Appendix 4A

Attachment 9: Suisun Marsh Salinity Control Gate Operation Sensitivity Analysis

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4A-9.1 Introduction

This document summarizes key findings from a sensitivity analysis of Suisun Marsh Salinity Control Gate (SMSCG) operations under the Proposed Project.

- **7-on/7-off:** The last seven-day average Martinez electrical conductivity (EC) from the previous month is compared against threshold values to determine the operation of the SMSCG. For May, this threshold is 17.5 microSiemens per centimeter (mS/cm), and for June and July, the threshold is 22.2 mS/cm. Gates are operated under the following conditions:
    - In Above Normal and Below Normal water years, SMSCG are operated for seven days on and seven days off for up to 60 days in June through October. If the salinity threshold is triggered in June, gates are operated in June through September. If the salinity threshold is not triggered in June, gates are operated in July through October. Central Valley Project (CVP) and State Water Project (SWP) operations compensate for any change to salinity as a result of these SMSCG operations.
    - In Dry years following Wet and Above Normal years, SMSCG are operated for seven days on and seven days off for up to 60 days in June through October. If the salinity threshold is triggered in June, gates are operated in June through September. If the salinity threshold is not triggered in June, gates are operated in July through October. CVP and SWP operations compensate for any change to salinity as a result of these SMSCG operations.
    - In Dry years following Below Normal years, SMSCG are operated for seven days on and seven days off for up to 30 days in June through September. If the salinity threshold is triggered in June or July, gates are operated for two months. If operation is triggered in neither June nor July, gates are operated in August and September. CVP and SWP operations compensate for any change to salinity as a result of SMSCG operations.
- **Continuous:** The same salinity threshold criteria described previously is utilized. Gates are operated under the following conditions:
    - In Above Normal and Below Normal years, continuous SMSCG operations are modeled for up to 60 days in June through August. If the salinity threshold is triggered in June, the gates are operated in June and July; otherwise, the SMSCG are operated in July and August. CVP and SWP operations compensate for any change to salinity as a result of operation of the SMSCG.
    - In Dry years following Wet and Above Normal years, continuous SMSCG operations are modeled for up to 60 days in June through August. If the salinity threshold is triggered in June, the gates are operated in June and July; otherwise, the SMSCG are operated July and August and limited to 100 TAF water carried over from the previous year to compensate for increased salinity costs. CVP and SWP operations compensate for any change to salinity as a result of the SMSCG operations.

- In Dry years following Below Normal years, continuous SMSCG operations are modeled for up to 30 days in June through August. If the salinity threshold is triggered in June or July, the gates are operated for the entire month. If operation is not triggered in neither June nor July, gates are operated for the entirety of August. SWP operations compensate for any change to salinity as a result of the SMSCG operations.

4A-9.2 Study Objectives

The CalSim 3 model was applied to evaluate the sensitivity of the Proposed Project to the SMSCG operational changes described above. The CalSim 3 model was used to quantify the changes in Delta outflow and X2 to provide context on potential differences in impacts between 7-on/7-off and continuous SMSCG operations.

4A-9.3 Results

The CalSim 3 simulations in this sensitivity analysis only differed in representation of SMSCG operations. None of the other system parameters differed between the scenarios. The results showed that, relative to Baseline Conditions, there were generally minor differences in Delta outflow and X2 between SMSCG 7-on/7-off and SMSCG Continuous scenarios (Table 4A-9-1 and Table 4A-9-2). As expected, the most apparent differences occurred during the summer-fall period, in particular August and September in Above Normal years. In August, the SMSCG 7-on/7-off scenario had 12% mean lower Delta outflow than Baseline Conditions, compared to 3% lower under the SMSCG Continuous scenario; this indicates that the effects analysis in the EIR (e.g., in Chapter 6) would indicate relatively greater outflow-related differences, given that the Proposed Project was assumed in the modeling to have 7-on/7-off as opposed to continuous operations. Although SMSCG 7-on/7-off mean Delta outflow in September of Above Normal years was 8% greater than Baseline Conditions and therefore larger than the 2% greater than Baseline Conditions outflow under the SMSCG Continuous scenario, the SMSCG Continuous scenario nevertheless had the same relative difference (i.e., positive compared to Baseline Conditions) as the SMSCG 7-on/7-off scenario. Differences in mean X2 were also limited, 0.3 km or less. Given these factors, plus the limited absolute differences between the scenarios, the impact analyses presented in the EIR would be generally representative of either SMSCG 7-on/7-off or continuous operations.

