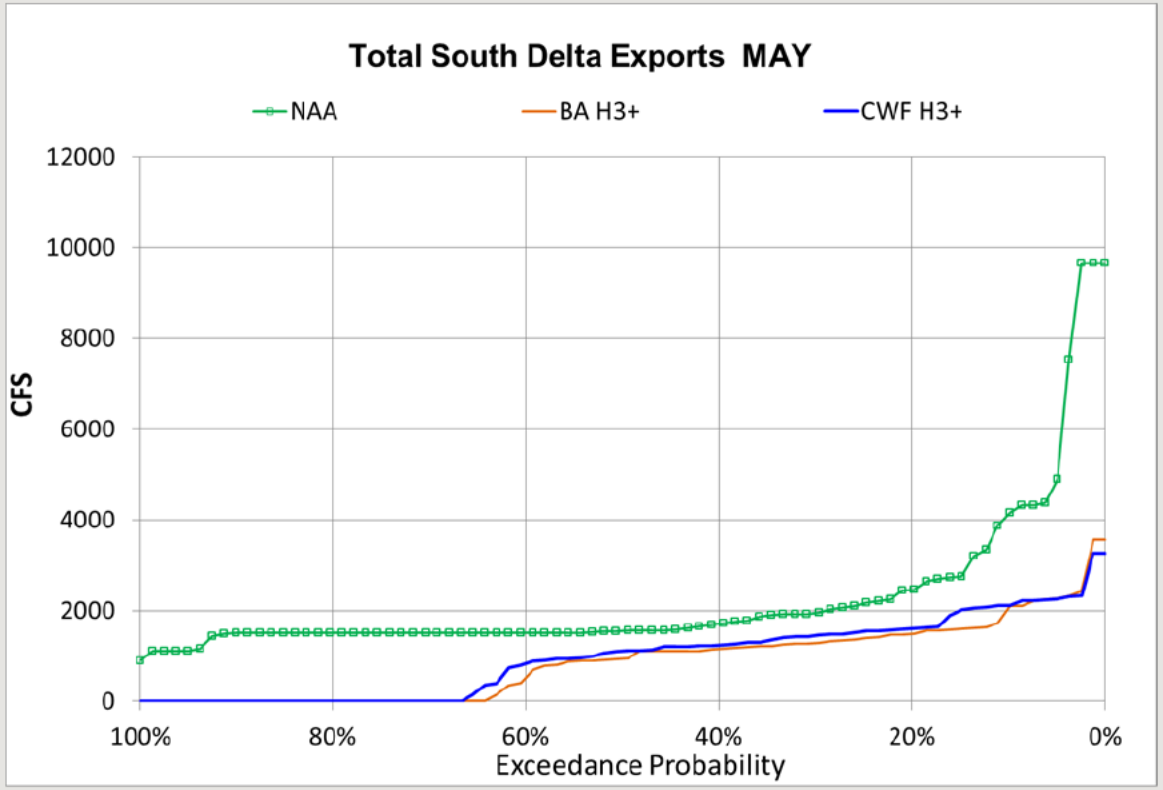
OPINION 1: DCC GATE OPERATIONS WITH CWF ARE EXPECTED TO REMAIN CONSISTENT WITH CURRENT OPERATIONS

- **CWF H3+ does not change to the DCC gate operations criteria compared to the NAA**
- **All the criteria and the real time decision making processes that govern DCC operations under the NAA, included in D1641 and 2009 NMFS BiOp, are proposed to continue with CWF**
- **The NMFS BiOp for CWF states that the DCC closure during high Sacramento River flows (>25,000 cfs) should be triggered based on the flows measured at Freeport gage, which is upstream of the proposed intakes.**

Opinion 2: Exports at the south Delta SWP and CVP pumping facilities under CWF H3+ are not expected to be greater than the NAA

OPINION 2: EXPORTS AT THE SOUTH DELTA SWP AND CVP PUMPING FACILITIES UNDER CWF H3+ ARE NOT EXPECTED TO BE GREATER THAN THE NAA





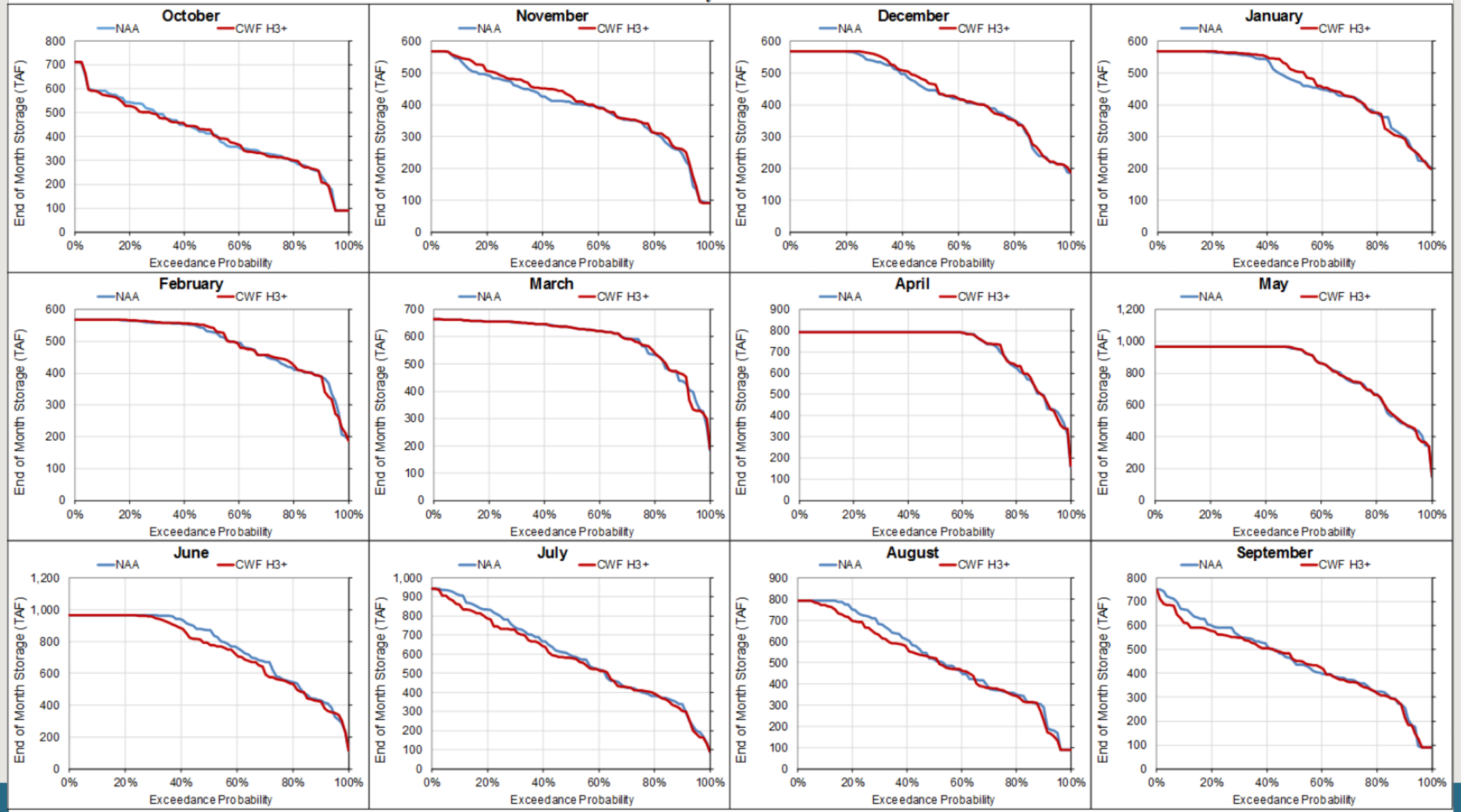
Opinion 3: CWF is not expected to impact CVP north-of-Delta carryover storage conditions. Therefore, proposed permit conditions in ARWA-502, CSPA-202-errata, and PCFFA-87 for carryover storage requirements are not necessary.

