

Alternate Regulatory Scenario Sensitivity Analysis

4C.1 Introduction

The purpose of this appendix is to provide information regarding a possible future Alternate Regulatory Scenario describing different regulatory requirements related to water quality and flow in the Delta from those assumed in the assessments provided for Chapters 5 through 32 in this Final Environmental Impact Report (EIR). The Final EIR impact analysis evaluates conditions, including appropriate regulatory requirements related to water quality and flow in the Delta, at the time of the release of the Notice of Preparation. This appendix considers whether potential future changes to existing regulatory requirements could cause changes to potential environmental effects disclosed in the Final EIR and is not required by the California Environmental Quality Act (CEQA) nor used to support the CEQA findings presented in Chapters 7 through 32 of this Final EIR.

The State Water Resources Control Board (State Water Board) is currently in the process of updating the *Water Quality Control Plan for the San Francisco Bay/Sacramento–San Joaquin Delta Estuary* (Bay-Delta WQCP, or Bay-Delta Plan), which establishes water quality control objectives to reasonably protect beneficial uses in the watershed. The updates to the Bay-Delta WQCP focus on multiple Central Valley tributaries, Delta eastside tributaries (including the Calaveras, Cosumnes, and Mokelumne Rivers), Delta outflows, and interior Delta flows and could lead to changes to existing regulatory requirements affecting operations of the SWP. The specific requirements of the Bay-Delta WQCP updates are uncertain as the State Water Board moves through the steps of the environmental review and water quality control planning process, and it is possible that the Bay-Delta WQCP could be amended yet again before the Delta Conveyance Project is operational.

Given the uncertainty regarding the updates to the Bay-Delta WQCP, this appendix describes a potential Alternate Regulatory Scenario that considers possible regulatory requirements for water quality and flow when an updated Bay-Delta WQCP is implemented. The appendix also characterizes the potential effects of the project under the Alternate Regulatory Scenario described herein.

The description of an Alternate Regulatory Scenario includes some provisions from the recent publicly released March 2022 memorandum of understanding that outlines the terms of the Voluntary Agreements to Update and Implement the Bay-Delta Plan (Natural Resources Agency 2022). The Alternate Regulatory Scenario described in this appendix is not intended to fully represent the March 2022 Voluntary Agreements Memorandum of Understanding (2022 VAs MOU) and is only one example of a potential future condition with an updated Bay-Delta WQCP.

The sensitivity study in this appendix is focused on the operation of Alternative 5 (the proposed project, 6,000 cfs discharging at Bethany Reservoir) to understand if potential environmental effects of the proposed project may vary with an Alternate Regulatory Scenario. For the purposes of this appendix, the terms *Alternative 5* and *proposed project* are used interchangeably. This appendix qualitatively discusses whether the type and magnitude of potential environmental impacts on resources with Alternative 5 under an Alternate Regulatory Scenario may change from those effects of Alternative 5 disclosed in Chapters 7 through 32 of the Final EIR. As described in Section 4C.4, *Potential Environmental Impacts*, no new impacts are identified under an Alternate Regulatory Scenario relative to those already disclosed in Chapters 7 through 32. The analysis presented below

shows that impacts would generally be similar in nature and extent with Alternative 5 under an Alternate Regulatory Scenario as compared to Alternative 5 under existing conditions and as described in Chapters 7 through 32.

4C.2 Background

The State Water Board is updating the Bay-Delta WQCP in phases by region. On December 12, 2018, through State Water Board Resolution No. 2018-0059, the State Water Board adopted the Bay-Delta WQCP amendments and Final Substitute Environmental Document establishing the lower San Joaquin River flow objectives and revised southern Delta salinity objectives (Phase 1). The Phase 1 amendments are proceeding toward implementation and will result in additional flows into the Delta from the San Joaquin River system. The Phase 1 amendments were not included in the modeling because the south Delta salinity standards metrics of compliance are not yet developed to the point that they can be modeled. The State Water Board is currently considering Bay-Delta WQCP amendments for the Sacramento River, Delta, and eastside tributaries (Phase 2).

As part of the process for the Bay-Delta WQCP Update, Governor Gavin Newsom reinitiated discussions in January 2019 among interested parties to seek voluntary agreements (VAs) that the State Water Board could consider as a pathway contributing to implementation of the update. These discussions have centered on how a comprehensive approach to managing habitat, flow, and other factors is required to protect native fish and wildlife species, while concurrently protecting water supply reliability, consistent with the legal requirement of providing reasonable protection for all beneficial uses.

On March 29, 2022, the California Natural Resources Agency, the California Environmental Protection Agency, the California Department of Water Resources (DWR), the California Department of Fish and Wildlife, the U.S. Bureau of Reclamation, and water agencies from across the state signed the 2022 VAs MOU. The 2022 VAs MOU describes an alternative implementation approach to contribute to achieving two narrative objectives to be evaluated as part of the Bay-Delta WQCP Update. The State Water Board's next steps are to complete a staff report and Substitute Environmental Document, pursuant to the State Water Board's certified regulatory program, and consider a resolution to update the Bay-Delta WQCP.

4C.3 Alternate Regulatory Scenario Description and Modeling Results

The specific contents of the Bay-Delta WQCP Update are uncertain as the State Water Board continues to move through the steps of the water quality control planning process. Additionally, the 2022 VAs MOU states that if the VAs are implemented as described, they would be implemented for 8 years, with a potential to extend to 15 years. If approved and constructed, the Delta Conveyance Project would not be operational until after that period. The timing of construction and operation of the Delta Conveyance Project and the independent process of updating the Bay-Delta WQCP result in uncertainty regarding the regulatory environment that would be present at the time of Delta Conveyance operations. Given the uncertainty described above, this sensitivity study is not intended to be a full representation of Bay-Delta WQCP Update conditions that could be approved in the

future, but instead provides an analysis of whether the effects of Alternative 5 operations would be expected to differ as a result of future regulatory changes.

For this sensitivity study, an Alternate Regulatory Scenario considers only some provisions from the 2022 VAs MOU and existing water quality requirements to describe how the effects of Alternative 5 may be different than described in the main body of the Final EIR if the regulations were different. At the time of the development of this appendix, the only available modeling assumptions for the VAs were from an earlier representation of the VAs in 2019, which modeled VAs that were different than the 2022 VAs MOU in some respects (Natural Resources Agency 2019). The modeling results presented in this appendix do not represent the full range of VAs flows in the 2022 VAs MOU. For example, the 2022 VAs MOU includes a significant volume of water being made available through water purchases that is not included in this analysis, which uses the 2019 VAs assumptions. And as described above, the modeling in this appendix does not assume any changes in San Joaquin River tributary operations. The flow requirements simulated by CalSim 3 for the Alternate Regulatory Scenario model run are shown in Table 4C-1, below. Modeling the VAs for the purpose of this appendix assumes specific deployment and timing of flows. During actual implementation, the VAs governance group would strategize on the appropriate timing of flows specific to the needs of a year.

Two elements of the 2019 VAs modeling efforts were updated for the purposes of this appendix:

- The reduced SWP/CVP Delta exports (characterized as “Delta VA” in Table 4C-1) were updated to reflect quantities of water from the 2022 VAs MOU.
- A component of the San Joaquin River system (characterized as “Friant VA” in Table 4C-1) was included in the modeling of the Alternate Regulatory Scenario. This VA would result in a reduction in the recapture of San Joaquin River Restoration Program flows currently made by the SWP and CVP.

The modeled Alternate Regulatory Scenario, shown in Table 4C-1, underestimates the Delta outflow (by about 400 thousand acre-feet [TAF]) associated with the potential VAs because it does not include a substantial quantity of water that is included in the 2022 VAs MOU, Appendix 1:

- San Joaquin River Basin: 48–181 TAF
- PWA Water Purchase Program: up to 144.5 TAF
- Permanent State Water Purchases: up to 123 TAF
- Mokelumne River, Putah Creek, and Tuolumne River contributions are not modeled as protected Delta outflow because discussions are still underway
- Sacramento River tributaries have small differences between 2019 and 2022 VAs, which add up to a difference of about 20 TAF

The modeled Alternate Regulatory Scenario does not include the 2020 Incidental Take Permit (ITP) Spring Outflow criteria implemented during April and May (Permit Condition 8.17). This criterion is replaced by spring outflow, as defined by the VAs, using anticipated volumes provided in March, April, and May that were ultimately agreed to in the 2022 MOU by the south-of-Delta SWP and CVP contractors (Delta VA). Modeling for the Delta VA employed a simplified method where export reductions started as early as March (for below normal and dry years) to meet the full Delta VA volume. In reality, Delta VA implementation monthly distribution could be different than what was assumed in the modeling.

The process to incorporate new diversions into the updated Bay-Delta WQCP is not yet developed. As described in the 2022 MOU, the VAs flows are to be protected from diversion. For purposes of understanding the effects of the proposed project with an Alternative Regulatory Scenario, the modeling of Alternative 5 under the Alternate Regulatory Scenario conservatively assumes the proposed project would not divert excess Delta outflow in January through June during times in which total Delta outflow is less than 29,200 cubic feet per second (cfs). The contribution of the flows listed in Table 4C-1 to Delta outflow is modeled identically in the Alternate Regulatory Scenario without and with Alternative 5.

Table 4C-1. Voluntary Agreements Assumptions Modeled for the Alternate Regulatory Scenario ^a

Tributary	Season	Source	Application	Wet	Above Normal	Below Normal	Dry	Critical
Sacramento	Spring/Summer	Land Fallowing	Block	0	100	100	100	0
Feather	Spring/Summer	Land Fallowing	Block	0	50	50	50	0
Yuba	Spring	Reservoir Storage	Block	0	50	50	50	0
American	Spring	Groundwater substitution, Reservoir Storage	Hybrid	0	10	10	40	30
Delta (SWP/CVP) ^b	Mar – May	Export Reduction	Block	0	175	125	125	0
Friant ^c	Feb – May	Reduction in SJRRP recapture	Flow	50	50	50	50	0
Mokelumne ^d	Mar – Oct	Reservoir Storage	Flow	45	45	20	10	0
Putah ^d	Nov – May	Reservoir Storage	Flow	6	6	6	6	6
Tuolumne ^d	–	–	Flow	45	70	89	99	99

Note: Water year types are based on the Sacramento 40-30-30 water year type, with the exception of Friant. Friant water year types are defined in note C below.

SJRRP = San Joaquin River Restoration Program.

^a All numeric values are in thousands of acre feet. Additional details can be found in the 2019 VAs Documents. The primary focus was the January through June period.

^b State Water Project (SWP) and Central Valley Project (CVP) export reductions, values differ slightly from 2019. For Alternative 5, SWP export reductions are applied at both Banks Pumping Plant and the north Delta diversion.

^c Only a reduction in recapture of San Joaquin River Restoration Program (SJRRP) flows with current facilities in the Delta was considered (i.e., no contribution from flood flows or consideration of future potential recapture); based on the SJRRP water year types (wet, normal-wet, normal-dry, dry, critical).

^d Flow contributions were not explicitly modeled as protected Delta Outflow, as discussions for these VAs are still underway.

4C.3.1 Water Operation Results

This section summarizes the CalSim 3 simulations regarding operations under four conditions: the Alternate Regulatory Scenario described above in Section 4C.3, existing conditions represented in the Final EIR, Alternative 5 represented in the Final EIR, and Alternative 5 under the Alternate

Regulatory Scenario. Table 4C-2 summarizes the description of the four conditions and the figure notations used in this section.

Table 4C-2. Summary of Four Conditions and Figure Notation

Condition	Description	Abbreviation on Figure	Line Type on Figures
Existing Conditions	Existing conditions (2020) representing the CEQA baseline as described and evaluated in the main body of the Final EIR	Existing	Black Solid Line
Alternative 5	Alternative 5, the proposed project, as described and evaluated in the main body of the Final EIR	Alt 5	Green Solid Line
Alternate Regulatory Scenario	Alternate Regulatory Scenario described in Section 4C.3 (2020), which does not include Alternative 5 (proposed project)	Alt Reg	Black Dashed Line
Alternative 5 under the Alternate Regulatory Scenario	Alternate Regulatory Scenario with Alternative 5, the proposed project, with all the same infrastructure as described in the Final EIR, incorporated as described in Section 4C.3 (2020)	Alt 5 Alt Reg	Green Dashed Line

The results shown below focus on how changes in system operations of Alternative 5 compare under the two regulatory conditions—existing conditions and Alternate Regulatory Scenario. Figures 4C-1 through Figure 4C-20 show the modeled system responses for the four conditions identified in Table 4C-2 above. Some key observations based on these simulations are also discussed below.

4C.3.1.1 Storage

Reservoir storage volumes at Oroville, Shasta, Trinity, and Folsom are very similar at the end of May and the end of September for all four conditions in most cases. There are some differences in end-of-September storage in Folsom between the four conditions ranging between 30% and 60% exceedance, but Alternative 5 has a minor increase in storage compared to the conditions without Alternative 5.

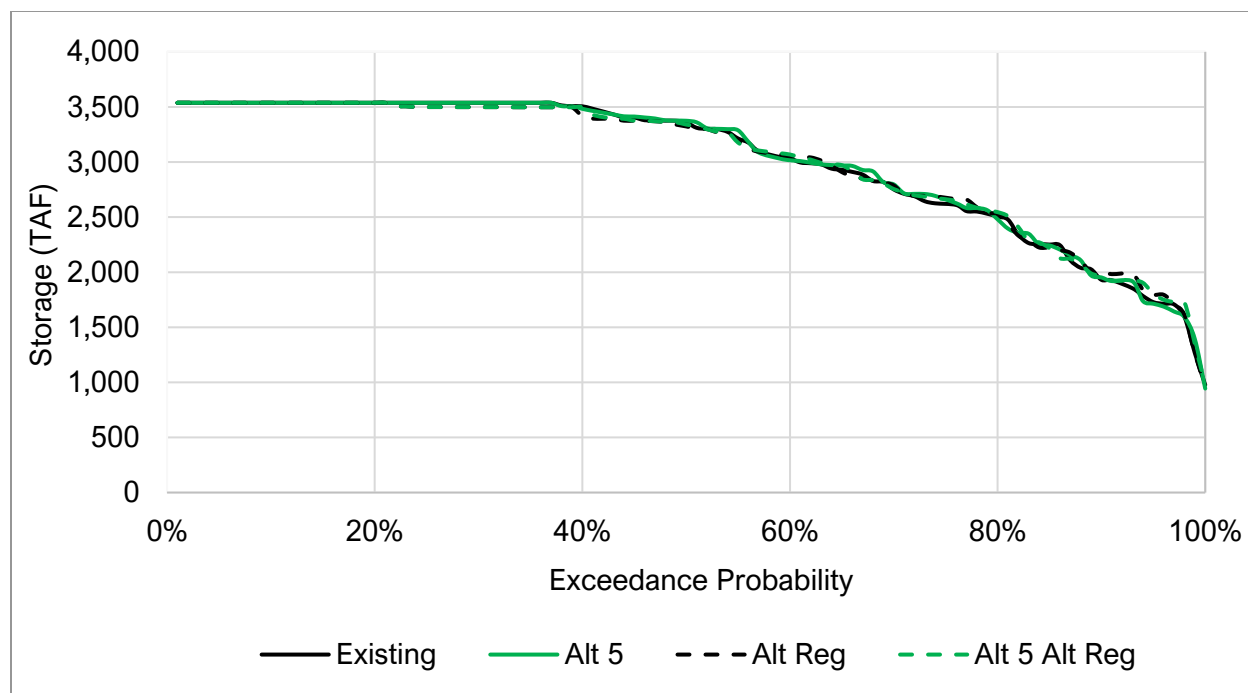


Figure 4C-1. Oroville End-of-Month Storage, Exceedance Probability for Monthly Average End-of-Month Storage (thousand acre-feet) for May