Table 4A-9-1. Mean Delta Outflow (Cubic Feet Per Second) by Month and Water Year Type for Suisun Marsh Salinity Control Gates Sensitivity Scenarios, With Difference (%) from Baseline Conditions (Scenario minus Baseline Conditions) Given in Parentheses

Month	Water Year Type	Baseline Conditions	SMSCG 7-on/7-off	SMSCG Continuous
October	Wet	8,221	8,290 (1%)	8,224 (0%)
October	Above Normal	6,085	6,170 (1%)	6,128 (1%)
October	Below Normal	6,487	6,484 (0%)	6,447 (-1%)
October	Dry	5,813	5,848 (1%)	5,797 (0%)
October	Critically Dry	4,240	4,257 (0%)	4,207 (-1%)
November	Wet	15,119	15,097 (0%)	15,154 (0%)
November	Above Normal	6,820	6,946 (2%)	6,844 (0%)
November	Below Normal	7,930	7,812 (-1%)	7,799 (-2%)
November	Dry	6,272	6,295 (0%)	6,273 (0%)
November	Critically Dry	5,061	5,100 (1%)	5,099 (1%)
December	Wet	47,570	47,540 (0%)	47,530 (0%)
December	Above Normal	14,592	14,362 (-2%)	14,342 (-2%)
December	Below Normal	12,212	12,328 (1%)	12,315 (1%)
December	Dry	10,766	10,754 (0%)	10,640 (-1%)
December	Critically Dry	8,749	8,961 (2%)	8,646 (-1%)
January	Wet	80,707	80,929 (0%)	80,868 (0%)
January	Above Normal	50,616	50,788 (0%)	50,839 (0%)
January	Below Normal	21,347	21,584 (1%)	21,507 (1%)
January	Dry	13,893	13,921 (0%)	14,152 (2%)
January	Critically Dry	11,077	11,546 (4%)	11,603 (5%)
February	Wet	101,897	101,816 (0%)	101,859 (0%)
February	Above Normal	59,027	59,320 (0%)	59,330 (1%)
February	Below Normal	32,990	33,011 (0%)	33,016 (0%)
February	Dry	21,516	22,023 (2%)	22,035 (2%)
February	Critically Dry	13,876	14,298 (3%)	13,976 (1%)
March	Wet	81,961	81,830 (0%)	81,848 (0%)
March	Above Normal	56,105	56,567 (1%)	56,864 (1%)
March	Below Normal	28,290	29,062 (3%)	29,065 (3%)
March	Dry	19,063	19,678 (3%)	19,706 (3%)
March	Critically Dry	11,855	11,830 (0%)	11,881 (0%)
April	Wet	55,323	55,086 (0%)	55,117 (0%)
April	Above Normal	30,579	30,186 (-1%)	30,173 (-1%)
April	Below Normal	22,358	22,253 (0%)	22,274 (0%)
April	Dry	14,038	14,183 (1%)	14,143 (1%)
April	Critically Dry	9,724	9,580 (-1%)	9,570 (-2%)

Month	Water Year Type	Baseline Conditions	SMSCG 7-on/7-off	SMSCG Continuous
May	Wet	39,956	38,551 (-4%)	38,567 (-3%)
May	Above Normal	23,772	22,840 (-4%)	22,870 (-4%)
May	Below Normal	18,687	17,603 (-6%)	17,612 (-6%)
May	Dry	11,606	11,540 (-1%)	11,539 (-1%)
May	Critically Dry	7,144	6,941 (-3%)	6,958 (-3%)
June	Wet	25,311	25,612 (1%)	25,613 (1%)
June	Above Normal	14,114	14,576 (3%)	14,662 (4%)
June	Below Normal	8,646	9,029 (4%)	9,029 (4%)
June	Dry	6,733	6,771 (1%)	6,778 (1%)
June	Critically Dry	5,154	5,154 (0%)	5,154 (0%)
July	Wet	10,619	10,539 (-1%)	10,539 (-1%)
July	Above Normal	9,698	9,279 (-4%)	9,505 (-2%)
July	Below Normal	7,643	7,443 (-3%)	7,590 (-1%)
July	Dry	5,188	5,025 (-3%)	5,025 (-3%)
July	Critically Dry	4,000	4,000 (0%)	4,000 (0%)
August	Wet	7,240	6,860 (-5%)	6,860 (-5%)
August	Above Normal	6,424	5,648 (-12%)	6,206 (-3%)
August	Below Normal	4,441	4,183 (-6%)	4,373 (-2%)
August	Dry	4,129	3,780 (-8%)	3,775 (-9%)
August	Critically Dry	2,975	2,958 (-1%)	2,956 (-1%)
September	Wet	10,852	10,715 (-1%)	10,715 (-1%)
September	Above Normal	10,416	11,233 (8%)	10,580 (2%)
September	Below Normal	4,081	4,204 (3%)	4,061 (0%)
September	Dry	3,435	3,586 (4%)	3,720 (8%)
September	Critically Dry	3,000	3,000 (0%)	3,000 (0%)

Source: DRAFT_TrendReport_MultiCalSim_NoMacros_9b_v2_PASMSCGOff_20240415.xlsx.