CWF H3+ DOES NOT EXACERBATE LOW STORAGE CONDITIONS IN FOLSOM

Table 3. Number of Months and Years with Folsom Lake Storage less than 100 TAF under CWF H3+ and NAA, modeled under projected Q5 climate change sea level rise conditions at 2030

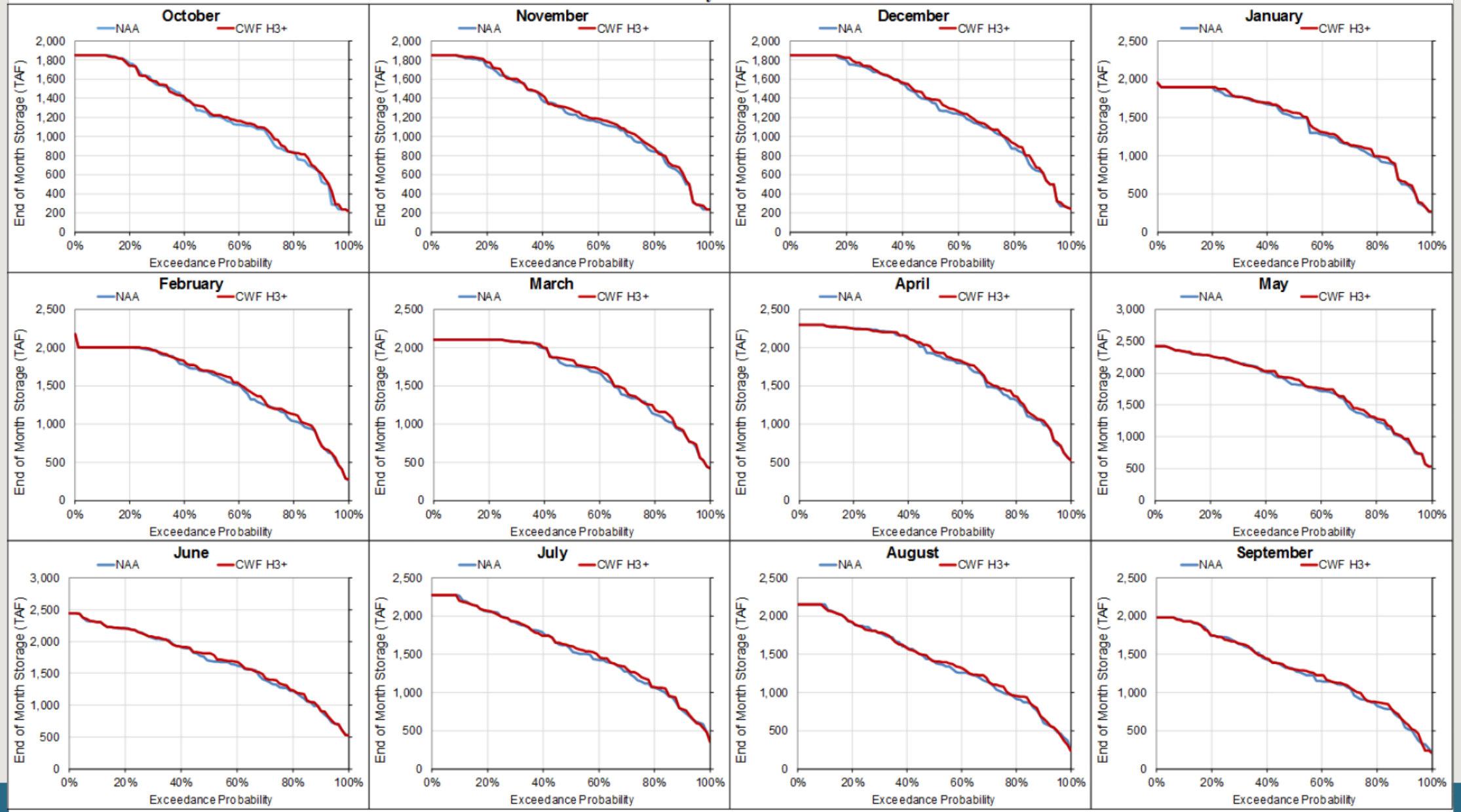
Month	NAA	CWF H3+
Number of months out of 984 months with modeled Folsom Lake storage is less than 100 TAF	19	18
Number of years out of 82 water years with at least one month modeled Folsom Lake storage is less than 100 TAF	5	5

Folsom Lake, End of Month Storage
Probability of Exceedance



a Exceedance probability is defined as the probability a given value will be exceeded in any one year. b Based on the 82-year simulation period. c Under projected conditions at year 2030, including Q5 climate and 15 cm sea level rise. d There are 26 wet years, 13 above normal years, 11 below normal years, 20 dry years, and 12 critical years projected for 2030 under Q5 climate scenario.