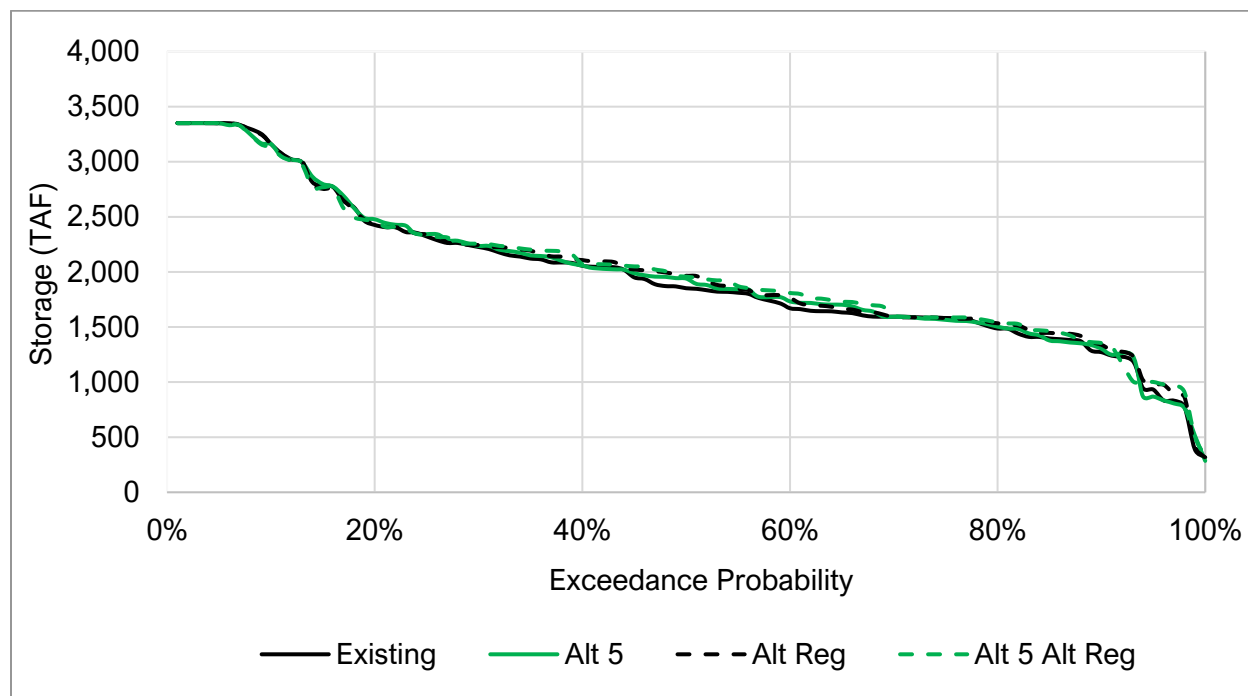


Figure 4C-2. Oroville End-of-Month Storage, Exceedance Probability for Monthly Average End-of-Month Storage (thousand acre-feet) for September

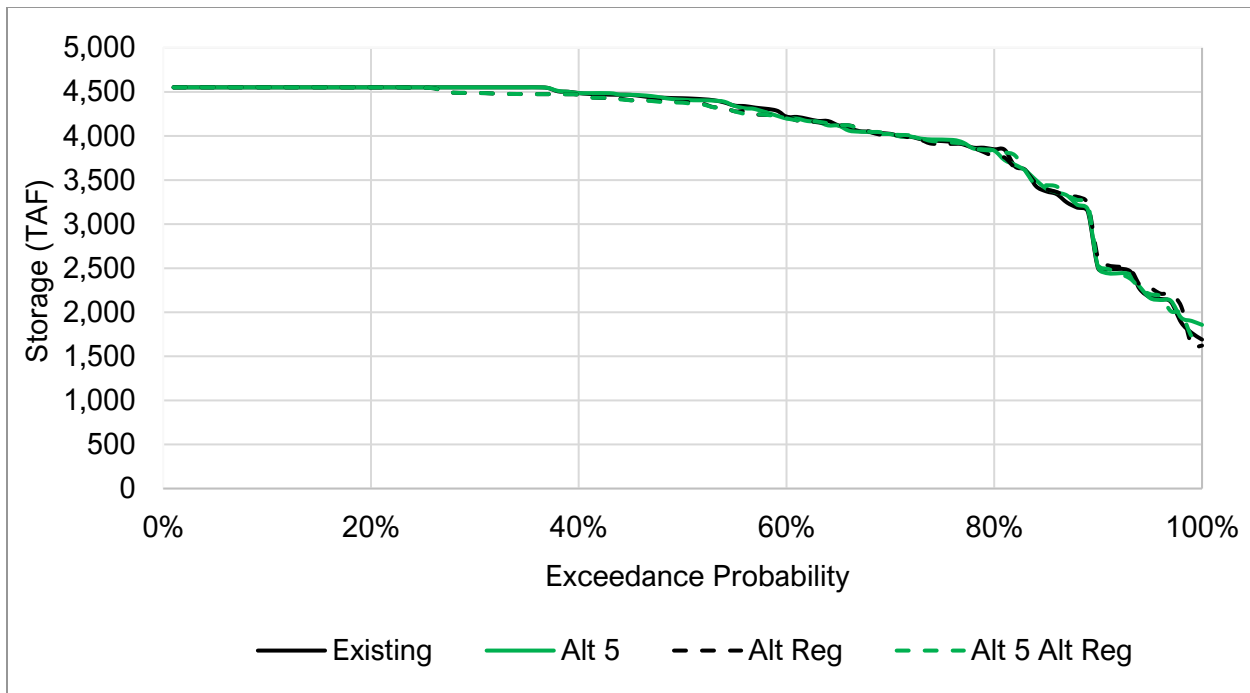


Figure 4C-3. Shasta End-of-Month Storage, Exceedance Probability for Monthly Average End-of-Month Storage (thousand acre-feet) for May

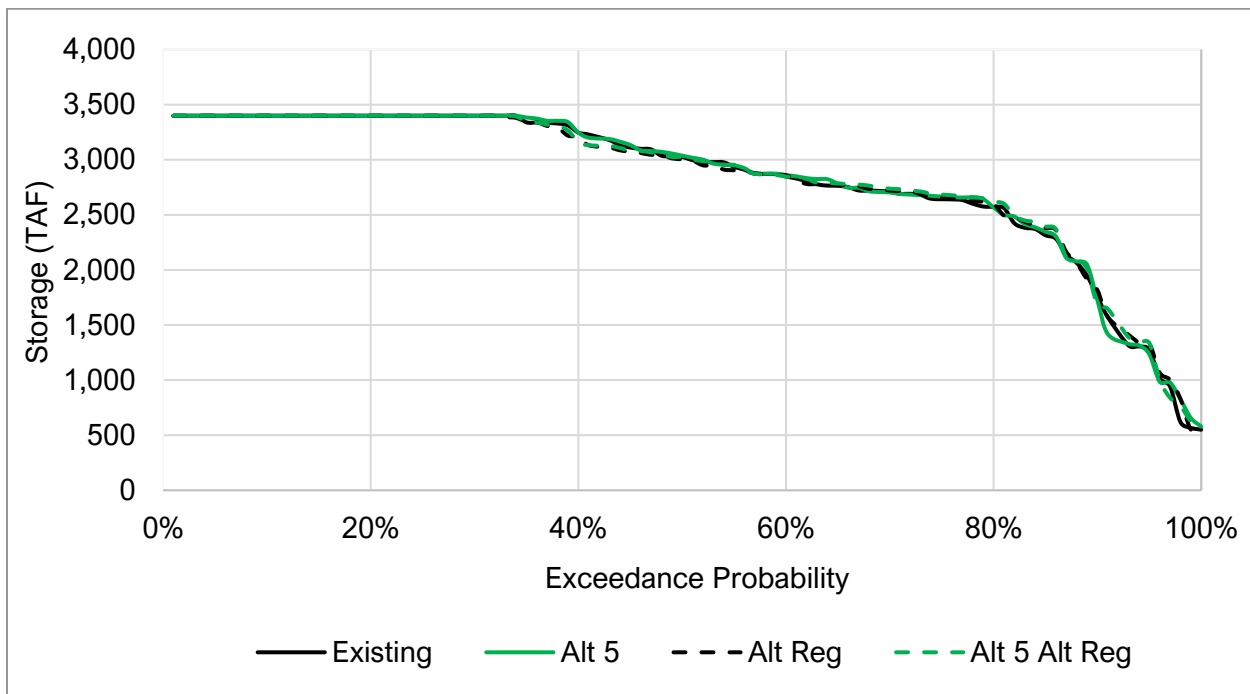


Figure 4C-4. Shasta End-of-Month Storage, Exceedance Probability for Monthly Average End-of-Month Storage (thousand acre-feet) for September

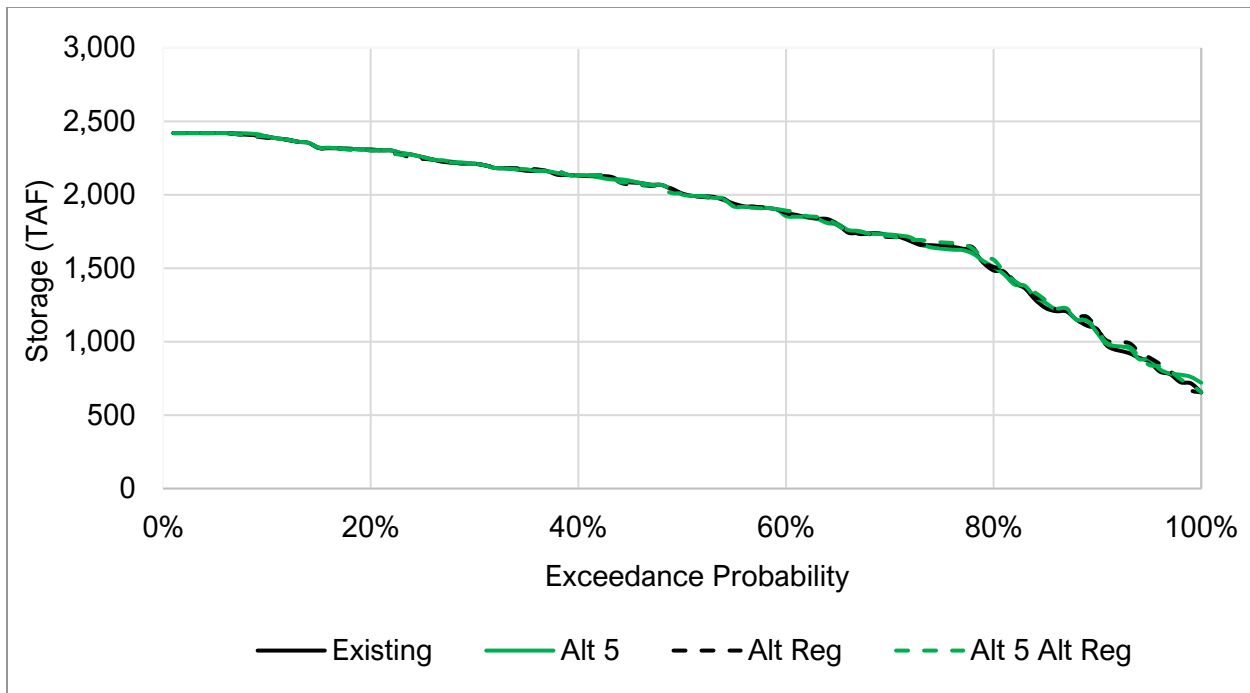


Figure 4C-5. Trinity End-of-Month Storage, Exceedance Probability for Monthly Average End-of-Month Storage (thousand acre-feet) for May

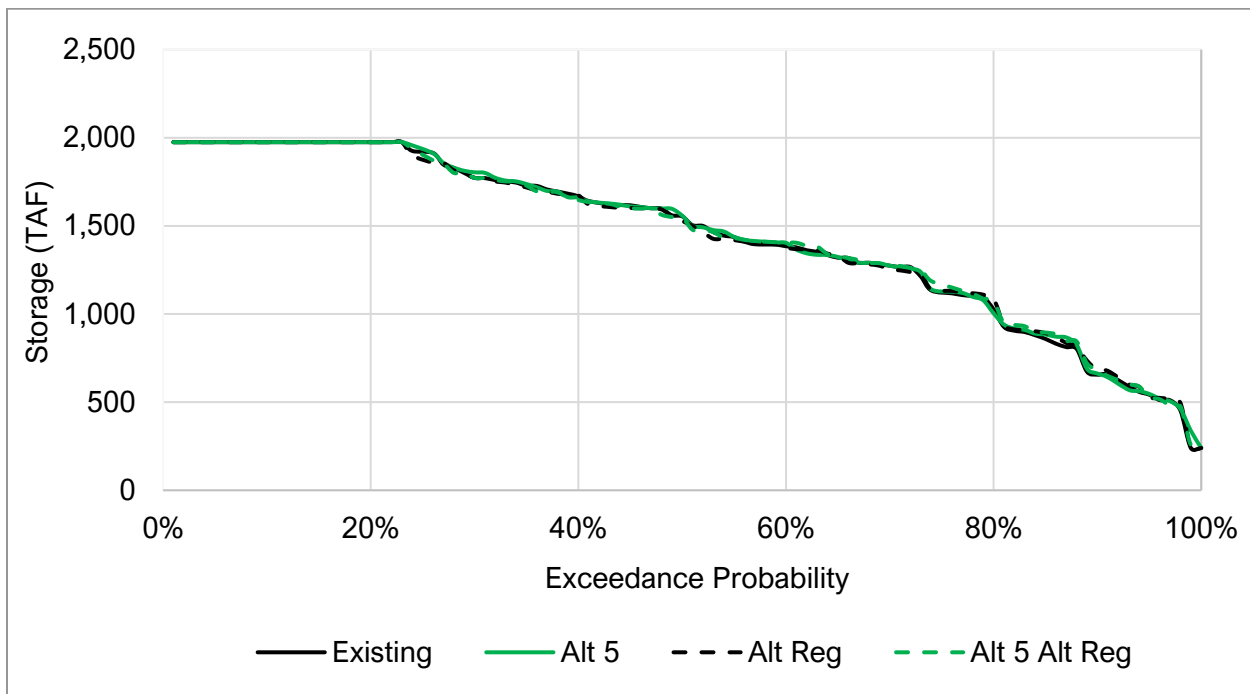


Figure 4C-6. Trinity End-of-Month Storage, Exceedance Probability for Monthly Average End-of-Month Storage (thousand acre-feet) for September

