Chapter 11
Alternatives to the Proposed Project

The chapter is presented in its entirety from the Draft Environmental Impact Report (DEIR), with revisions to text presented as a strikethrough or underline. Text shown with a strikethrough has been deleted from the DEIR. Text that has been added is presented as single underlined. Deleted figures are shown with a dashed border. Added figures do not have unique formatting.

11.1 Introduction

Section 21100(b)(4) of the Public Resources Code states that an Environmental Impact Report (EIR) shall include a detailed statement setting forth alternatives to the project.

EIRs must consider alternatives to a proposed project that could substantially reduce or avoid significant environmental impacts. Section 15126.6(b) of the California Environmental Quality Act (CEQA) Guidelines states the following.

> Because an EIR must identify ways to mitigate or avoid the significant effects that a project may have on the environment (Pub. Resources Code Section 21002.1), the discussion of alternatives shall focus on alternatives to the project or its location which are capable of avoiding or substantially lessening any significant effects of the project, even if these alternatives would impede to some degree the attainment of the project objectives, or would be more costly.

Although both the Legislature, in enacting CEQA, and the California Natural Resources Agency, in promulgating the CEQA Guidelines, assumed that projects requiring EIRs would generally cause one or more significant environmental effects, and thereby required that all EIRs discuss alternatives that could reduce the severity of such effects, there are instances in which proposed projects for which EIRs are prepared actually do not cause any significant environmental effects. This occurs where a project likely would not qualify for a negative declaration or mitigated negative declaration because substantial evidence suggests that significant effects may occur. EIRs are required in such circumstances even though, once a lead agency opts to undertake an EIR, a lead agency may ultimately find itself persuaded by substantial evidence that significant effects will not occur. This EIR was prepared because the Long-Term Operations of the State Water Project (SWP) facilities in the Sacramento–San Joaquin Delta (Delta), Suisun Marsh, and Suisun Bay (Proposed Project) was not one for which it was immediately apparent that all conceivable substantial evidence would show an absence of significant effects. Thus, under the circumstances, prudence convinced the California Department of Water Resources (DWR) to prepare an EIR, despite the analyses showing that the Proposed Project would not cause any significant effects.

11.2 Range of Alternatives Considered

Section 15126.6(a) of the CEQA Guidelines requires EIRs to describe the following.

... a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project and evaluate the comparative merits of the alternatives. An EIR need not consider every conceivable alternative to a project. Rather it must consider a reasonable range of potentially feasible alternatives that will foster informed decision-making and public participation. An EIR is not required to consider alternatives that are infeasible. The lead agency is responsible for selecting a range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives. There is no ironclad rule governing the nature or scope of the alternatives to be discussed other than the rule of reason.

See also CEQA Guidelines, Section 15126.6(f).

The CEQA Guidelines require that an EIR include sufficient information about each alternative to allow meaningful evaluation, analysis, and comparison with the project. If an alternative would cause one or more significant effects in addition to those that would be caused by the project, the significant effects of the alternative must be discussed, but in less detail than the significant effects of the project as proposed (CEQA Guidelines, Section 15126.6[d]). The CEQA Guidelines further require consideration of a "no project" alternative (CEQA Guidelines, Section 15126.6[e]).

In defining "feasibility" (e.g., "... feasibly attain most of the basic objectives of the project ..."), CEQA Guidelines, Section 15126.6(f) (1) states, in part, the following.

Among the factors that may be taken into account when addressing the feasibility of alternatives are site suitability, economic viability, availability of infrastructure, general plan consistency, other plans or regulatory limitations, jurisdictional boundaries (projects with a regionally significant impact should consider the regional context), and whether the proponent can reasonably acquire, control or otherwise have access to the alternative site (or the site is already owned by the proponent). No one of these factors establishes a fixed limit on the scope of reasonable alternatives.

The range of alternatives to the Proposed Project should include those that could feasibly accomplish most of the basic objectives of the Project and could avoid or substantially lessen one or more significant effects. In this ~~Draft Environmental Impact Report (DEIR)~~ EIR, however, as presented in the body of the document, and summarized in Table ES-1, the Proposed Project does not result in significant effects; thus, the need to lessen does not exist.

Alternatives were, however, considered in this ~~DEIR~~ EIR. The range of alternatives was developed based on considerations regarding effects of operations (such as on sensitive species), other possible means to meet the Project objectives, and suggestions through public input during the public scoping process.

11.2.1   Alternatives Considered but Not Analyzed Further

The following alternatives presented in Table 11-1 were identified in scoping comments or identified by DWR. These alternatives were considered but were not analyzed further in this ~~DEIR~~ EIR because they do not meet the Project objectives or cannot be feasibly implemented by DWR.