Table 4A-9-2. Mean X2 (km) by Month and Water Year Type for Suisun Marsh Salinity Control Gates Sensitivity Scenarios, With Difference (%) from Baseline Conditions (Scenario minus Baseline Conditions) Given in Parentheses

Month	Water Year Type	Baseline Conditions	SMSCG 7-on/7-off	SMSCG Continuous
October	Wet	78.7	78.7 (0.0)	78.7 (0.0)
October	Above Normal	81.7	81.8 (0.1)	81.7 (0.0)
October	Below Normal	88.2	88.5 (0.3)	88.4 (0.1)
October	Dry	92.0	92.1 (0.0)	92.1 (0.0)
October	Critically Dry	93.9	94.0 (0.1)	94.0 (0.1)
November	Wet	79.5	79.6 (0.1)	79.6 (0.0)
November	Above Normal	83.0	82.9 (-0.1)	83.1 (0.1)
November	Below Normal	85.6	85.6 (0.0)	85.8 (0.1)
November	Dry	90.7	90.5 (-0.2)	90.7 (0.0)
November	Critically Dry	93.4	93.4 (0.0)	93.4 (0.0)
December	Wet	66.3	66.5 (0.2)	66.4 (0.2)
December	Above Normal	77.2	77.1 (-0.1)	77.3 (0.1)
December	Below Normal	83.3	83.3 (0.1)	83.3 (0.0)
December	Dry	85.0	85.0 (0.0)	85.1 (0.1)
December	Critically Dry	87.6	87.6 (-0.1)	87.9 (0.3)
January	Wet	56.6	56.6 (0.0)	56.6 (0.0)
January	Above Normal	64.0	64.0 (0.0)	63.9 (0.0)
January	Below Normal	73.8	73.6 (-0.2)	73.6 (-0.2)
January	Dry	79.4	79.4 (0.1)	79.2 (-0.2)
January	Critically Dry	82.4	81.8 (-0.7)	82.0 (-0.4)
February	Wet	53.4	53.4 (0.0)	53.4 (0.0)
February	Above Normal	59.3	59.2 (0.0)	59.2 (0.0)
February	Below Normal	65.7	65.5 (-0.2)	65.7 (0.0)
February	Dry	69.9	69.8 (-0.1)	69.7 (-0.2)
February	Critically Dry	78.0	76.6 (-1.4)	77.0 (-1.0)
March	Wet	54.4	54.4 (0.0)	54.4 (0.0)
March	Above Normal	57.3	57.1 (-0.2)	57.1 (-0.2)
March	Below Normal	63.8	63.4 (-0.5)	63.4 (-0.4)
March	Dry	69.2	68.9 (-0.3)	68.9 (-0.4)
March	Critically Dry	76.7	76.1 (-0.6)	76.4 (-0.3)
April	Wet	56.7	56.8 (0.2)	56.8 (0.2)
April	Above Normal	61.0	61.1 (0.1)	61.1 (0.1)
April	Below Normal	66.2	65.9 (-0.3)	65.9 (-0.3)
April	Dry	72.6	72.3 (-0.2)	72.3 (-0.3)
April	Critically Dry	78.3	78.4 (0.1)	78.5 (0.2)

Month	Water Year Type	Baseline Conditions	SMSCG 7-on/7-off	SMSCG Continuous
May	Wet	59.7	60.3 (0.6)	60.3 (0.6)
May	Above Normal	63.8	64.1 (0.4)	64.1 (0.4)
May	Below Normal	69.8	70.5 (0.7)	70.5 (0.7)
May	Dry	76.3	76.3 (-0.1)	76.3 (-0.1)
May	Critically Dry	81.9	82.1 (0.2)	82.1 (0.2)
June	Wet	65.8	65.9 (0.0)	65.9 (0.0)
June	Above Normal	70.4	70.4 (0.0)	70.4 (-0.1)
June	Below Normal	77.8	77.9 (0.1)	77.9 (0.1)
June	Dry	81.4	81.5 (0.0)	81.5 (0.0)
June	Critically Dry	86.0	86.1 (0.1)	86.1 (0.1)
July	Wet	74.5	74.3 (-0.2)	74.4 (-0.1)
July	Above Normal	78.4	77.4 (-1.0)	78.4 (0.0)
July	Below Normal	83.1	82.7 (-0.4)	83.1 (0.0)
July	Dry	85.6	85.7 (0.1)	85.7 (0.1)
July	Critically Dry	89.3	89.3 (0.0)	89.3 (0.0)
August	Wet	80.3	80.6 (0.3)	80.7 (0.4)
August	Above Normal	83.8	83.4 (-0.4)	83.9 (0.1)
August	Below Normal	86.3	86.0 (-0.2)	86.4 (0.1)
August	Dry	88.7	88.9 (0.2)	89.2 (0.4)
August	Critically Dry	91.6	91.7 (0.1)	91.8 (0.1)
September	Wet	78.4	78.7 (0.3)	78.7 (0.3)
September	Above Normal	81.8	81.9 (0.1)	81.9 (0.1)
September	Below Normal	88.4	88.6 (0.1)	88.5 (0.1)
September	Dry	91.0	91.2 (0.2)	91.2 (0.2)
September	Critically Dry	92.8	92.9 (0.1)	92.9 (0.1)

Source: DRAFT_TrendReport_MultiCalSim_NoMacros_9b_v2_PASMSCGOff_20240415.xlsx.