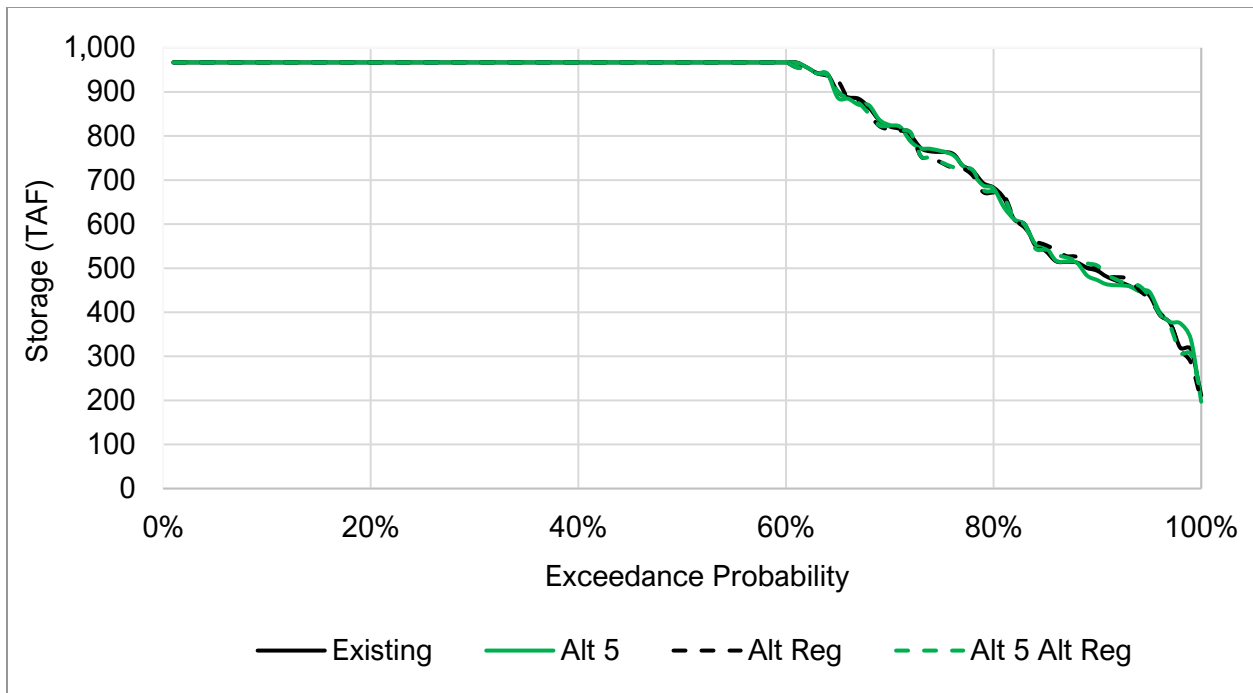


Figure 4C-7. Folsom End-of-Month Storage, Exceedance Probability for Monthly Average End-of-Month Storage (thousand acre-feet) for May

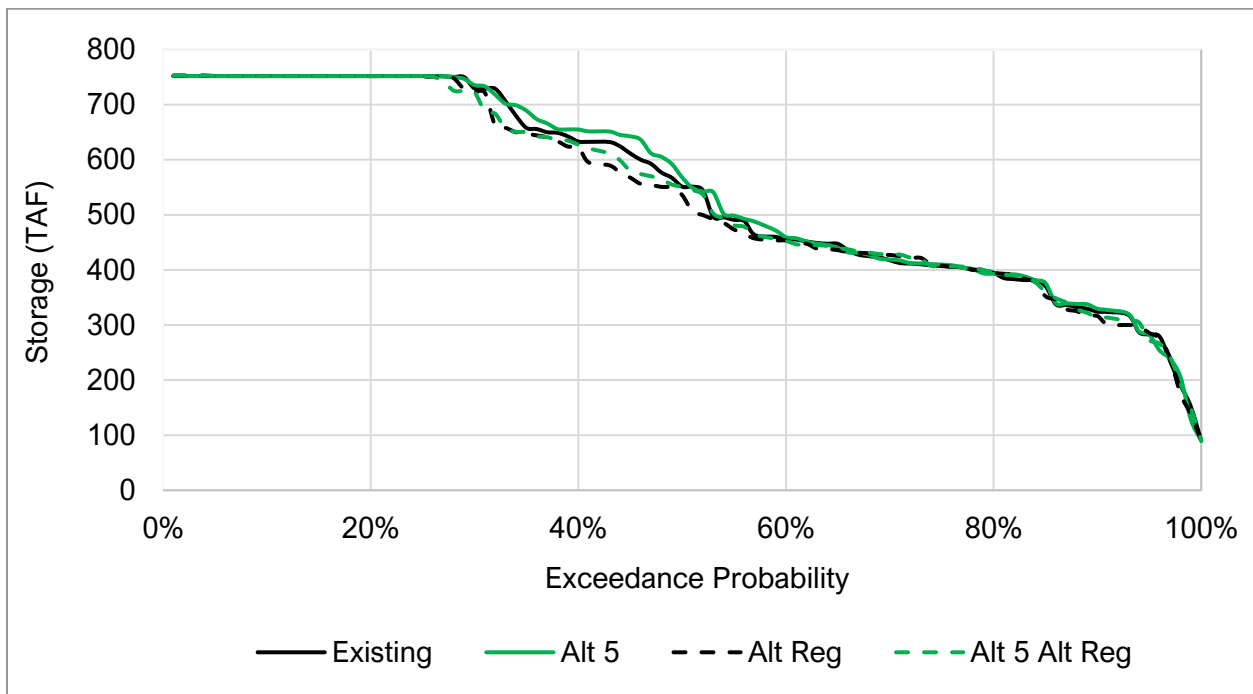


Figure 4C-8. Folsom End-of-Month Storage, Exceedance Probability for Monthly Average End-of-Month Storage (thousand acre-feet) for September

4C.3.1.2 River Flows

Flows on rivers upstream of the two proposed north Delta points of diversion were generally consistent between the four conditions, with a few exceptions. April and May flows on the Feather River at Thermalito and on the Sacramento River at Freeport are slightly higher under the Alternate Regulatory Scenario without and with Alternative 5 compared to existing conditions and Alternative 5. In general, the flows under Alternative 5 compared to existing conditions are the same as existing conditions. The flows with Alternative 5 under the Alternate Regulatory Scenario are also the same as existing conditions. The flows with Alternative 5 under the Alternate Regulatory Scenario are also the same as the Alternate Regulatory Scenario. The American River at Nimbus shows the same pattern from April to June. These flow changes under the Alternate Regulatory Scenario and with Alternative 5 under the Alternate Regulatory Scenario are due to additional flows under the Alternate Regulatory Scenario on these individual rivers.

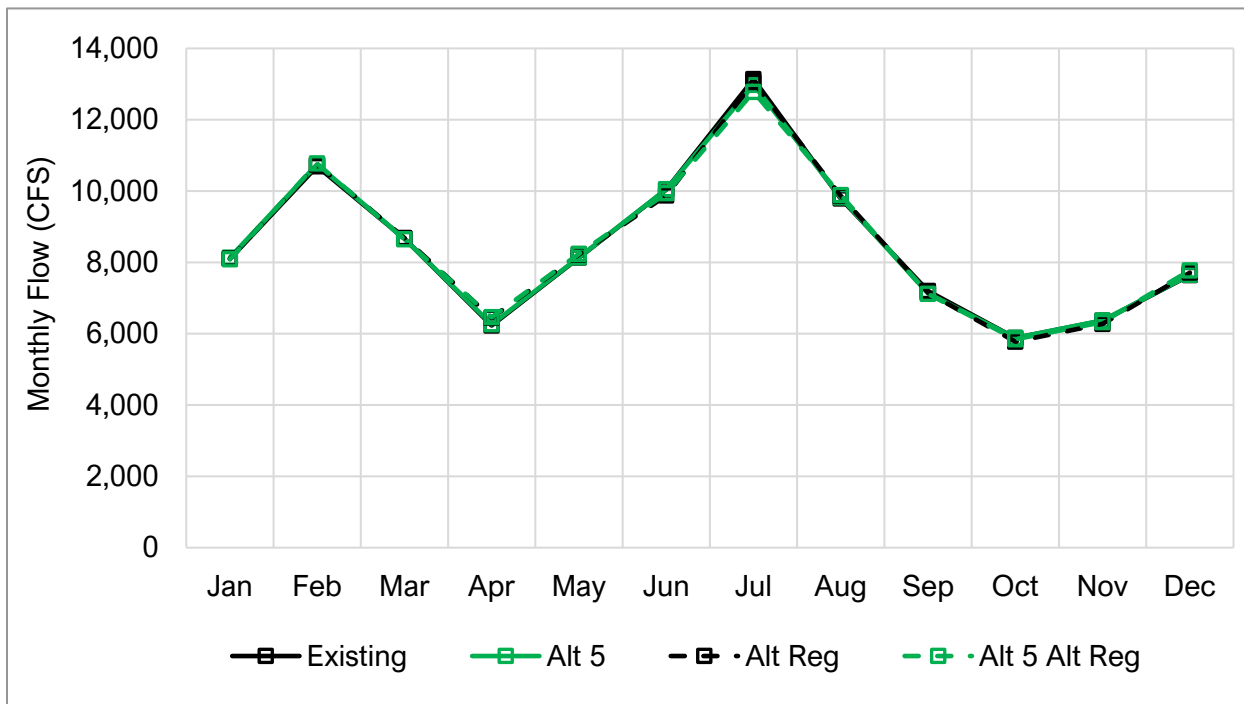


Figure 4C-9. Sacramento River at Keswick, Monthly Average Flow (cubic feet per second)

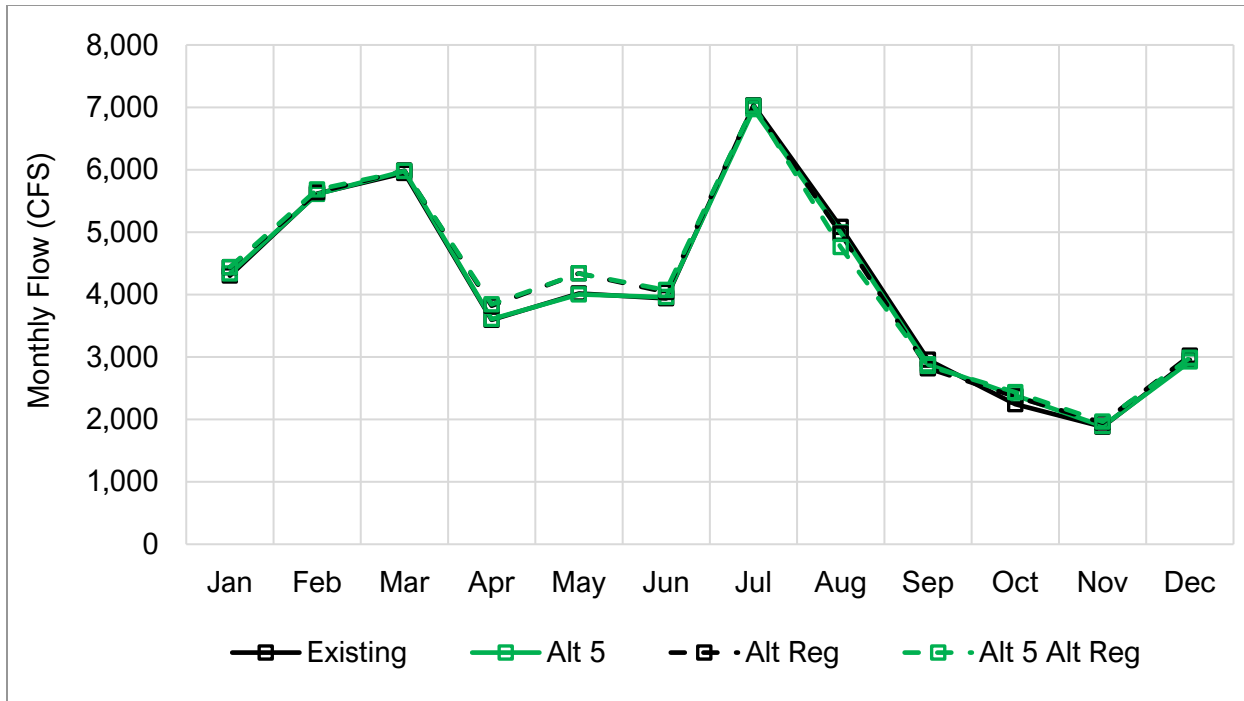


Figure 4C-10. Feather River at Thermalito, Monthly Average Flow (cubic feet per second)

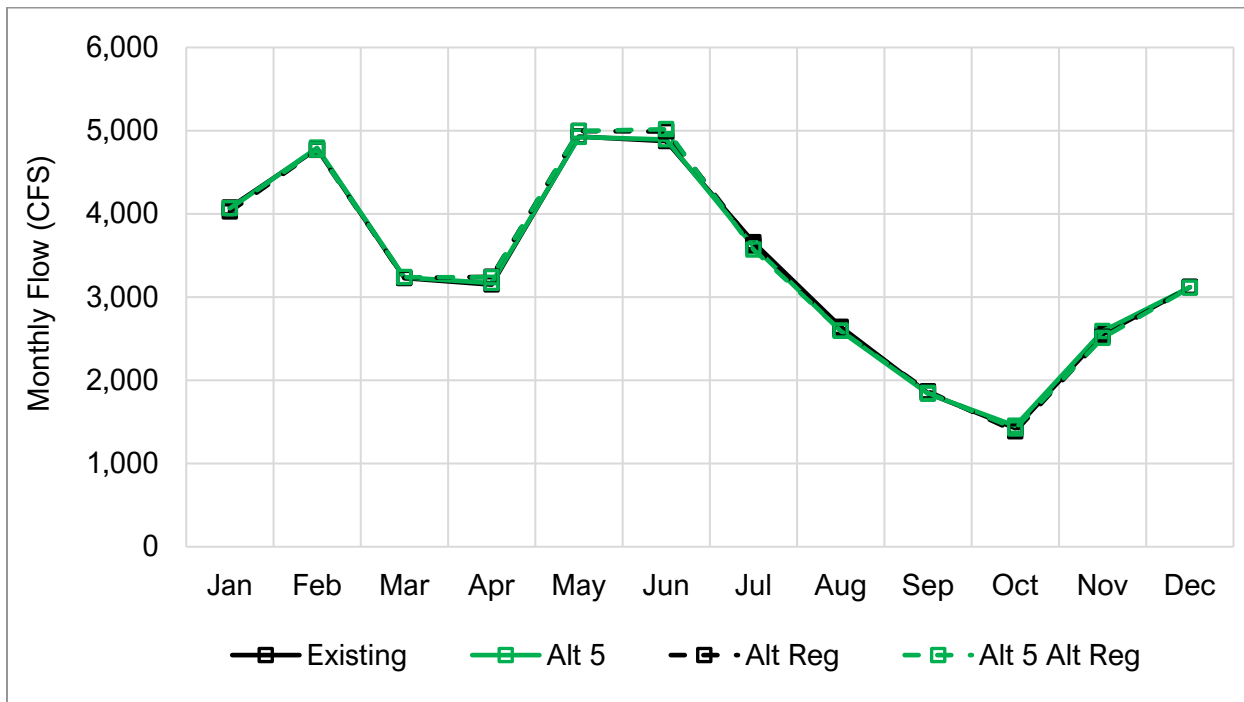


Figure 4C-11. American River at Nimbus, Monthly Average Flow (cubic feet per second)