Trinity Lake, End of Month Storage
Probability of Exceedance



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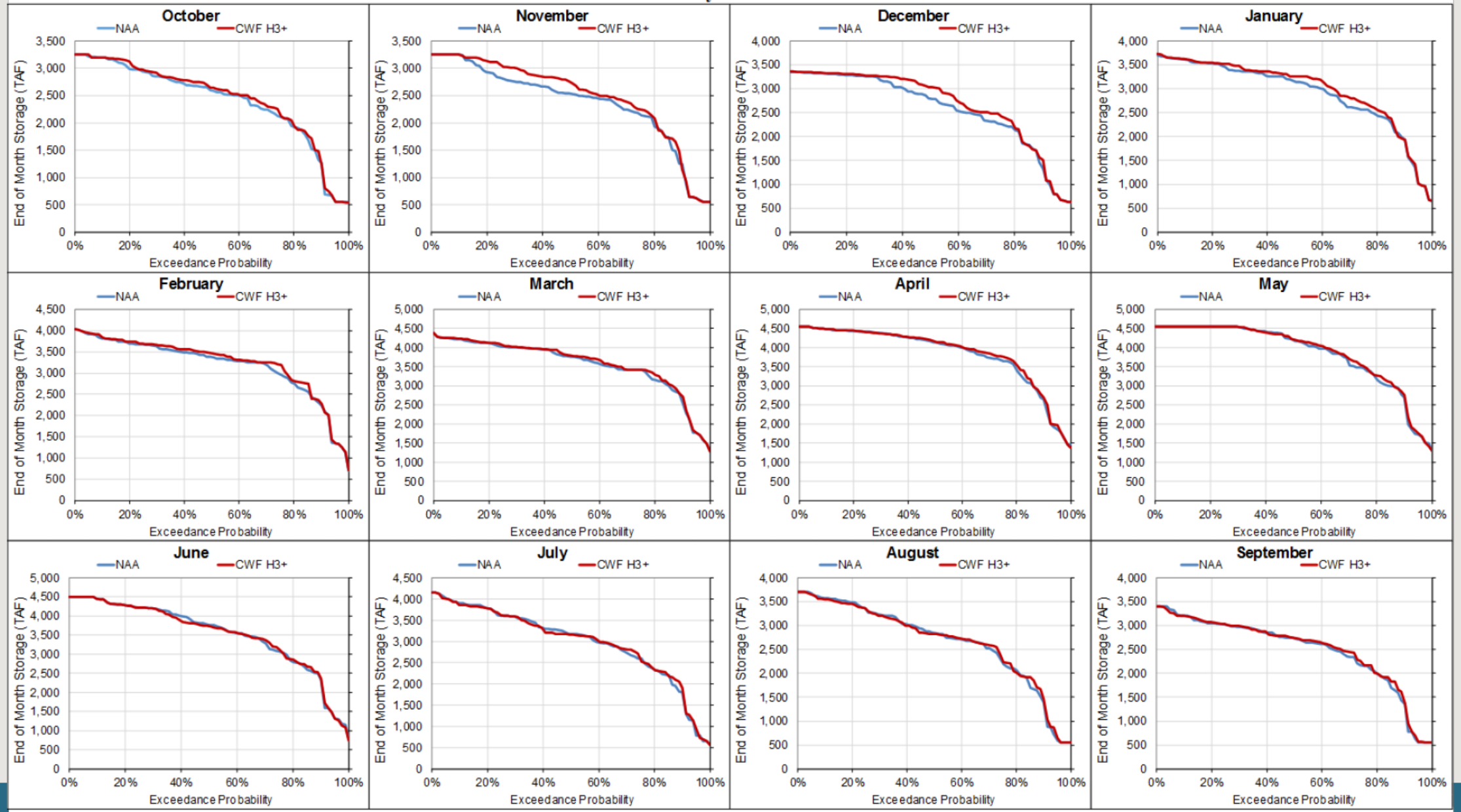
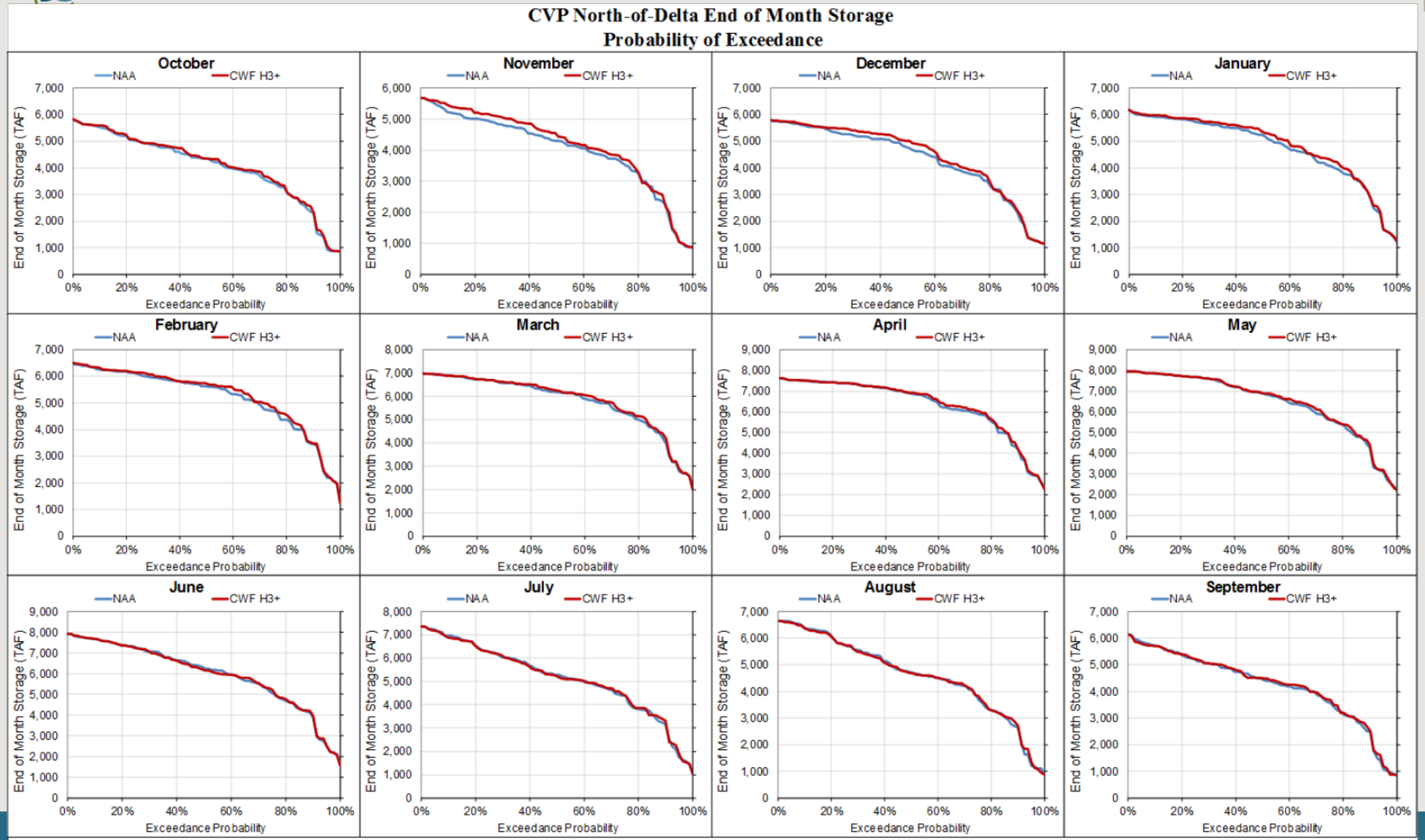
Shasta Lake, End of Month Storage
Probability of Exceedance



a Exceedance probability is defined as the probability a given value will be exceeded in any one year. b Based on the 82-year simulation period. c Under projected conditions at year 2030, including Q5 climate and 15 cm sea level rise. d There are 26 wet years, 13 above normal years, 11 below normal years, 20 dry years, and 12 critical years projected for 2030 under Q5 climate scenario.