Table 11-1. Alternatives Considered but Not Analyzed Further

Originating Organization[a]	Proposed Alternative	Alternative Description [b,c]	Project Objective Component Not Met by the Alternative	Feasibility
DWR	Early deployment of SWP-facilitated spring Delta outflow implemented through tributary inflow from the fallowing program.	This alternative shifts the SWP upstream water purchases and deployment of those flows from any time between March and May, to during March. These additional flows are assumed to be generated from fallowing and would result in additional inflows at Freeport.	Alternative would not optimize water supply and improve operational flexibility.	This alternative would be feasible.
DWR	Early deployment of SWP-facilitated spring Delta outflow through tributary inflow from the fallowing program and expansion of the CCF Increased Winter Diversion Window	This alternative shifts the SWP upstream water purchases and deployment of those flows from any time between March and May, to during March, and allows for an expanded period during which increased diversions from the CCF can occur, expanding the period from mid-December to mid-March to December 1 to March 31.	Alternative would not optimize water supply and improve operational flexibility.	This alternative would be feasible.
CDWA	Recapture of Both Natural Flow and Stored Water for Needs Within the Watershed	N/A	Alternative would not allow DWR to store, divert, and convey water in accordance with DWR's existing water rights to deliver water pursuant to water contracts and agreements up to full contract quantities.	The feasibility of this alternative is questionable because some areas rely on SWP supplies to meet basic human health and safety when water supply is scarce.
CDWA	No Exports from the Delta	N/A	Alternative would not allow DWR to store, divert, and convey water in accordance with DWR's existing water rights to deliver water pursuant to water contracts and agreements up to full contract quantities.	The feasibility of this alternative is questionable because some areas rely on SWP supplies to meet basic human health and safety when water supply is scarce.

Originating Organization[a]	Proposed Alternative	Alternative Description [b,c]	Project Objective Component Not Met by the Alternative	Feasibility
CDWA	Alternative Water Sources for Supply to Areas Importing Delta Water	N/A	Alternative would not allow DWR to store, divert, and convey water in accordance with DWR's existing water rights to deliver water pursuant to water contracts and agreements up to full contract quantities.	The feasibility of this alternative is questionable because some areas rely on SWP supplies to meet basic human health and safety when water supply is scarce.
CDWA	Provide Flow and Water Quality Necessary to Meet CVPIA Fish Doubling Requirements and Restoration of Fall-Run, Spring-Run, and Winter-Run Salmon on the San Joaquin River	N/A	This alternative is not applicable to DWR because DWR has no ability to provide water to the San Joaquin River. Therefore, this alternative cannot be implemented by DWR. .	The feasibility of this alternative is questionable because DWR has no ability to provide water to the San Joaquin River.
CDWA Sierra Club Counsel, Planning and Conservation League, Environmental Water Caucus, Center for Biological Diversity, California Water Impact Network, AquAlliance, California Sportfishing Protection Alliance, Friends of the River	Reduce Exports or Exports from the Delta Limited to 2 Million Acre-Feet per Year	Alternatives that would reduce reliance on the Delta and restore the Delta ecosystem. Alternatives that would reduce SWP exports in order to increase freshwater flows through the Delta. Alternatives that prohibit any export of water from the Delta that is not clearly surplus to the present and future needs, including fish and wildlife needs in the Delta watershed. The prohibition should include pumping from the Delta of Project water, transfer water, water for exchanges and water pursuant to changes in permits, points of diversion and places of use.	Alternative would not allow DWR to store, divert, and convey water in accordance with DWR's existing water rights to deliver water pursuant to water contracts and agreements up to full contract quantities.	The feasibility of this alternative is questionable because reducing exports generally or reducing exports to 2 million acre-feet per year may not be sufficient to meet human health and safety needs during periods of low water availability.