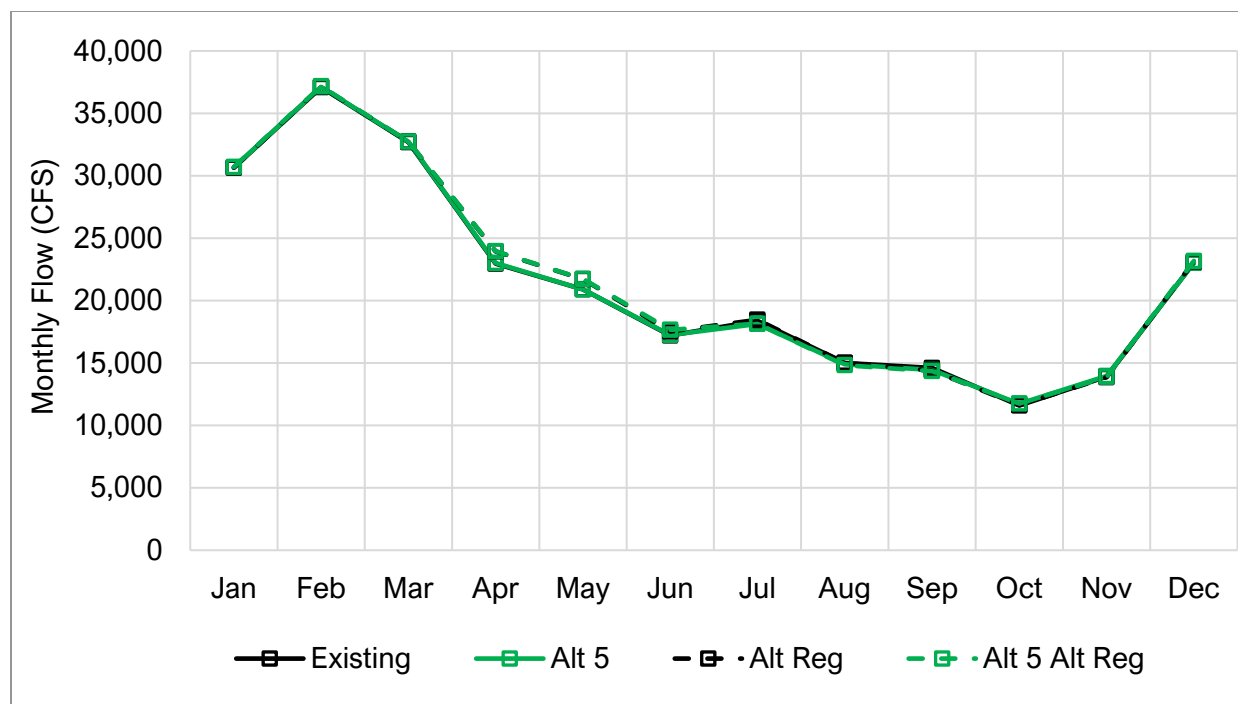


Figure 4C-12. Sacramento River at Freeport, Monthly Average Flow (cubic feet per second)

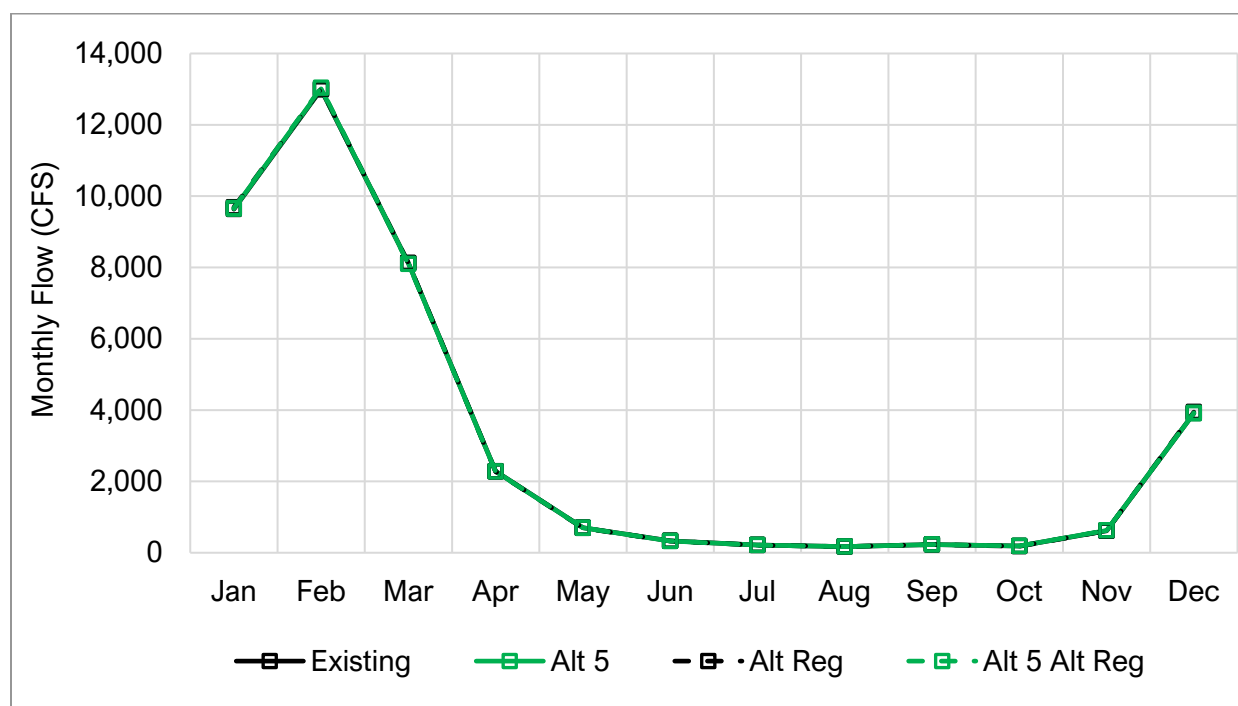


Figure 4C-13. Yolo Bypass at Delta, Monthly Average Flow (cubic feet per second)

Flows on the San Joaquin River at Vernalis are very similar under all four conditions. Alternative 5 and Alternative 5 under the Alternate Regulatory Scenario show a slight decrease in flows in April.

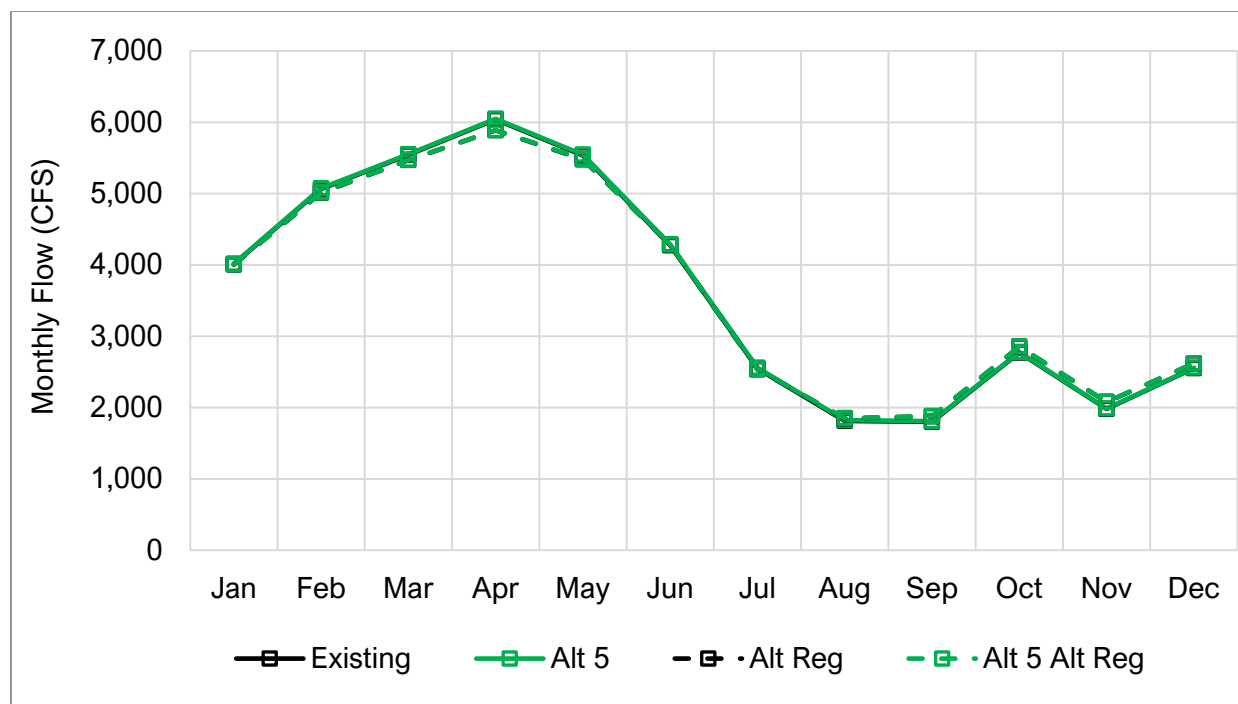


Figure 4C-14. San Joaquin River at Vernalis, Monthly Average Flow (cubic feet per second)

Alternative 5 compared to existing conditions shows a decrease in flows in the Sacramento River downstream of the proposed diversion locations in November through March, and Alternative 5 under the Alternate Regulatory Scenario compared to the Alternate Regulatory Scenario shows a similar decrease. While there is some variability in flows between the four conditions in the April through September period, the effect of the north Delta diversion on flows during that period is consistent between existing conditions and the Alternate Regulatory Scenario. There is a minor decrease in flows in April and May and then a slightly larger decrease in June and July due to Alternative 5 operation of the north Delta diversion under existing conditions and the Alternate Regulatory Scenario. September also shows a minor decrease due to north Delta diversion operations under existing conditions and the Alternate Regulatory Scenario. As shown in Figure 4C-16, Delta outflow shows very similar patterns to flows on the Sacramento River below the north Delta diversion. As described in Section 4C.3, for the purpose of this appendix, modeled results do not include approximately 400 TAF of flows identified in the 2022 VAs MOU and therefore do not represent full implementation of the VAs described in the March MOU.

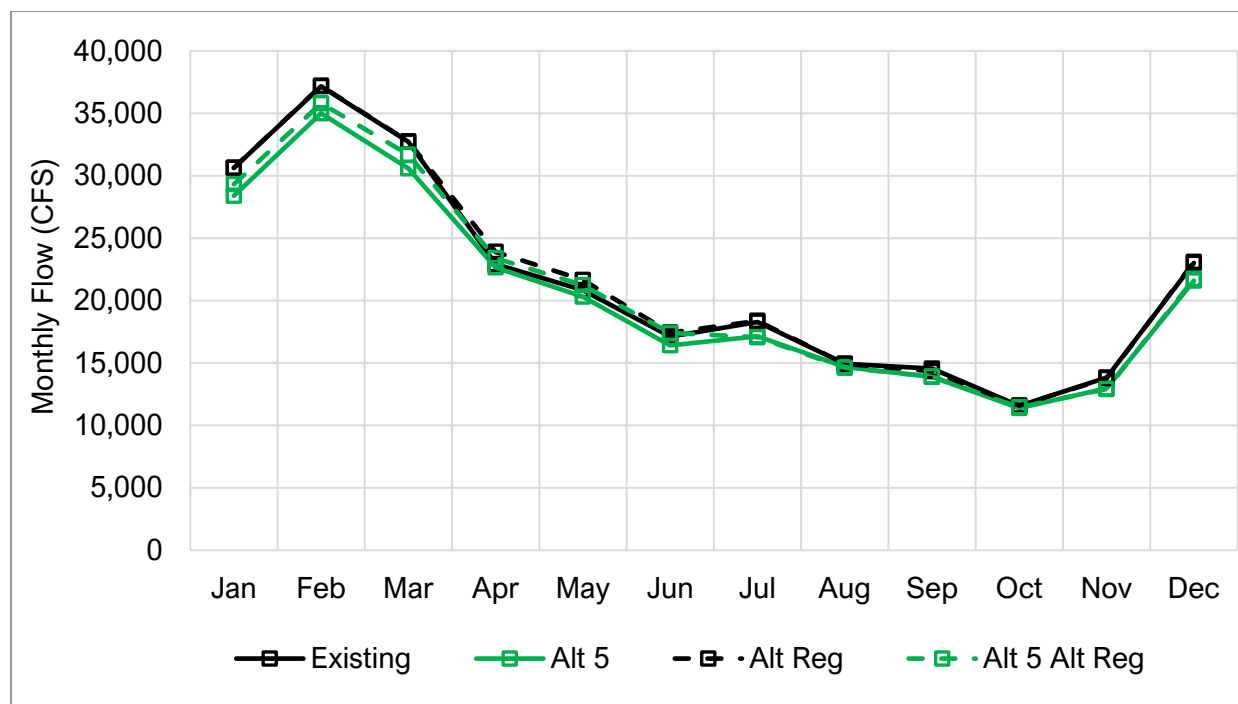


Figure 4C-15. Sacramento River Downstream of the North Delta Diversion, Monthly Average Flow (cubic feet per second)

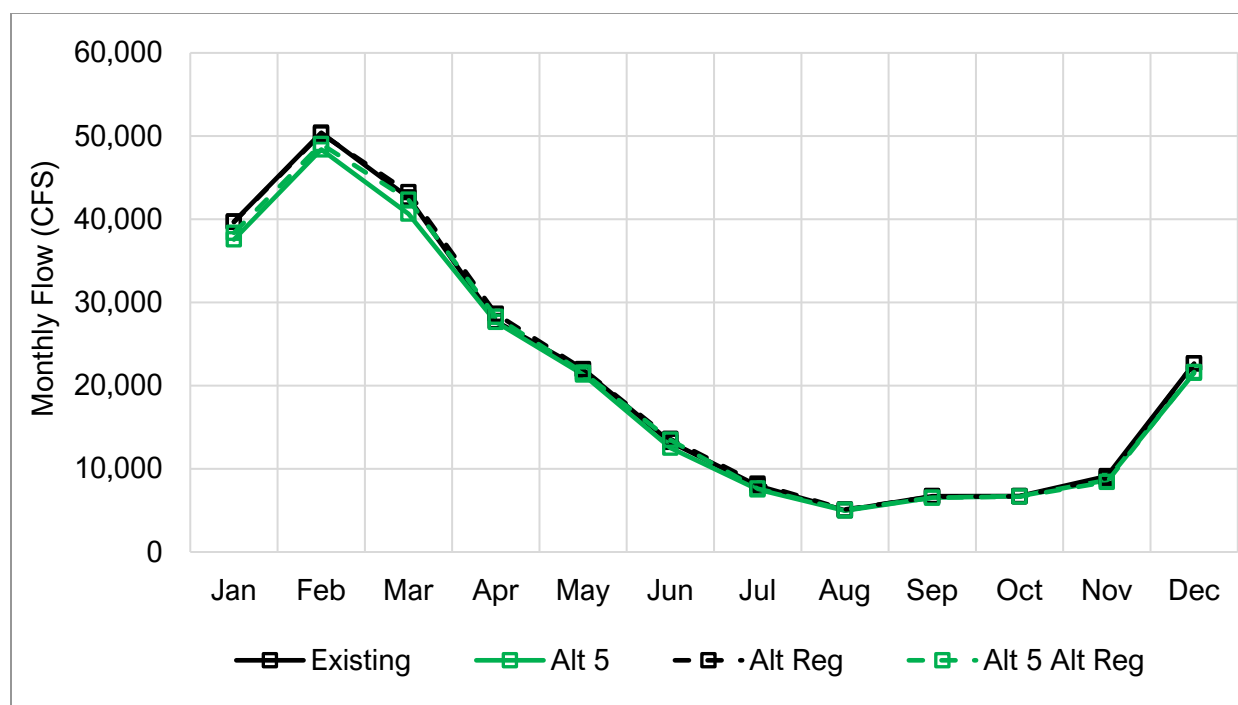


Figure 4C-16. Delta Outflow (NDOI), Monthly Average Flow (cubic feet per second) ¹

¹ For the purpose of this appendix, modeled results do not include approximately 400 TAF of flows identified in the 2022 VAs MOU and therefore do not represent full implementation of the VAs.

4C.3.1.3 Delta (X2 and OMR)

X2 position is slightly further west in the spring and summer under the Alternate Regulatory Scenario and with Alternative 5 under the Alternate Regulatory Scenario. Alternative 5 causes X2 position to be 1 to 2 kilometers further east in many months under existing conditions and a few months under the Alternate Regulatory Scenario.