CWF H3+ results in similar CVP north-of-Delta carryover storage conditions as NAA



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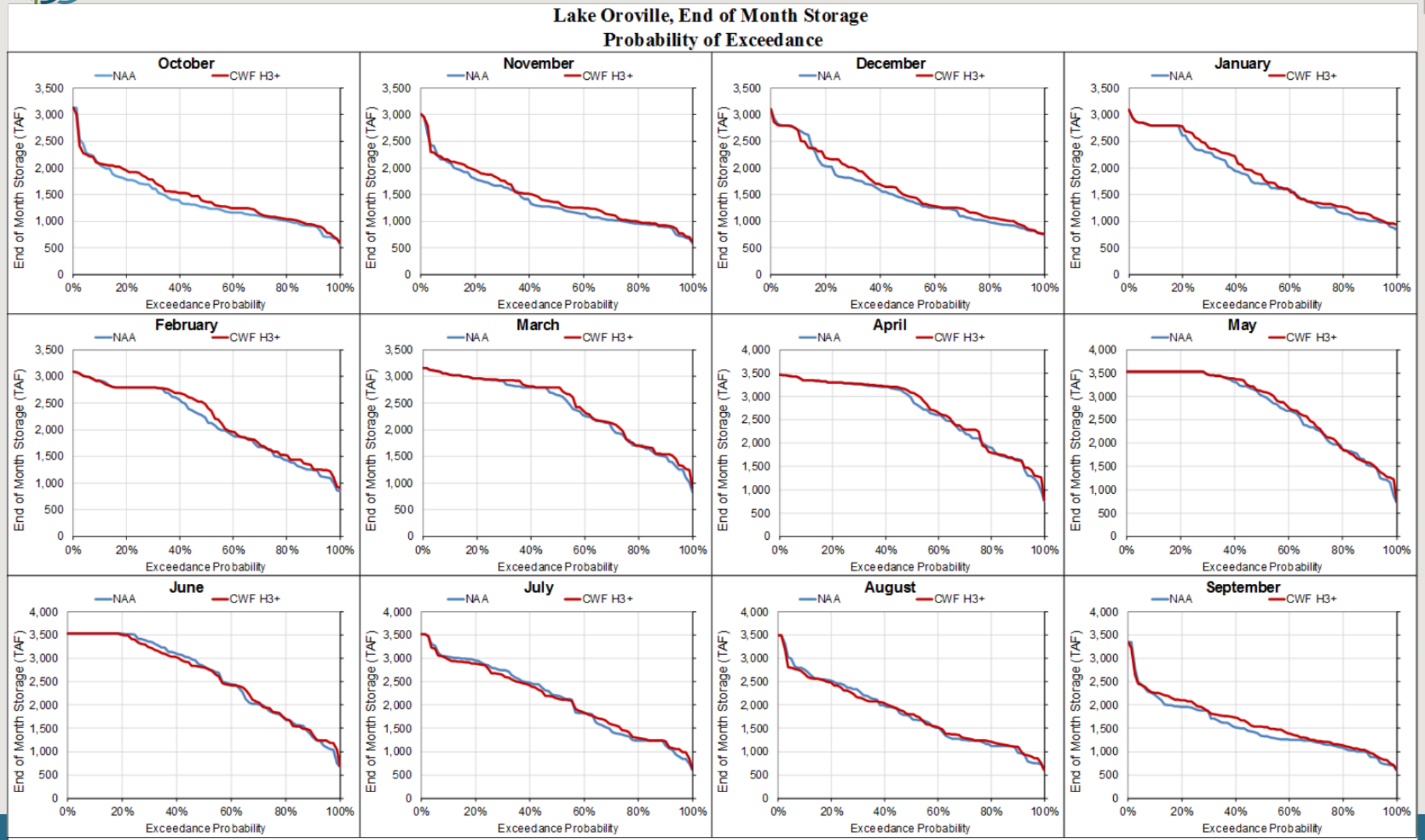
Opinion 4: CWF is not expected to impact Lake Oroville carryover storage conditions, and therefore, the proposed permit condition for Oroville carryover storage in CSPA-202-errata is not necessary.

CWF H3+ results in similar Lake Oroville carryover storage conditions as NAA



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Opinion 5: Applicable salinity requirements for City of Antioch's M&I use will continue to be met.

CWF H3+ results in similar salinity conditions at Antioch as NAA

DWR - 1294

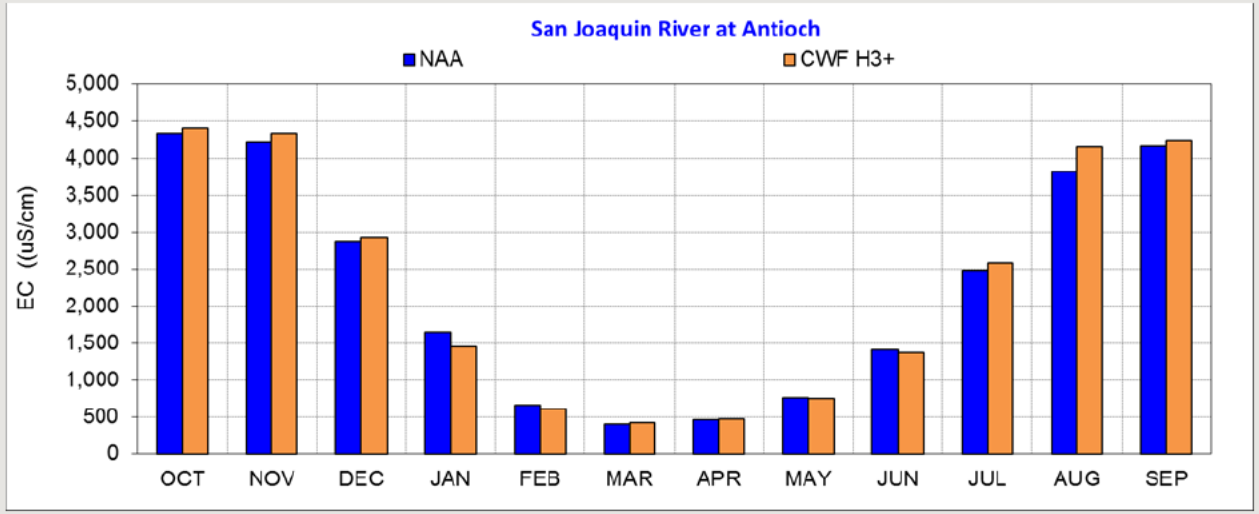


Table 1. Number of days per year chloride is below 250 mg/L at Antioch during low-tide for different hydrologic conditions and different exceedance levels (calculated from DSM2 model results for 1976-1991).

	EBC2 (days)	NAA (days)	B1 (days)	H3 (days)	H4 (days)	B2 (days)	Historical [pre-1918] Condition[a]
Driest 10 %	61	64	59	62	62	124	275
Driest 25 %	117	119	116	138	139	161	320
Median	164	164	159	172	171	260	365
Wettest 25 %	291	270	209	317	319	361	365
Wettest 10 %	325	328	281	334	338	365	365

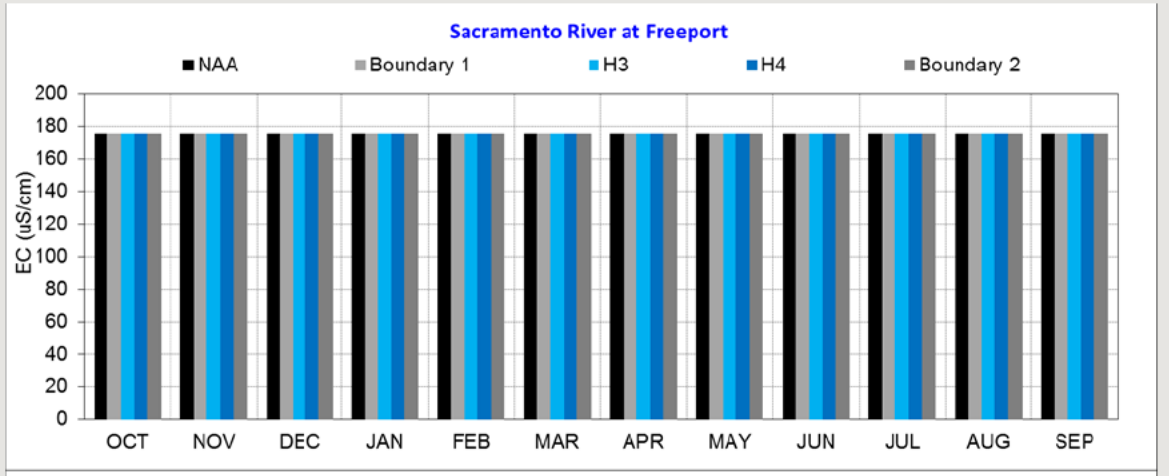
[a] Historical information indicates that during the driest 25 percent of historical (pre-1918) water years, chloride remained below 250 mg/L year-round (see Figure 1). Exceedance estimates for historical conditions (pre-1918) were adjusted for the 1976-1991 period because critical years occurred 31 percent of the time in 1976-1991 but less frequently in the historical record (e.g., only 14 percent of the time from 1906 to 2016).

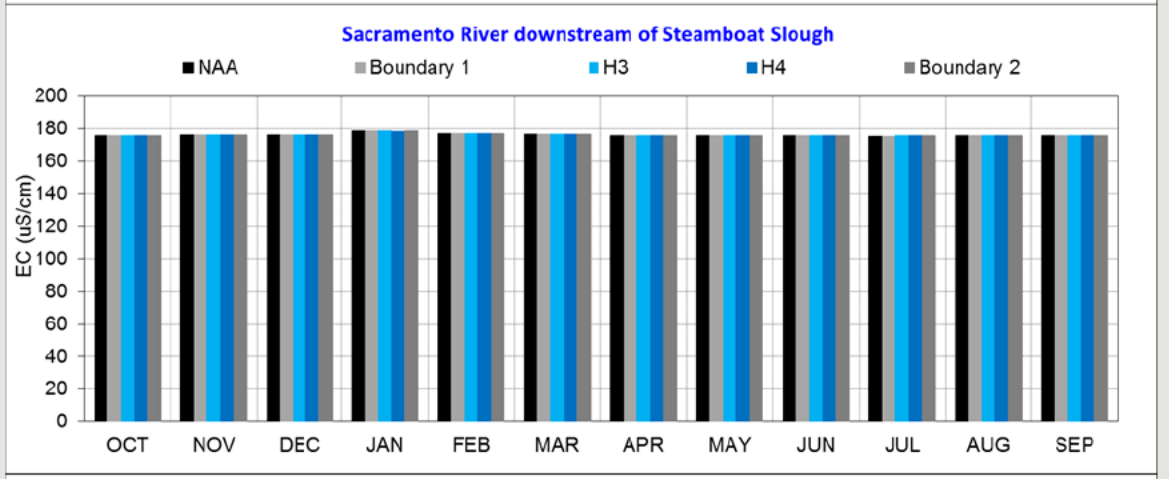
Table 2. Number of days per year chloride is below 250 mg/L at Antioch 2 hours after higher-high tide for different hydrologic conditions for different exceedance levels (calculated from DSM2 model results for 1976-1991)

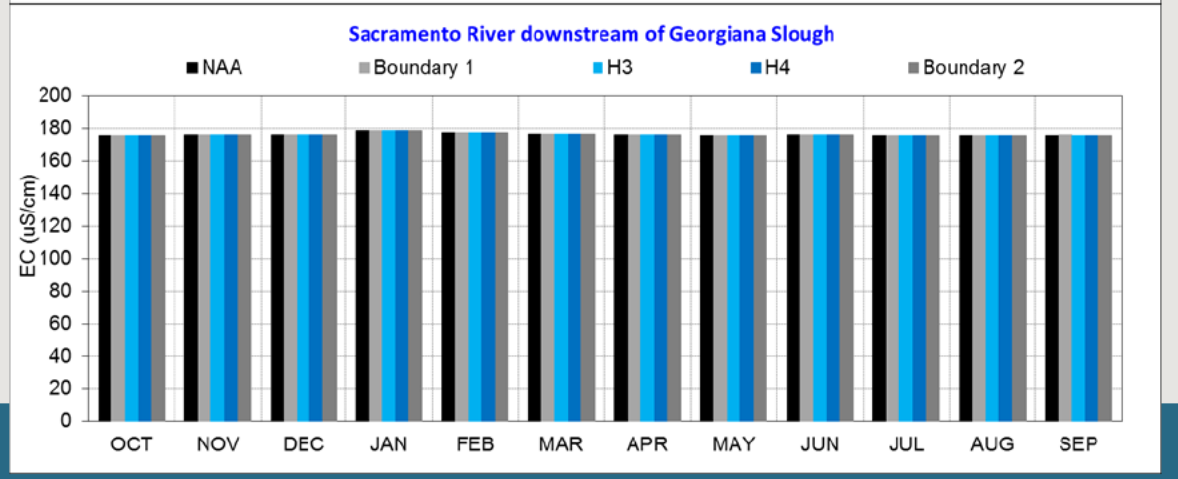
	EBC2 (days)	NAA (days)	B1 (days)	H3 (days)	H4 (days)	B2 (days)
Driest 10 %	0	0	0	0	0	0
Driest 25 %	10	13	0	14	13	60
Median	108	104	87	103	104	116
Wettest 25 %	183	174	140	182	186	206
Wettest 10 %	278	252	207	259	261	282

Opinion 6: CWF is not expected to impact Sacramento Regional County Sanitation District (SRCSD) and its Sacramento Regional Wastewater Treatment Plant (SRWTP) operations.

CWF and NAA result in similar salinity conditions in the Sacramento River near SRWTP outfall to Cache Slough confluence, 30 mi downstream.