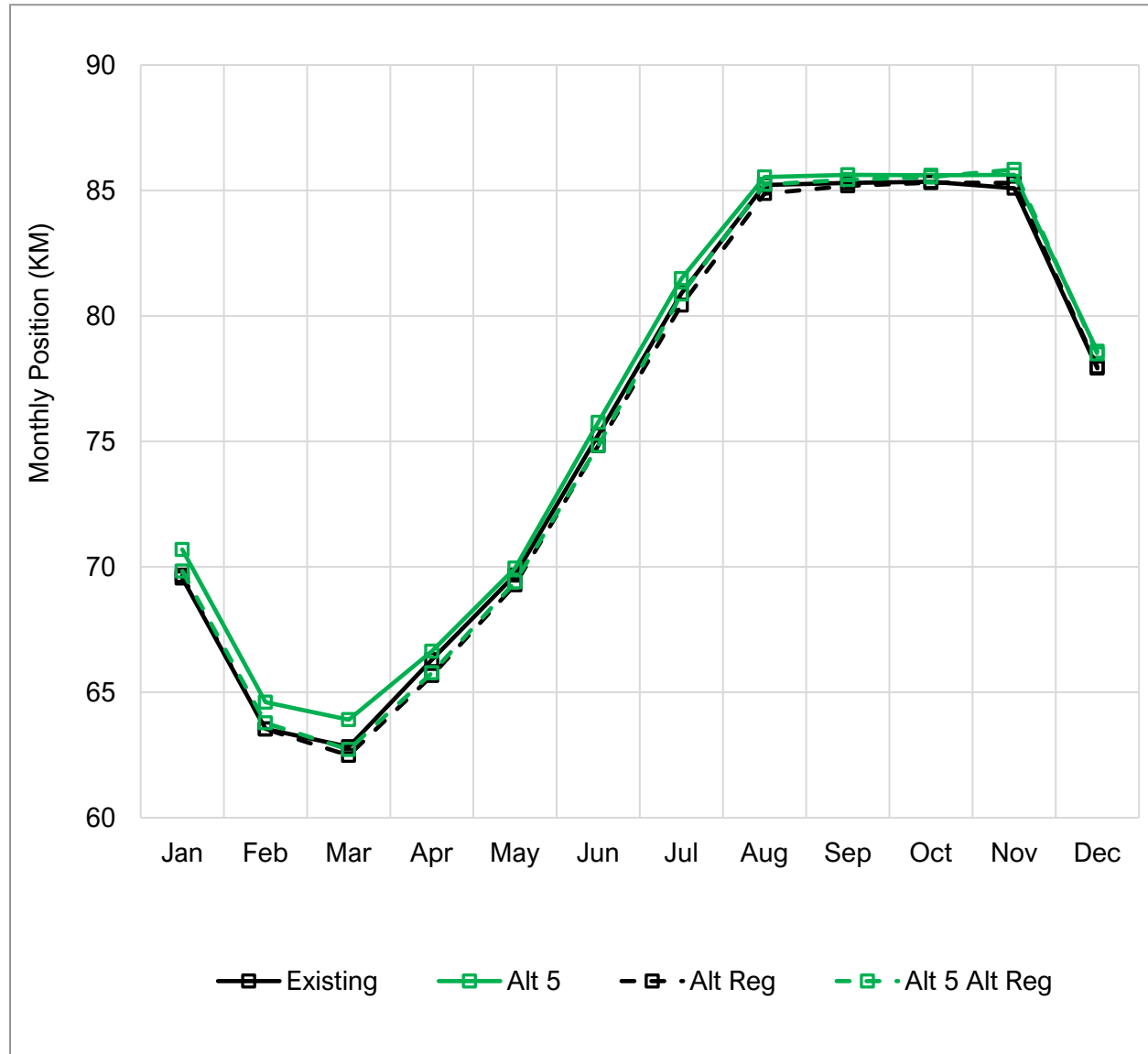


Figure 4C-17. X2 Position, Monthly Average Position (kilometers)

Old and Middle River flows show some differences between the four conditions during the December through June period. In March, the Alternate Regulatory Scenario and Alternative 5 under the Alternate Regulatory Scenario show less negative flows, while in May flows are more negative. This is due to the modeled representation of differences in timing between flows under the Alternate Regulatory Scenario compared to the ITP Spring Outflow requirement. Overall, Alternative 5 is similar to existing conditions and Alternative 5 under Alternate Regulatory Scenario is similar to the Alternate Regulatory Scenario.

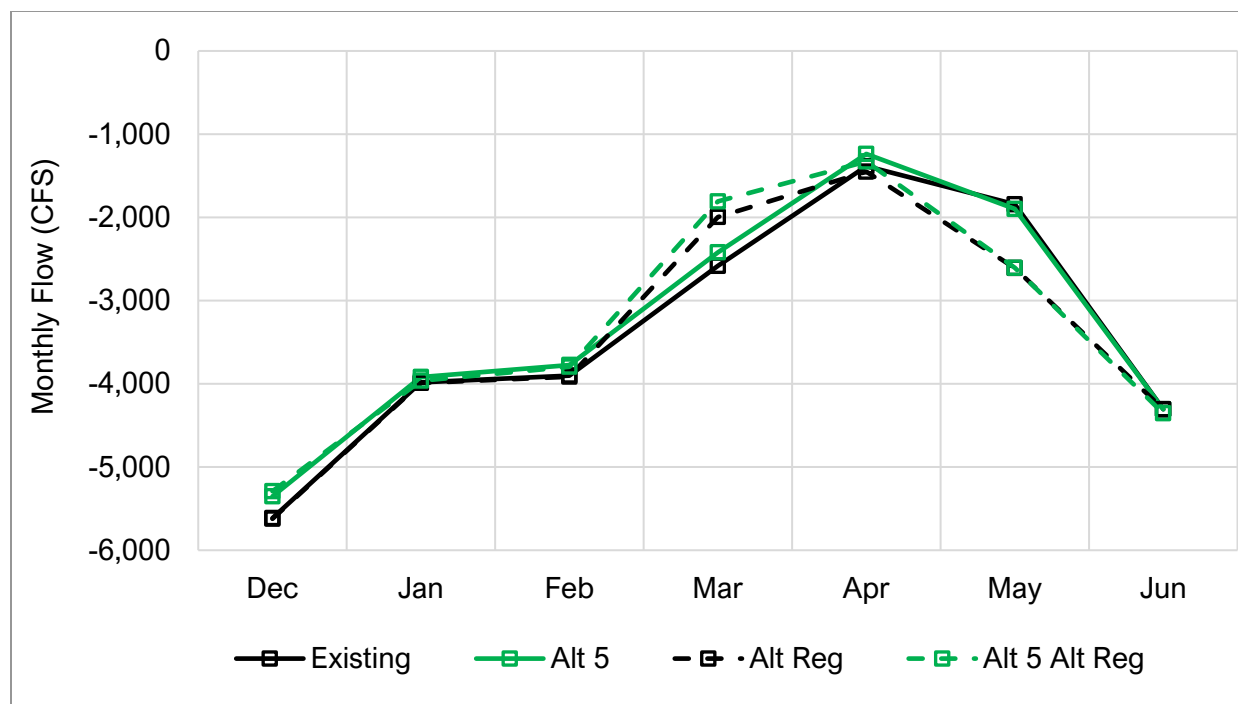


Figure 4C-18. Combined Old and Middle River, Monthly Average Flow (cubic feet per second)

4C.3.1.4 Exports

Total Delta exports under the Alternate Regulatory Scenario and with Alternative 5 under the Alternate Regulatory Scenario are lower in March and higher in May, which is consistent with the OMR flow changes discussed in Section 4C.3.1.3 and is a result of modeling assumptions included in the Alternate Regulatory Scenario. Total Delta exports are also lower in January and February with Alternative 5 under the Alternate Regulatory Scenario compared to the Alternate Regulatory Scenario. Exports increase with Alternative 5 under existing conditions and the Alternate Regulatory Scenario in November through March and May through July, with the largest increases occurring in the winter due to north Delta diversions of large storm and runoff flows. Annual north Delta diversion is lower under the Alternate Regulatory Scenario across the entire simulation period compared to existing conditions.

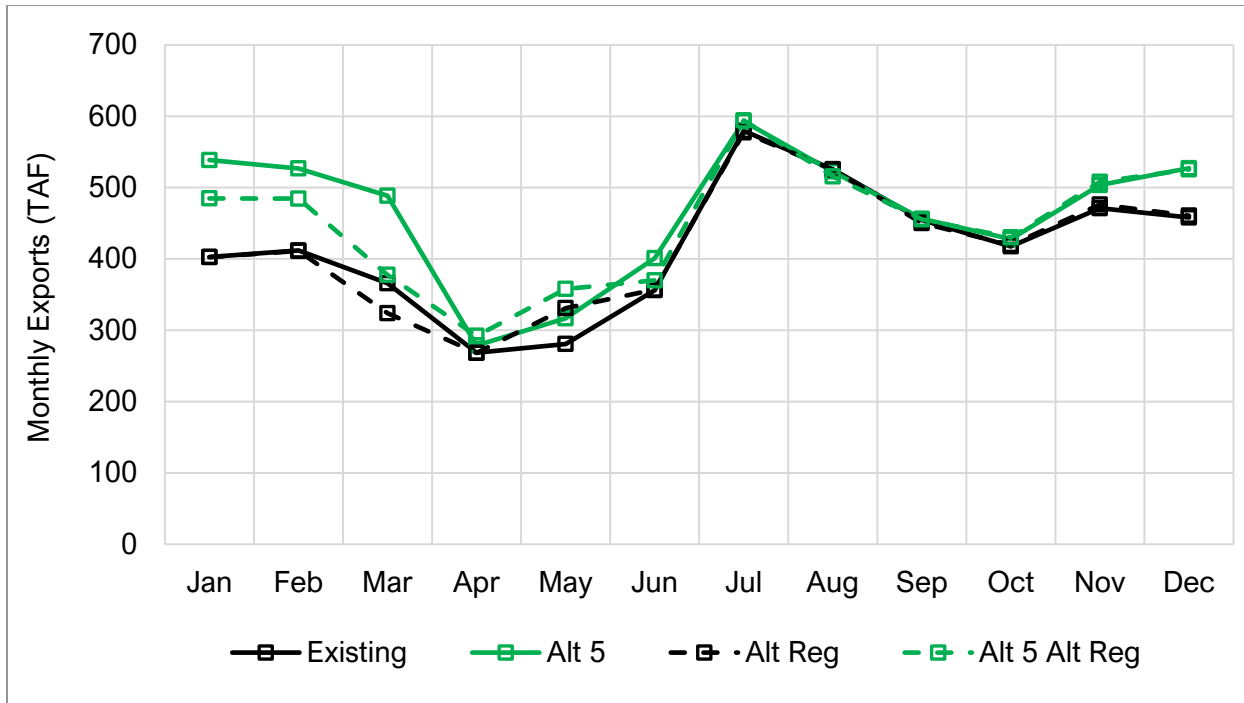


Figure 4C-19. Total Delta Exports, Monthly Average Exports (thousand acre-feet)

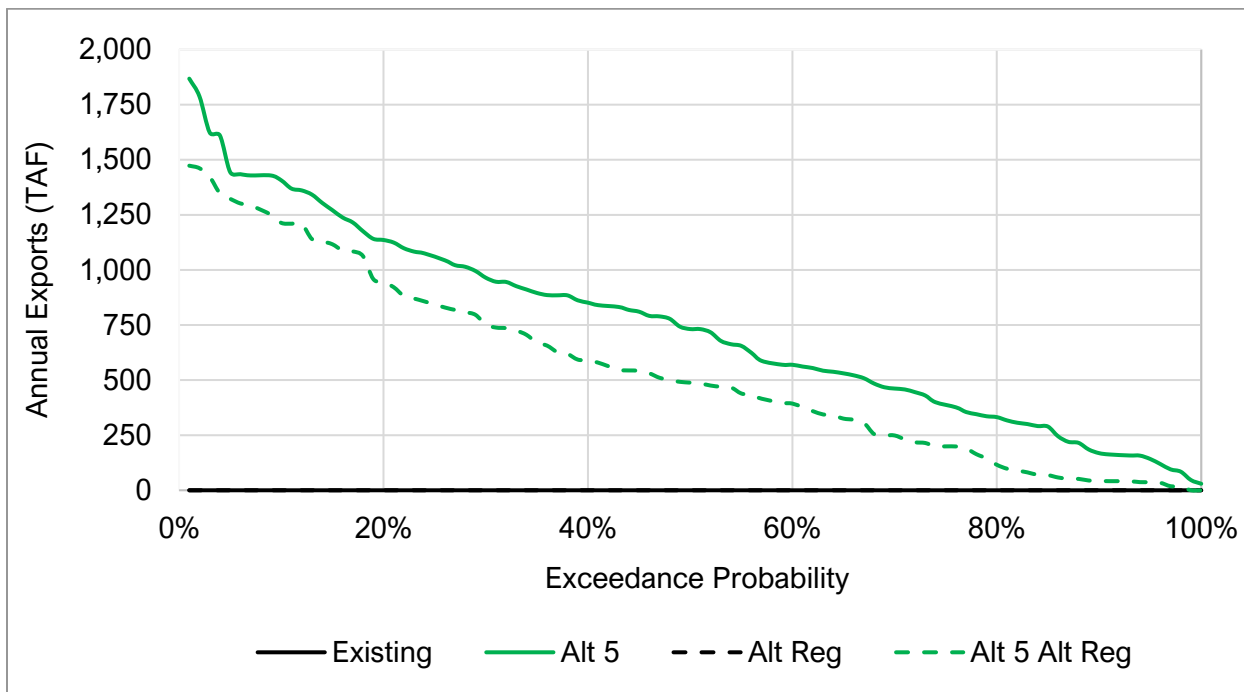


Figure 4C-20. North Delta Diversion Delta Exports, Exceedance Probability for Annual Water Year Exports (thousand acre-feet)

4C.3.2 Water Quality Results

A set of DSM2 simulations were performed for the Alternate Regulatory Scenario and Alternative 5 under the Alternate Regulatory Scenario for 93 years of hydrology (1923–2015). These results were compared to existing conditions and Alternative 5 operating under existing conditions. Overall, the water quality results for Alternative 5 are similar under both regulatory conditions.

Figures 4C-21 through 4C-23 show the long-term monthly average electrical conductivity (EC) at three locations (Sacramento River at Emmaton, San Joaquin River at Jersey Point, and Old River at Rock Slough). The changes in EC for Alternative 5 compared to both existing conditions and the Alternate Regulatory Scenario are very similar at all three locations. This indicates that changes in water quality with Alternative 5 is not affected by the Alternate Regulatory Scenario. Figures 4C-24 through 4C-26 show the probability of exceedance of daily average EC at the same three locations. Each line in the figures includes information from roughly 34,000 data points (one for each day within the simulation period). Overall, the water quality results for all four conditions are very similar at all three locations.

Tables 4C-3 and 4C-4 show the probability of exceedance of D-1641 water quality objectives at Emmaton and Jersey Point. The results indicate that there is a lower probability of exceedance of D-1641 water quality objectives under the Alternate Regulatory Scenario and with Alternative 5 under the Alternate Regulatory Scenario than under existing conditions (2020) and Alternative 5 (2020). Furthermore, the results show that the probability of exceedance of D-1641 water quality objectives at these two locations for Alternative 5 is similar to conditions without Alternative 5 for both existing conditions and the Alternate Regulatory Scenario. CalSim 3 includes an algorithm to operate the SWP/CVP to meet Bay-Delta WQCP objectives, among other requirements. While CalSim 3 simulates operations on a monthly timestep, actual decisions associated with real-time system operations are conducted on a daily timestep. The small modeled increased frequency of exceedance of objectives relative to the 93-year period of record modeled indicates that Alternatives 5 would not be expected to increase the frequency of exceeding Bay-Delta WQCP objectives with actual real-time operations.

Table 4C-5 shows the probability of exceedance of the D-1641 water quality objective at Rock Slough (based on model results at Old River at Rock Slough) for daily average chloride concentration of 250 mg/l. The results indicate all four conditions meet this objective at a very similar probability.