SRCSD ANALYSIS OF SRWTP OPERATIONS ASSUMED MAXIMUM PERMITTED DISCHARGE ALL THE TIME

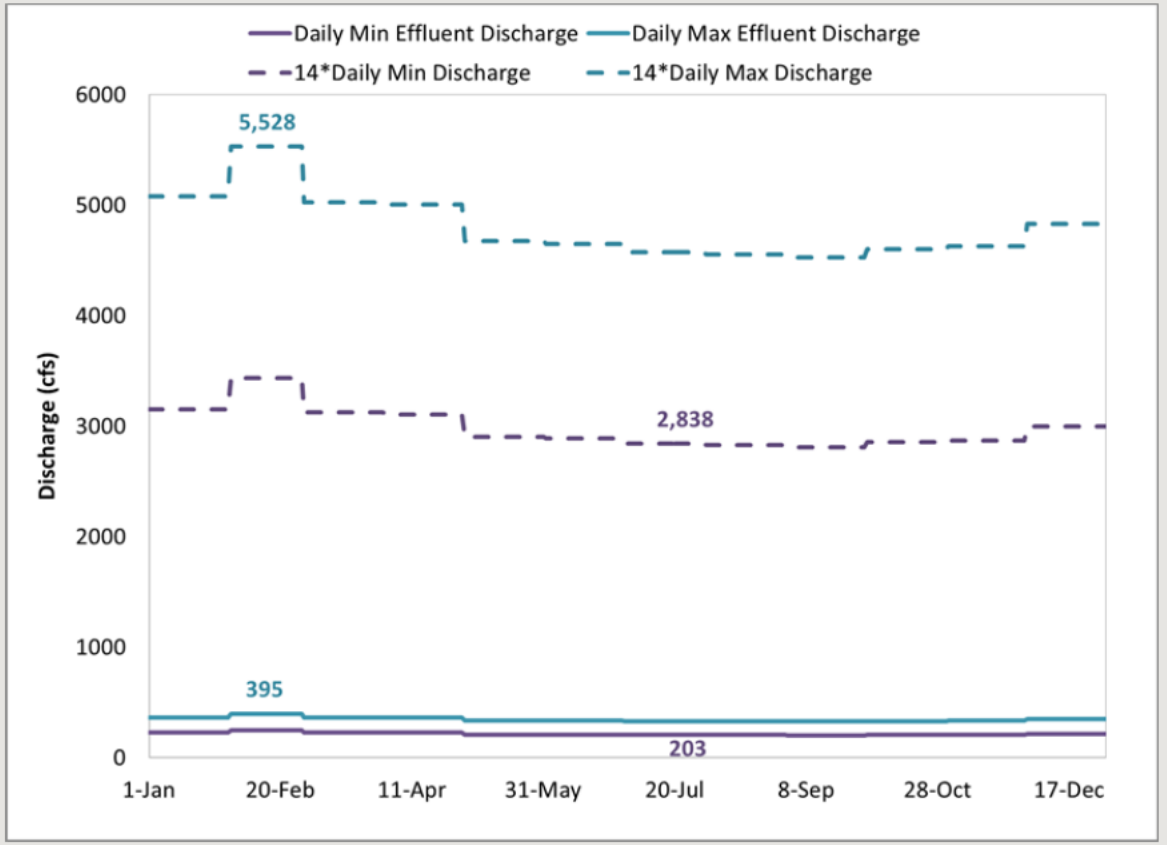
Excerpted from SRCSD-31 Appendix A:

Table 1 — Monthly SRWTP Influent Flows versus Modeled Monthly Flows Scaled to 181 mgd ADWF

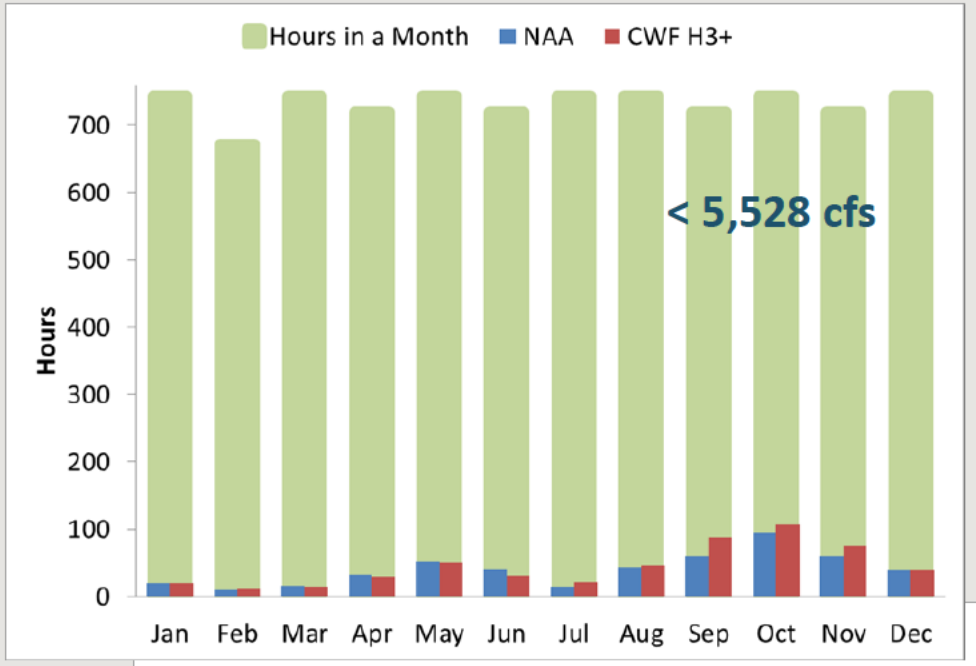
Month	Influent Flow	Scaled to 181 mgd ADWF
	mgd	mgd
1	134	202
2	146	220
3	133	200
4	132	199
5	124	186
6	123	185
7	121	182
8	120	181
9	120	180
10	122	183
11	123	184
12	128	192

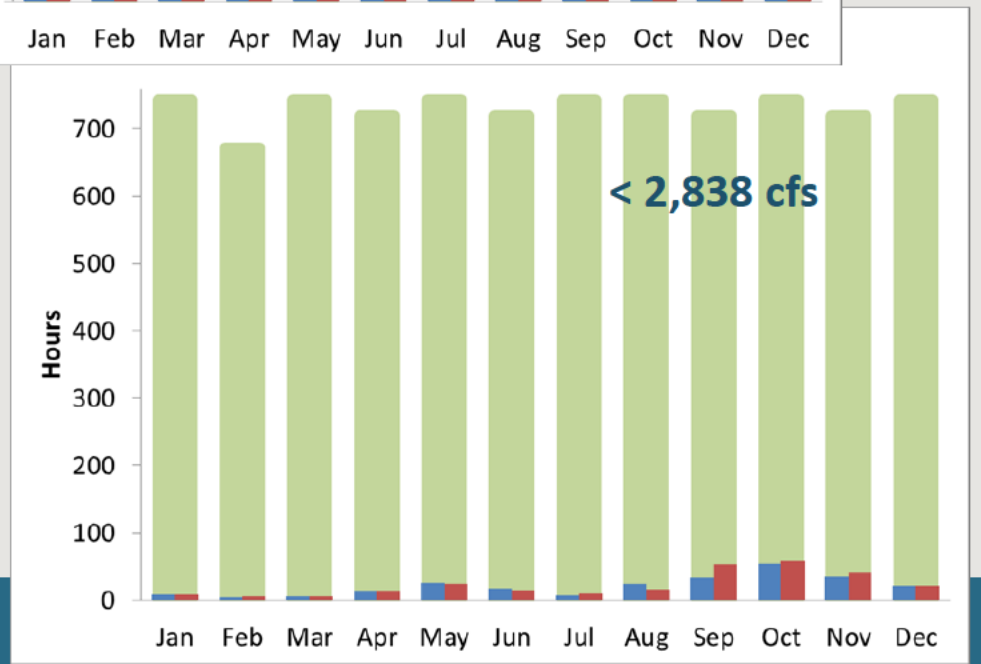
Table 2 — Hourly Diurnal Flow Factors Provided by Regional San