Table 4C-6 shows the probability of meeting the D-1641 water quality objective requiring the daily average chloride concentration at Rock Slough (based on model results at Old River at Rock Slough) to be below 150 mg/l for some specified minimum number of days within a calendar year (depending on the water year type). According to the results, existing conditions (2020) and Alternative 5 under the Alternate Regulatory Scenario meet this criterion in all years except one (1976). The Alternate Regulatory Scenario and Alternative 5 evaluated in the Final EIR (2020) meet this water quality objective for all years.

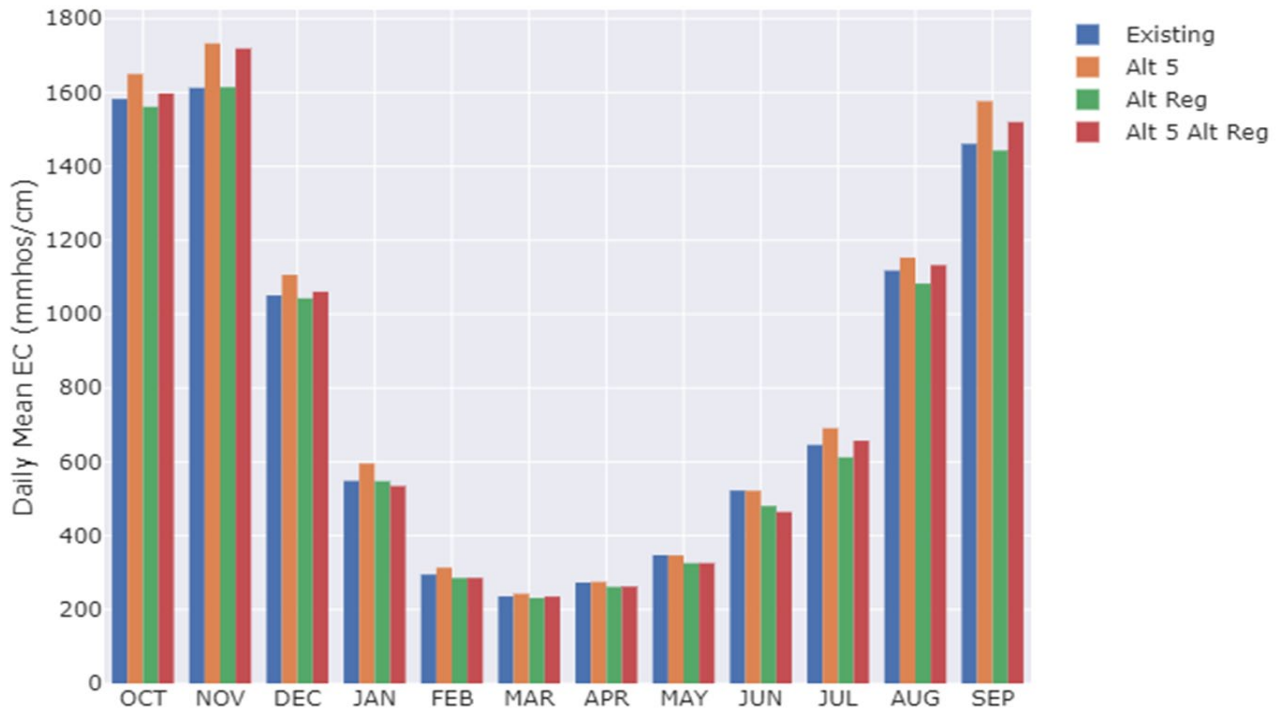


Figure 4C-21. Long-Term Monthly Average Water Quality (EC) at Sacramento River at Emmaton



Figure 4C-22. Long-Term Monthly Average Water Quality (EC) at San Joaquin River at Jersey Point²

² For the purpose of this appendix, modeled results do not include approximately 400 TAF of flows identified in the 2022 VAs MOU and therefore do not represent full implementation of the VAs.



Figure 4C-23. Long-Term Monthly Average Water Quality (EC) at Old River at Rock Slough

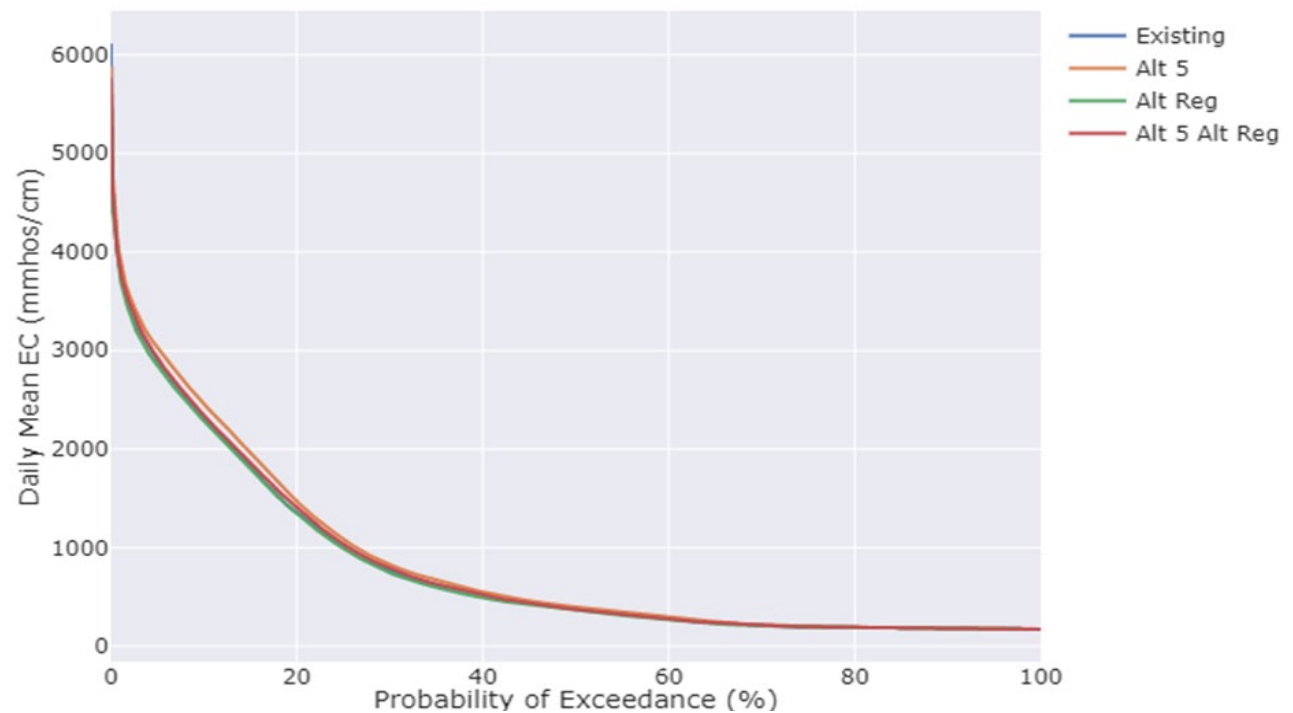


Figure 4C-24. Probability of Exceedance of Daily Average EC at Sacramento River at Emmaton

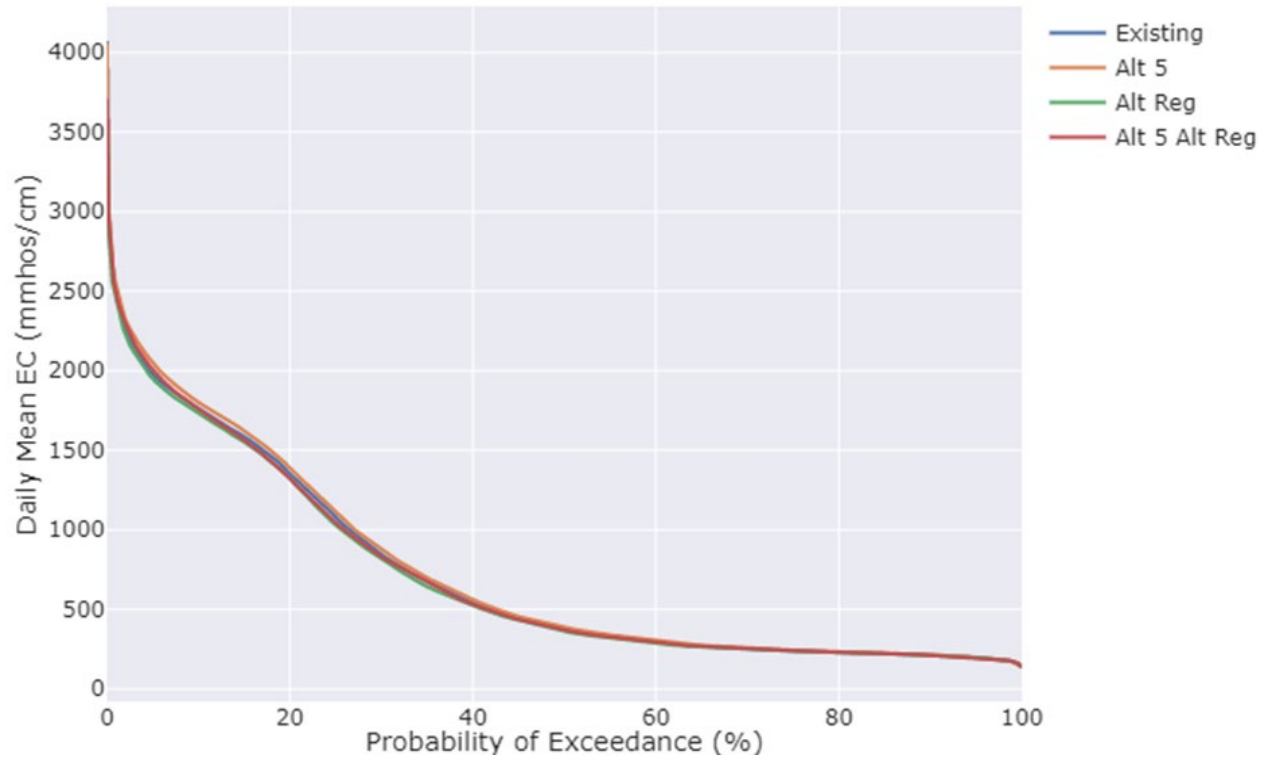


Figure 4C-25. Probability of Exceedance of Daily Average EC at San Joaquin River at Jersey Point

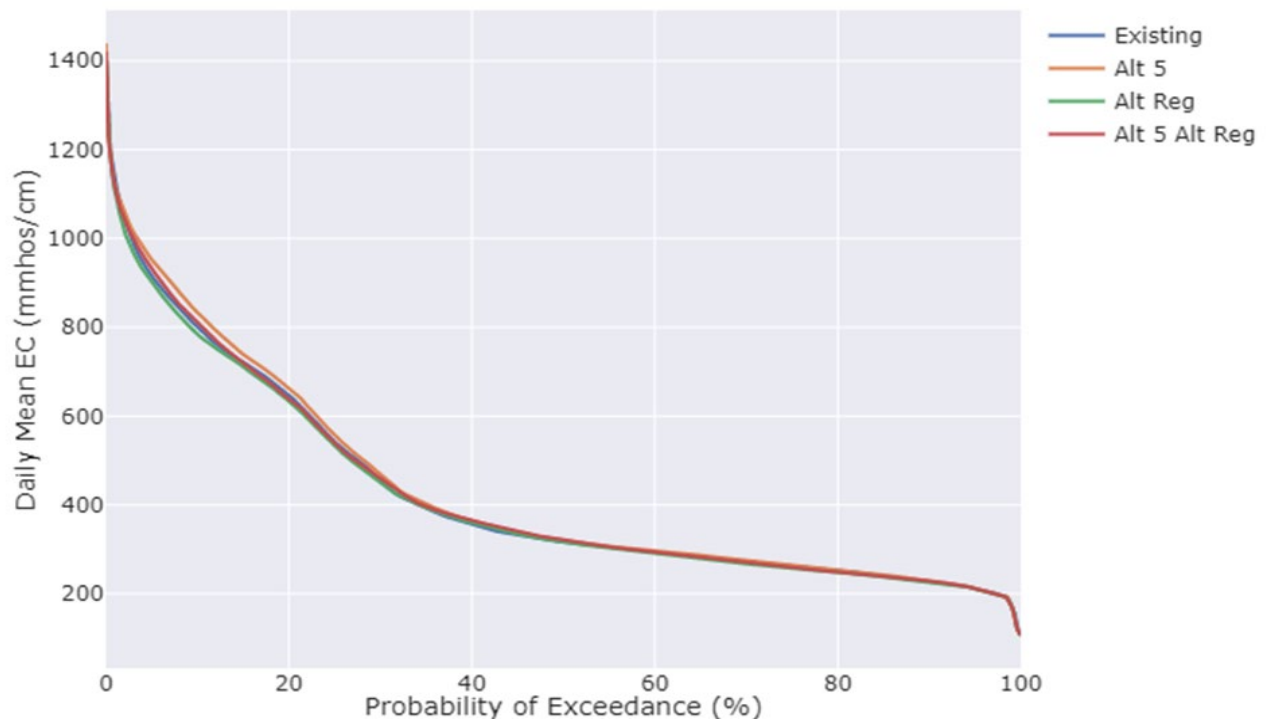


Figure 4C-26. Probability of Exceedance of Daily Average EC at Old River at Rock Slough

Table 4C-3. Probability of Exceedance of D-1641 Water Quality Objective at Sacramento River at Emmaton

Scenario	# of Days Standards are Applicable	# of Days Exceeded	% of Days Exceeded
Existing	12741	556	4.36
Alt 5	12741	594	4.66
Alt Reg	12741	324	2.54
Alt 5 Alt Reg	12741	343	2.69

Table 4C-4. Probability of Exceedance of D-1641 Water Quality Objective at San Joaquin River at Jersey Point

Scenario	# of Days Standards are Applicable	# of Days Exceeded	% of Days Exceeded
Existing	12741	690	5.42
Alt 5	12741	782	6.14
Alt Reg	12741	486	3.81
Alt 5 Alt Reg	12741	601	4.72

Table 4C-5. Probability of Exceedance of D-1641 Water Quality Objective at Rock Slough (Maximum 250 mg/l Daily Average Chloride Concentration)

Scenario	# of Days Standards are Applicable	# of Days Exceeded	% of Days Exceeded
Existing	33603	607	1.81
Alt 5	33603	704	2.10
Alt Reg	33603	485	1.44
Alt 5 Alt Reg	33603	592	1.76

Table 4C-6. Probability of Exceedance of D-1641 Water Quality Objective at Rock Slough (Specified Minimum Number of Days in a Calendar Year with Daily Average Chloride Concentration below 150 mg/l, Depending on the Water Year Type)

Scenario	# of Years Standards are Applicable	# of Years Exceeded	% of Years Exceeded
Existing	92	1	1.09
Alt 5	92	0	0.00
Alt Reg	92	0	0.00
Alt 5 Alt Reg	92	1	1.09

4C.4 Potential Environmental Impacts

Each resource section below considers the potential effects on the resource from project operations under the Alternate Regulatory Scenario in the year 2020 in the Delta to understand if the potential effects are different from those described for Alternative 5 in the main body of the Final EIR. The assumptions described in Section 4C.3 were used, as is the terminology described in Table 4C-2. The resource sections describe Alternative 5 under the Alternate Regulatory Scenario. The analysis in this section identifies any substantial changes in potential effects to resources from Alternative 5 under the Alternate Regulatory Scenario compared to Alternative 5 under existing conditions as evaluated in the Final EIR.

As described in Chapter 5, *Surface Water*, operation of the Delta Conveyance Project is not expected to have impacts upstream of the proposed north Delta intakes. For the purposes of this sensitivity analysis, operations of Alternative 5 under the Alternate Regulatory Scenario are also not expected to have upstream effects because operations of the proposed project would be the same as under existing conditions. Therefore, this analysis focuses on changes to resource conditions under the Alternate Regulatory Scenario in the Delta and Alternative 5 effects in the Delta.

Effects on resources from construction and maintenance of Alternative 5 under the Alternate Regulatory Scenario would be identical to those previously discussed in Chapters 7 through 32 and therefore are not discussed in this appendix. Also not considered further are resources that would not be affected or that would not result in additional or different impacts from changes to water supply or hydrology under the Alternate Regulatory Scenario compared to the impacts discussed in the Final EIR. These resources are not discussed further because the effects under the Alternate Regulatory Scenario would not be different in type or magnitude than those already disclosed in Chapters 7 through 32 of the Final EIR. These resources include Geology and Seismicity; Soils; Land Use; Recreation; Aesthetics and Visual Resources; Cultural Resources; Transportation; Public Services and Utilities; Noise and Vibration; Hazards, Hazardous Materials, and Wildfire; Mineral Resources; and Paleontological Resources.

In addition, for the Alternate Regulatory Scenario, the upstream hydrologic/hydraulic conditions are the same as what is described in the Final EIR Chapter 7, *Flood Protection* for Alternative 5. Because the Alternate Regulatory Scenario is not affecting in-Delta hydrologic or hydraulic conditions to such a degree that flood protection would change from the condition described for Alternative 5 (i.e., river stage during the 100- and 200-year flood events), this appendix does not include a separate assessment of the potential for impacts on flood protection.

Finally, this evaluation focuses on 2020 and does not include a future projected climate change condition. Therefore, there is no discussion of climate change in this appendix.

4C.4.1 Surface Water, Water Supply, and Groundwater

The potential surface water, water supply, and groundwater effects of Alternative 5 operations under the Alternate Regulatory Scenario would be similar to the potential effects described in Final EIR Chapter 5, Chapter 6, *Water Supply*, and Chapter 8, *Groundwater*. This section summarizes potential operational effects of Alternative 5 under the Alternate Regulatory Scenario on these resources based on the modeling of the Alternate Regulatory Scenario and Alternative 5 described in Section 4C.3.

Overall, there would be little change in reservoir storage with Alternative 5 under the Alternate Regulatory Scenario, and generally storage is not affected as a result of the operations of Alternative 5 under the modeled Alternate Regulatory Scenario. There would be very little change in storage in Oroville, Shasta, or Trinity Reservoirs (Figures 4C-1 through 4C-6). Folsom Reservoir storage is higher with Alternative 5 under the Alternate Regulatory Scenario, which is identical to the change in Alternative 5 as described in the Final EIR (Figure 4C-8).

Figures 4C-9 through 4C-16 provide modeling results for flows through the Delta and in the Feather, Sacramento, American, and San Joaquin Rivers. Modeled river flows with Alternative 5 under the Alternate Regulatory Scenario indicate that monthly average flows in the Sacramento River would be slightly higher in the April through June period at Freeport and slightly higher in the January through April period just downstream of the north Delta diversion intakes than the flows modeled for Alternative 5 in the Final EIR. As shown in Figure 4C-12, the small changes in modeled Sacramento River flows at Freeport are attributable to the Alternate Regulatory Scenario and not the operation of Alternative 5. Figure 4C-15 shows modeled Sacramento River average monthly flows just downstream the proposed north Delta intakes and indicates river flows would be similar from April through December between Alternative 5 under the Alternate Regulatory Scenario and Alternative 5 as evaluated in the Final EIR. Differences in flows are expected to occur from January through April, with flows during this period being slightly higher under Alternative 5 under the Alternate Regulatory Scenario compared to Alternative 5. Feather River flows at Thermalito would be the same over the modeled period, with the exception of the April through June period reflecting a small increase with Alternative 5 under the Alternate Regulatory Scenario when compared to Alternative 5 evaluated in the Final EIR. As depicted in Figure 4C-10, this increase would be attributable to the Alternate Regulatory Scenario and not operation of Alternative 5. Average monthly flows in the American River would be nearly the same between Alternative 5 under the Alternate Regulatory Scenario and Alternative 5 evaluated in the Final EIR. The small decrease in Sacramento River flows depicted in Figure 4C-15 would not influence the groundwater/surface water interactions because the changes in flow are relatively small and would occur during the higher flow periods (January through April).

The result of the modeled Delta outflow depicted in Figure 4C-17, as the monthly average position of X2, suggests very similar changes between Alternative 5 under the Alternate Regulatory Scenario and Alternative 5 as evaluated in the Final EIR during the April through May period. Changes in the predicted position of X2 do occur in the January through March period. As shown in Figure 4C-17, the position of X2 would be slightly more to the west with Alternative 5 under the Alternate Regulatory Scenario than under Alternative 5 evaluated in the Final EIR.³ Modeled OMR flows for the Alternate Regulatory Scenario and for Alternative 5 are shown in Figure 4C-18. The trends in monthly OMR flows are essentially the same between Alternative 5 under the Alternate Regulatory Scenario and Alternative 5 over the December through June modeled period. Flows would generally be lower (less negative) for both Alternative 5 under the Alternate Regulatory Scenario and Alternative 5 evaluated in the Final EIR during the February through April modeled period, and flows would be slightly higher (more negative) from April through June. For the remaining modeled period, there are no modeled differences. Over the modeled period, the modeling suggests Alternative 5 under the Alternate Regulatory Scenario and Alternative 5 evaluated in the Final EIR would generally influence OMR flows to a similar degree.

³ For the purpose of this appendix, modeled results do not include approximately 400 TAF of flows identified in the 2022 VAs MOU and therefore do not represent full implementation of the VA.

1 Total monthly average Delta exports are shown in Figure 4C-19. Generally, exports occurring under
2 the Alternate Regulatory Scenario show greater variability when compared to the exports modeled
3 for Alternative 5 under the Alternate Regulatory Scenario. Exports with Alternative 5 under the
4 Alternate Regulatory Scenario on average are lower in the January through April period
5 (approximately 110 TAF less in March) when compared to the estimated exports occurring under
6 Alternative 5 evaluated in the Final EIR. However, this trend shifts in the April through June period
7 with exports being higher (approximately 50 TAF more in May) with Alternative 5 under the
8 Alternate Regulatory Scenario when compared to Alternative 5. Although total exports under
9 Alternative 5 under the Alternate Regulatory Scenario would generally be lower when compared to
10 Alternative 5 in Chapters 5 and 6 of the Final EIR because of the assumption that the Delta
11 Conveyance Project would not divert excess flows unless Delta outflow is over 29,200 cfs, these
12 exports would be greater when compared to existing conditions. The trends in diversions made
13 from the north Delta for Alternative 5 under the Alternate Regulatory Scenario and Alternative 5 are
14 shown in Figure 4C-20. This figure indicates that diversions under Alternative 5 evaluated in the
15 Final EIR would always exceed those occurring under Alternative 5 under the Alternate Regulatory
16 Scenario. The slope of the trend line is essentially the same, and the greatest differences in
17 diversions occur between the 40% and 50% exceedance probabilities. Potential beneficial effects on
18 groundwater in the export service area are associated with the availability of surface water.
19 Groundwater could benefit from both Alternative 5 under the Alternate Regulatory Scenario and
20 Alternative 5 because south-of-Delta surface water deliveries would be greater when compared to
21 existing conditions.

22 Potential effects in the south-of-Delta SWP/CVP export service areas are related to changes in
23 SWP/CVP delivery reliability and growth inducement. As discussed qualitatively in Chapter 17,
24 *Socioeconomics*, Alternative 5 would increase water supply reliability as compared to existing
25 conditions. Alternative 5 under the Alternate Regulatory Scenario might slightly alter the magnitude
26 or pattern of delivery reliability compared to Alternative 5, but the direction of improvement would
27 not change, so the general qualitative assessment in Chapter 17 would also be applicable for
28 Alternative 5 under the Alternate Regulatory Scenario. For the same reasons, the water supply and
29 delivery with Alternative 5 under the Alternate Regulatory Scenario would not be expected to result
30 in any additional indirect or direct growth beyond what is already described in Chapter 31, *Growth*
31 *Inducement*.

32 4C.4.2 Water Quality

33 The water quality impacts of Alternative 5 under the Alternate Regulatory Scenario on Delta water
34 quality are expected to be similar to those described in Chapter 9, *Water Quality*, for Alternative 5,
35 relative to existing conditions, because the differences in modeled EC are similar, and the differences
36 in modeled inflow and outflow rates are similar, as summarized below.

37 The differences between existing conditions and Alternative 5 would be similar to the differences
38 between the Alternate Regulatory Scenario and Alternative 5 under the Alternate Regulatory
39 Scenario for long-term average EC in the Sacramento River at Emmaton, San Joaquin River at Jersey
40 Point, and Old River at Rock Slough (Section 4C.3.2, Figures 4C-21 through 4C-26, and Tables 4C-3
41 through 4C-6). Chloride and bromide levels are expected to exhibit a similar pattern with
42 Alternative 5 under the Alternate Regulatory Scenario because these constituent levels are
43 correlated with EC. As discussed in detail in Chapter 9, modeling results showing exceedances of D-
44 1641 water quality objectives are artifacts of the modeling process and not an indicator of actual

exceedance due to Alternative 5 because DWR operates the SWP in real time in coordination with Reclamation's operations of the CVP to avoid exceedances of D-1641 water quality objectives, but such real time operations cannot be represented in models.

As shown in Figures 4C-10 through 4C-16, there would be small differences in inflow rates with Alternative 5 under the Alternate Regulatory Scenario. The relative difference in effects to Delta mercury, nutrients, organic carbon, dissolved oxygen, selenium, pesticides, trace metals, and turbidity and TSS levels between the Alternate Regulatory Scenario without and with Alternative 5 would be similar to the relative difference between Alternative 5 and existing conditions. For the reasons provided in Chapter 9, there would be little to no differences in concentrations of these constituents in inflows to the Delta, and any small differences in inflow rates would not be expected to cause measurable differences in these constituent concentrations throughout the Delta.

The Alternate Regulatory Scenario, as modeled for this appendix, which does not include the full suite of potential flow actions, would likely not measurably affect the factors that contribute to CHABs in Delta waters, based on the small differences in inflow and outflow rates in some months under the Alternate Regulatory Scenario. Consequently, the relative difference in effects to CHABs between the Alternate Regulatory Scenario with and without Alternative 5 would be similar to the relative difference between Alternative 5 and existing conditions, as described in Chapter 9.

4C.4.3 Fish and Aquatic Resources

Impact mechanisms of Alternative 5 operations under the Alternate Regulatory Scenario are expected to be similar to those discussed for Alternative 5 under existing conditions in Chapter 12, *Fish and Aquatic Resources*. The relative difference in effects during the spring season to aquatic biological resources between the Alternate Regulatory Scenario without and with Alternative 5 is expected to be similar or less than the relative difference between Alternative 5 and existing conditions, based on the relative differences in key parameters (inflows to the Delta, Delta outflow, and X2; Attachment 1, Figures 4C.1-1a to 4C.1-1f, Figures 4C.1-3a to 4C.1-3f). For example, the mean monthly Sacramento River flow downstream of the north Delta diversion was modeled to be over 10% less than existing conditions under Alternative 5 in March of below normal years, compared to less than a 5% reduction in flow under the Alternate Regulatory Scenario with Alternative 5 compared to without Alternative 5. Based on observed relationships with biological resources discussed in Chapter 12, such differences have the potential to result in a smaller relative difference in through-Delta migration survival for juvenile Chinook salmon between the Alternate Regulatory Scenario with Alternative 5 compared to without Alternative 5 than Alternative 5 compared to existing conditions. As modeled, there may be the potential for less use of the north Delta diversion with Alternative 5 under the Alternate Regulatory Scenario compared to Alternative 5 under existing conditions, thereby resulting in the potential for less effects with Alternative 5 under the Alternate Regulatory Scenario (e.g., less entrainment of sediment at the north Delta diversion, which may result in less potential for effects to turbidity [see Impact AQUA-6 in Chapter 12]). Considering the information discussed above, the impacts of operating Alternative 5 under the Alternate Regulatory Scenario on aquatic biological resources are expected to be similar to those described in Chapter 12 for Alternative 5, relative to existing conditions.

4C.4.4 Terrestrial Biological Resources

As described in Chapter 13, *Terrestrial Biological Resources*, special-status wildlife species in the Delta (i.e., western pond turtle, giant garter snake, and several bird species) could potentially be

affected by changes in water quality or flow from operations of Alternative 5. Potential impacts identified for Alternative 5 in Chapter 13 related to water quality on these special-status wildlife species are expected to be similar to potential impacts of operations of Alternative 5 under the Alternate Regulatory Scenario. This is because water quality conditions would not change substantially for those mechanisms and constituents described in Chapter 13. The potential water quality effects on mercury and methylmercury concentration and bioavailability, detailed in Chapter 9 and Appendix 9H, *Mercury*, relied on the Delta flow modeling in Chapter 5 for the analysis. As shown in the figures in Section 4C.3.1 and described in Section 4C.4.2, *Water Quality*, flows with Alternative 5 under the Alternate Regulatory Scenario would not substantially differ from those described for Alternative 5 in the Final EIR. Therefore, the impacts on water quality for terrestrial biological resources are expected to be similar. Considering the information discussed above, the impacts of operating Alternative 5 under the Alternate Regulatory Scenario on terrestrial biological species would be similar to those described in Chapter 13 for Alternative 5, relative to existing conditions.

4C.4.5 Agricultural

DSM2 model results identified in Section 4C.3.2 show minimal differences in long-term average EC with Alternative 5 under the Alternate Regulatory Scenario in the Delta. The impacts of operating Alternative 5 under the Alternate Regulatory Scenario on agricultural resources are expected to be similar to those described in Chapter 15, *Agricultural Resources*, for Alternative 5, relative to existing conditions.

4C.4.6 Energy

As described above in Section 4C.4.1, *Surface Water, Water Supply, and Groundwater*, and shown in Figure 4C-19, total monthly average Delta exports would generally be similar between Alternative 5 under the Alternate Regulatory Scenario and Alternative 5 as described in Chapter 22, *Energy*. The figure suggests operating Alternative 5 under the Alternate Regulatory Scenario pumps less during January through April and may pump slightly more in April through July as compared to Alternative 5 evaluated in the Final EIR. Given the trends identified in Figure 4C-19, energy use for operating Alternative 5 under the Alternate Regulatory Scenario would be slightly lower, higher, or similar, depending on the time of year, than the energy use for Alternative 5 in Chapter 22. Therefore, the impacts of operating Alternative 5 under the Alternate Regulatory Scenario on energy resources would be similar to those described in Chapter 22 for Alternative 5, relative to existing conditions.

4C.4.7 Air Quality and Greenhouse Gas Emissions

Alternative 5 under the Alternate Regulatory Scenario would be expected to have similar operationally related air quality and GHG effects as those identified in Chapter 23, *Air Quality and Greenhouse Gases*, for Alternative 5. Criteria pollutants associated with operational electricity consumption would be controlled according to existing permit conditions for electrical-generating facilities. Electricity for SWP and CVP pumping would result in GHG emissions from the generation, distribution, and transmission of this electricity. As discussed in Section 4C.4.6, *Energy*, electricity use from pumping to operate Alternative 5 under the Alternate Regulatory Scenario would overall be similar when compared to electricity use from operating Alternative 5 evaluated in the Final EIR. GHG emissions from SWP pumping and displaced purchases of CVP electricity would therefore be similar to those for Alternative 5 in Table 23-70 in Chapter 23. Considering the information

discussed above, the impacts of operating Alternative 5 under the Alternate Regulatory Scenario on air quality and GHGs would be similar to those described in Chapter 23 for Alternative 5, relative to existing conditions.