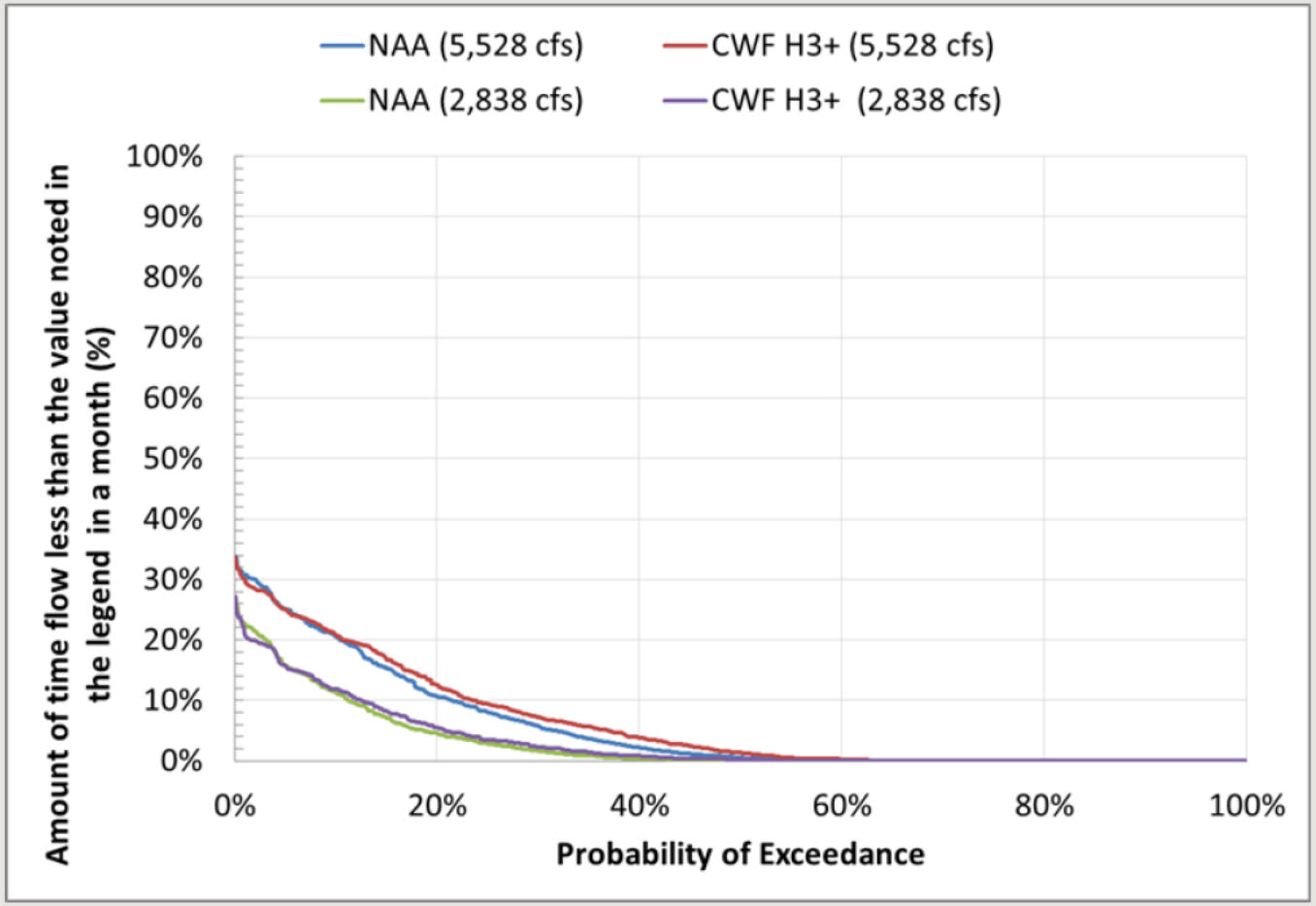
Hour of Day	$Q_{hourly}/Q_{monthly\ avg}$
0:00	1.13
1:00	1.1
2:00	1.05
3:00	1
4:00	0.94
5:00	0.87
6:00	0.8
7:00	0.75
8:00	0.72
9:00	0.75
10:00	0.79
11:00	0.85
12:00	0.91
13:00	0.98
14:00	1.05
15:00	1.12
16:00	1.15
17:00	1.16
18:00	1.15
19:00	1.15
20:00	1.14
21:00	1.13
22:00	1.14
23:00	1.14



COMPARED TO NAA, CWF H3+ SHOWS MINIMAL INCREASES IN TIMES WHEN SACRAMENTO RIVER FLOW IS LESS THAN THE FLOW NEEDED FOR 14:1 DILUTION







Opinion 7: Salt budget analysis presented in SDWA-291 is incomplete, imprecise and unreliable, and any opinions about the effects of CWF on south Delta salinity based on this analysis are incorrect.

PROBLEMS WITH THE APPROACH USED

- **Incomplete salt budget analysis – not all salt sources and sinks accounted for**
- **One set of EC-Chloride conversions for all conditions - for the same EC value, the Chloride concentration is lower if the major source of salinity is land salt versus ocean salt**

Excerpted from DWR-932 p. 11:

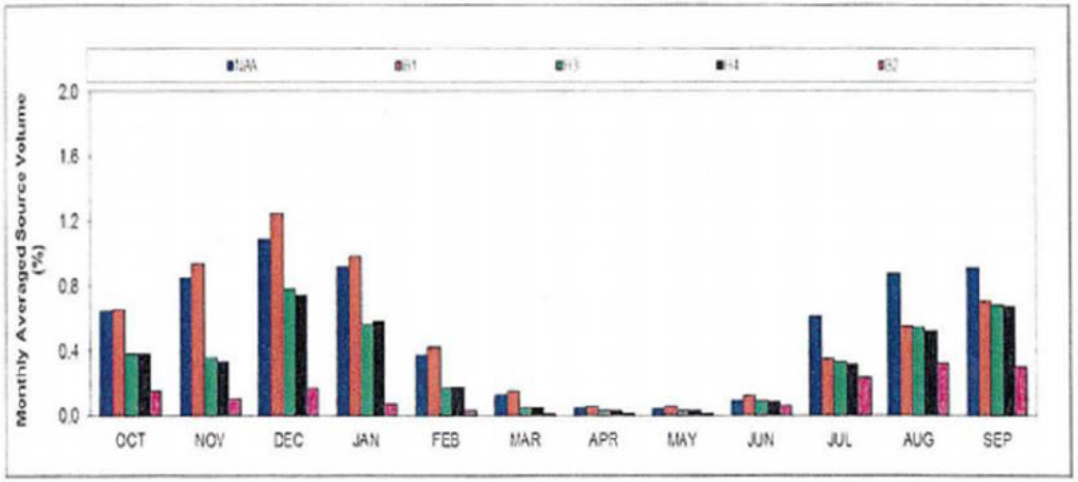
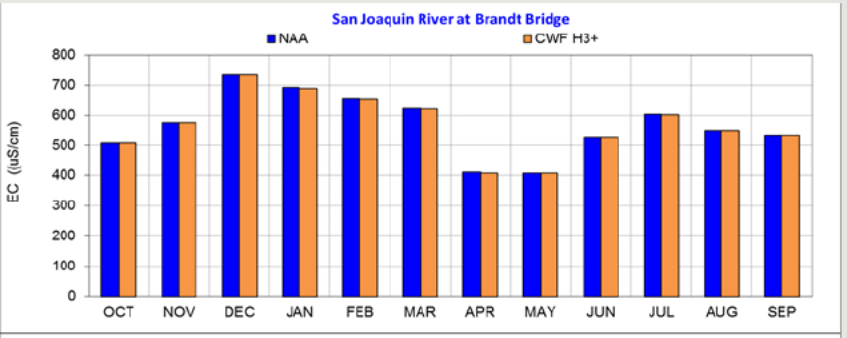
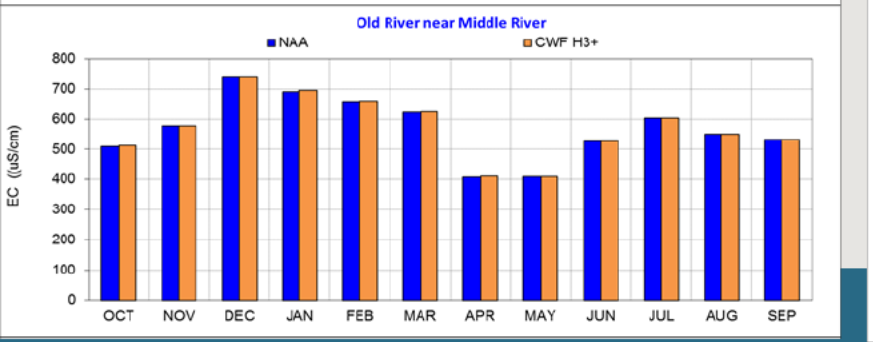


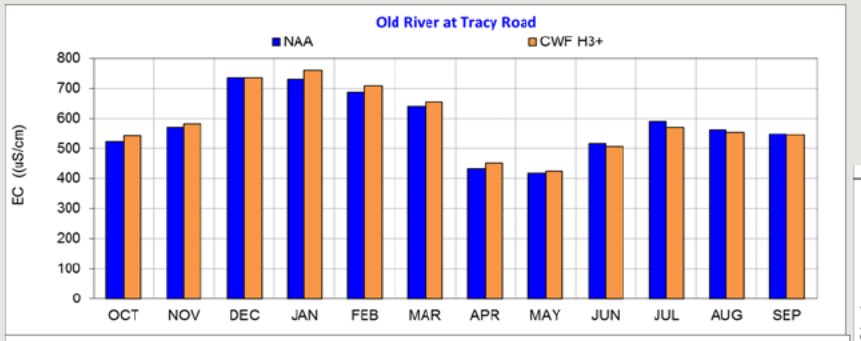
Figure 3- Source Water Finger-Print from Martinez Long Term Monthly Average (1976-1991) at City of Stockton's Intake Location

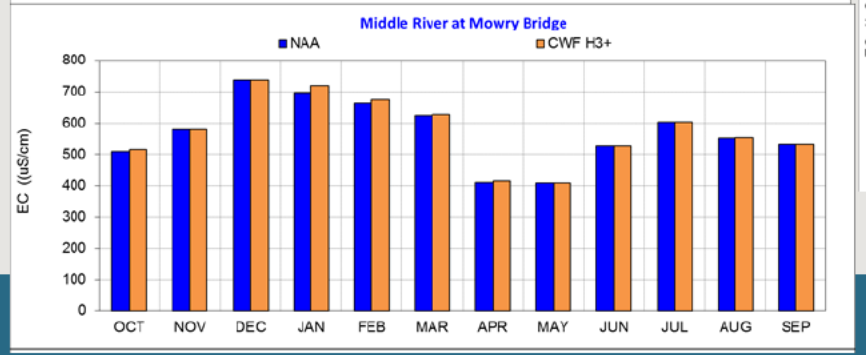
PROBLEMS WITH RESULTS INTERPRETATION

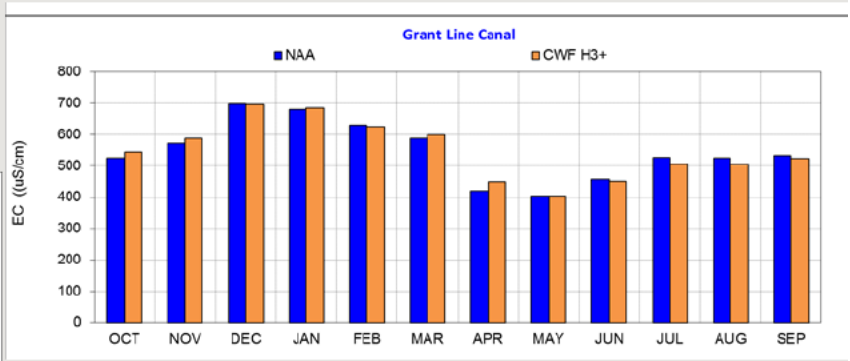
- **CWF is not bringing in more salt into south Delta – results indicate both NAA and BA H3+ are loosing salt in the south Delta**
- **CWF is not accumulating more salt in south Delta – EC values remain similar**











SUMMARY

1. DCC gate operations with CWF are expected to remain consistent with current operations, and therefore, proposed permit condition in EBMUD-155 is not necessary.
2. Exports at the south Delta SWP and CVP pumping facilities under CWF H3+ are not expected to be greater than the No Action Alternative.
3. CWF is not expected to impact CVP north-of-Delta carryover storage conditions, and therefore proposed permit conditions in ARWA-502, CSPA-202-errata, PCFFA-87 for carryover storage requirements are not necessary.
4. CWF is not expected to impact Lake Oroville carryover storage conditions, and therefore proposed permit condition for Oroville carryover storage in CSPA-202-errata is not necessary.
5. Applicable salinity requirements for City of Antioch's M&I use will continue to be met.
6. CWF is not expected to impact SRCSD and the SRWTP operations.
7. Salt budget analysis presented in SDWA-291 is incomplete, imprecise and unreliable, and any opinions about CWF effects on south Delta salinity based on this analysis are incorrect.