4C.4.8 Public Health

As discussed in Section 4C.4.2, *Water Quality*, for Alternative 5 under the Alternate Regulatory Scenario, there would be no substantial differences in bromide and organic carbon concentrations in the Delta. Accordingly, there would be no increase in the potential for formation of disinfection byproducts during drinking water treatment for Alternative 5 under the Alternative 5 Regulatory Scenario relative to Alternative 5 evaluated in the Final EIR.

Changes in Delta bioaccumulative pesticides, mercury, and methylmercury levels, including bioaccumulation in fish for Alternative 5 under the Alternate Regulatory Scenario, would not be substantially different from Alternative 5 evaluated in the Final EIR. The relatively small change in inflow to the Delta under the Alternate Regulatory Scenario would not result in a substantial increase in these water quality constituents entering the Delta. Accordingly, there would be no difference in the potential for exposure to bioaccumulative pesticides and methylmercury through fish consumption.

Operation of Alternative 5 under the Alternate Regulatory Scenario would not measurably change the environmental factors that affect CHAB frequency or magnitude in the Delta (i.e., temperature, nutrient levels, flow velocities and associated turbulence and mixing, and irradiance), as discussed in Section 4C.4.2. As such, there would be no substantial difference in the potential for public exposure to cyanotoxins for Alternative 5 under the Alternate Regulatory Scenario relative to Alternative 5 evaluated in the Final EIR.

4C.4.9 Environmental Justice

Water deliveries would continue to occur with Alternative 5 under the Alternate Regulatory Scenario. These deliveries would provide beneficial effects on water supply conditions in minority and low-income communities within the SWP and potentially CVP export service areas, supplementing or reducing groundwater use and increasing economic security for those industries that rely on water as described in Chapter 29, *Environmental Justice*, for the project, relative to existing conditions.

4C.4.10 Tribal Cultural Resources

The Delta is identified as a Tribal Cultural Landscape (TCL) and a Tribal Cultural Resource in Chapter 32, *Tribal Cultural Resources*. This chapter analyzed effects to the character-defining features that contribute to the significance of the Delta TCL. Many of the character-defining features of the Delta TCL are water-related resources, including water quality, water supply, surface water, and aquatic resources. Flow-related changes could affect the water-related, character-defining features as identified for Alternative 5 in Chapter 32. The effect of operations of Alternative 5 under the Alternate Regulatory Scenario would be similar to the effects analyzed in Chapter 32. As described in 4C.4.1, *Surface Water, Water Supply, and Groundwater*, Section 4C.4.2, *Water Quality*, and Section 4C.4.3, *Fish and Aquatic Resources*, the flows in the Delta under Alternative 5 with the Alternate Regulatory Scenario would not substantially differ from those described for Alternative 5

in Chapter 32. Therefore, the effects on water-related, character-defining features for the Delta TCL is expected to be relatively similar.

4C.5 References Cited

4C.5.1 Printed References

State of California, Natural Resources Agency. 2019. *Voluntary Agreements*. Available: https://www.waterboards.ca.gov/waterrights/water_issues/programs/bay_delta/docs/bay_delta/complete_va_package03012019.pdf. Accessed: April 2, 2022.

State of California, Natural Resources Agency. 2022. Memorandum of Understanding Advancing a Term Sheet for the Voluntary Agreements to Update and Implement the Bay-Delta Water Quality Control Plan, and Other Related Actions. Available: https://resources.ca.gov/-/media/CNRA-Website/Files/NewsRoom/Voluntary-Agreement-Package-March-29-2022.pdf?utm_medium=email&utm_source=govdelivery. Accessed: April 20, 2022.

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2

Attachment 1:
CalSim 3 Results by Water Year Type

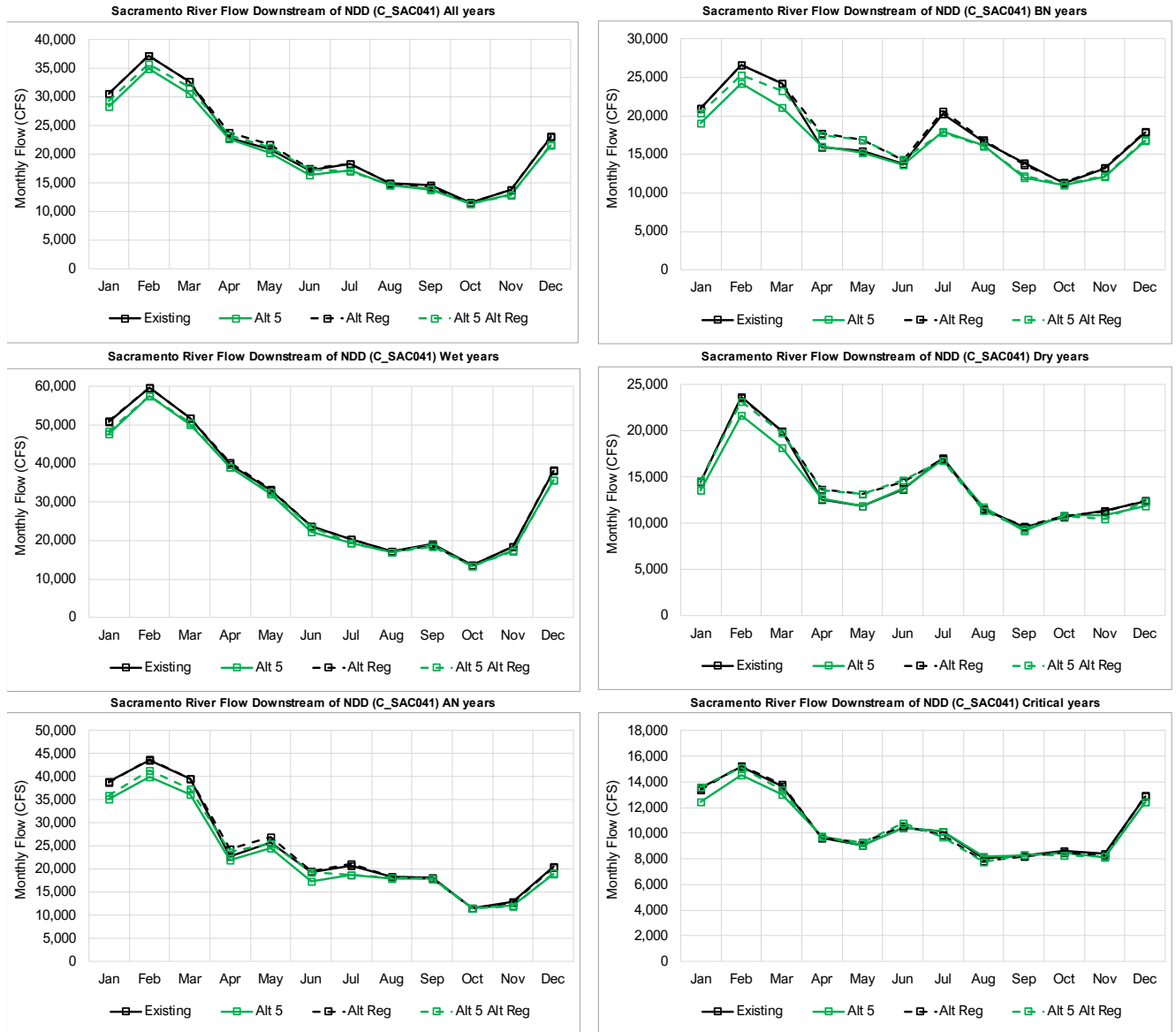


Figure 4C.1-1a through 4C.1-1f. Sacramento River Flow Downstream of NDD (C_SAC041) for Water Years



Figure 4C.1-2a through 4C.1-2f. Delta Outflow (NDOI) for Water Years



Figure 4C.1-3a through 4C.1-3f. X2 Position (X2 PRV) for Water Years

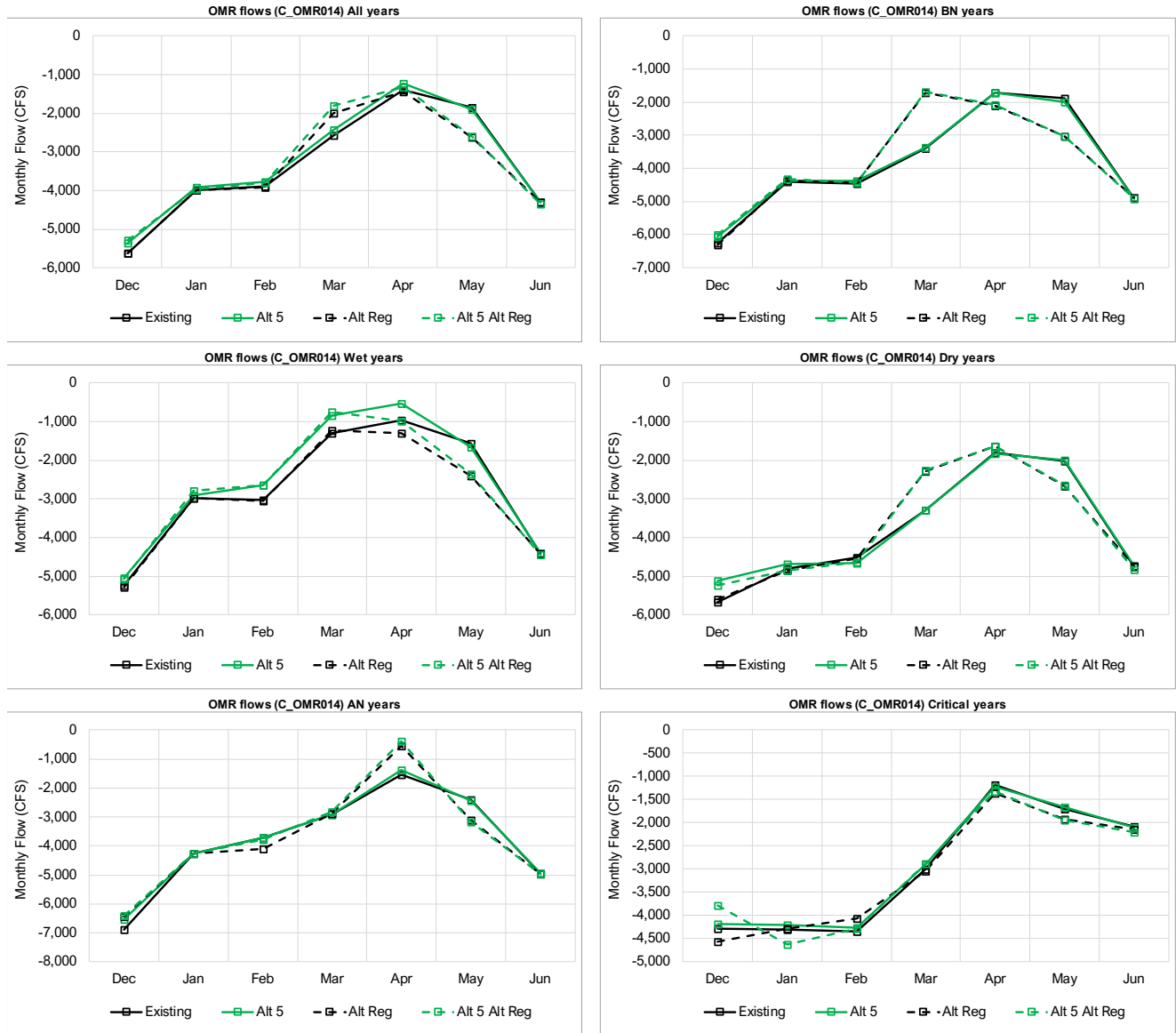


Figure 4C.1-4a through 4C.1-4f. OMR Flows (C_OMR014) for Water Years



Figure 4C.1-5a through 4C.1-5f. Total Exports (EXPORTACTUALTD + EXPORTACTUALIF) for Water Years

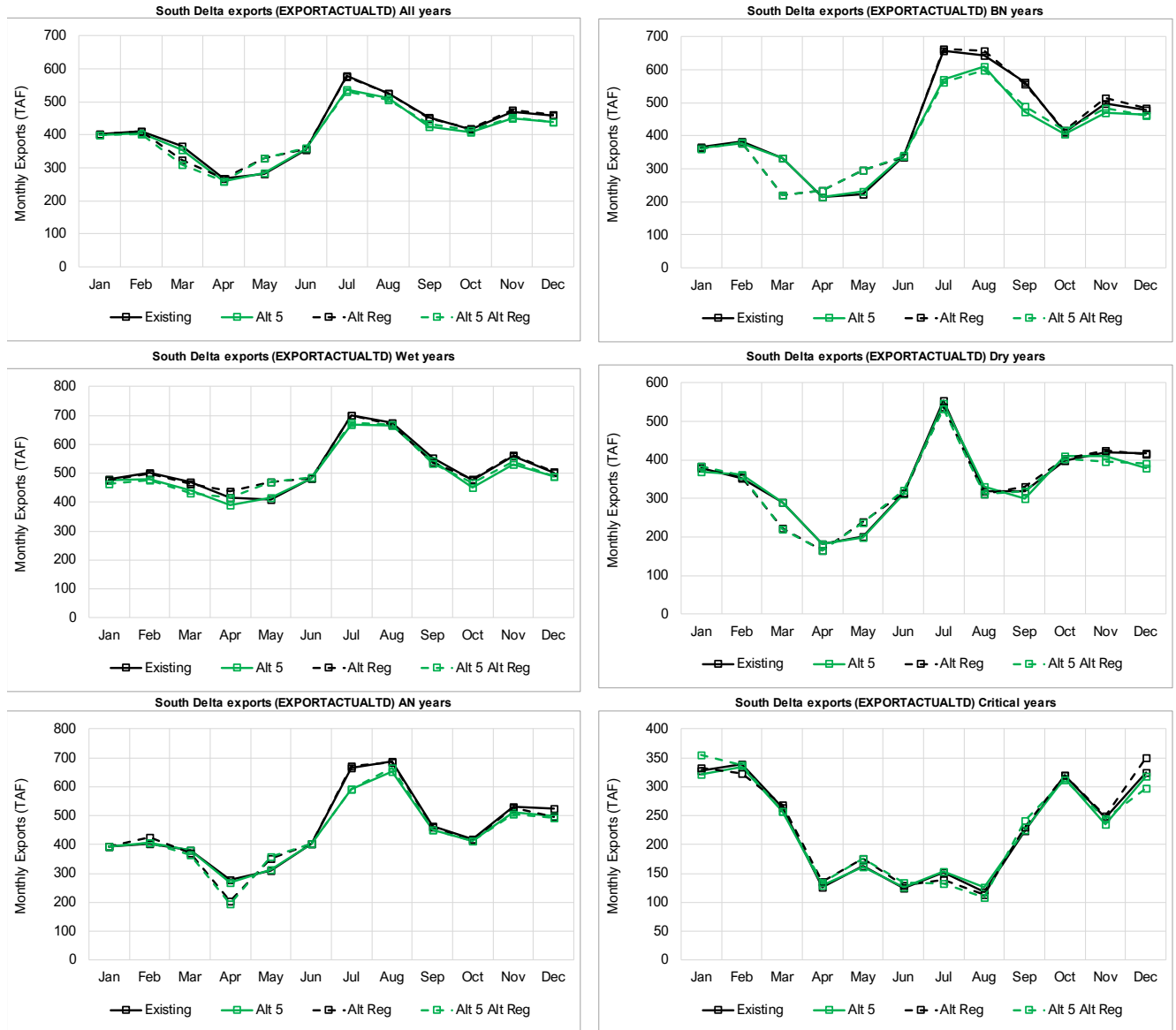


Figure 4C.1-6a through 4C.1-6f. South Delta Exports (EXPORTACTUALTD) for Water Years



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Figure 4C.1-7a through 4C.1-7f. North Delta Exports (EXPORTACTUALIF) for Water Years