Originating Organization[a]	Proposed Alternative	Alternative Description [b,c]	Project Objective Component Not Met by the Alternative	Feasibility
Natural Resources Defense Council, Defenders of Wildlife, Winnemem Wintu Tribe, California Sportfishing Protection Alliance, The Bay Institute, Sierra Club California, San Francisco Baykeeper, Golden State Salmon Association, Restore the Delta	Reduce Diversions from the Delta Watershed to Significantly Increase Delta Outflows, Improve Reservoir Coldwater Pool Storage, and Increase Winter/Spring Flows in the Sacramento River and Other Rivers to Meet CESA Requirements and Other Legal Obligations	Include several alternatives that reduce diversions from the Delta watershed in order to increase Delta outflows, improve reservoir coldwater pool storage, and increase winter/spring flows in the Sacramento River and other rivers in order to meet the requirements of CESA and other legal obligations.	Alternative would not allow DWR to store, divert, and convey water in accordance with DWR's existing water rights to deliver water pursuant to water contracts and agreements up to full contract quantities.	The feasibility of this alternative is questionable because this alternative would require operation of facilities that are outside of the geographic scope of the Proposed Project and are subject to different regulatory requirements and operational control.
Sierra Club Counsel, Planning and Conservation League, Environmental Water Caucus, Center for Biological Diversity, California Water Impact Network, AquAlliance, California Sportfishing Protection Alliance, Friends of the River	Crafting a Sustainable Water Plan for California (December 2022) (Exhibit 3)	This proposed alternative includes reducing exports out of the Delta to 3 million acre-feet per year. Reasonable alternatives would include other variants on that quantity. This proposed alternative also includes abandoning infrastructure projects including the Delta Conveyance Tunnel Project and new reservoirs and, developing and funding water conservation, water recycling, farmland retirement including drainage-impaired lands, and other such modern measures. Also included in the alternative is renegotiating Table A allocations in the SWP contracts to reflect safe yield water availability, climate change analysis, and allocation of public trust resources.	Alternative would not allow DWR to store, divert, and convey water in accordance with DWR's existing water rights to deliver water pursuant to water contracts and agreements up to full contract quantities.	The feasibility of this alternative is questionable because 3 million acre-feet per year may not be sufficient to meet human health and safety needs during periods of low water availability.

[a] Alternatives were requested by organizations that provided comment letters during the public scoping comment period or were identified by DWR.

[b] Some agencies requested alternatives without providing detailed descriptions of the alternative. These are indicated by N/A.

[c] Descriptions provided are paraphrased from comment letters.

CCF = Clifton Court Forebay

CDWA = Central Delta Water Agency

CESA = California Endangered Species Act

Delta = Sacramento–San Joaquin Delta

SWP = State Water Project

11.2.2   Alternatives Considered in this Environmental Impact Report

The following alternatives were considered in this ~~DEIR~~ EIR .

- **No Project Alternative**
- **Alternative 1:** May Deployment of SWP-Facilitated Fallowing Inject and No Expansion of the Clifton Court Forebay (CCF) Increased Winter Diversion Window
- **Alternative 2:** May Deployment of SWP-Facilitated Fallowing Inject and Expansion of the CCF Increased Winter Diversion Window
- **Alternative 3:** Flexible Deployment of SWP-Facilitated Fallowing Inject

The following sections describe the potential effects of each alternative compared to the effects of the Proposed Project as identified in Chapters 4 through 9. The analysis of the alternatives presented below is expected to cover the range of actions that may be considered as a part of the California Endangered Species Act incidental take permit process.

11.3 No Project Alternative

CEQA requires that the specific alternative of "No Project" shall be evaluated in an EIR along with its impact (CEQA Guidelines, Section 15126.6[b]). The purpose of describing the No Project Alternative is to allow decision-makers to compare the impacts of approving the Proposed Project with the impacts of not approving the Proposed Project. When the Proposed Project is a revision to an existing operation, the No Project Alternative will typically be a continuation of the existing operation into the future.

The No Project Alternative would include continuation of SWP operations in compliance with the 2020 ITP, 2019 U.S. Fish and Wildlife Service Biological Opinion and the 2019 National Marine Fisheries Service Biological Opinion, State Water Resources Control Board Water Rights Decision 1641, 2023 Interim Operations Plan for Central Valley Project and SWP operations, and other regulatory requirements as of June 16, 2023. The No Project Alternative includes existing facilities and ongoing programs that existed as of June 16, 2023, the publication date of the Notice of Preparation. The No Project Alternative also includes facilities and programs that received approvals and permits by June 2023.

The No Project Alternative is the same as Baseline Conditions. A description of the existing SWP facilities is provided in Chapter 2, Section 2.1.3, "Description of Existing State Water Project Facilities." A description of the existing regulatory framework is provided in Chapter 2, Section 2.2, "Existing Regulations." A description of the existing SWP Water Service Contracts is provided in Chapter 2, Section 2.1.4, "Description of Existing SWP Water Service Contracts." Daily operations are described in Chapter 2, Section 2.1.7, "Daily Operations." The modeling assumptions used to represent the No Project Alternative are provided in Appendix 4A, Attachment 1, "Model Assumptions."

11.3.1 Surface Water Hydrology

The No Project Alternative would not modify existing operations and associated reservoir storage, downstream surface water flows, and diversions at SWP facilities and related waterways (e.g., Delta channel flows). Surface water hydrology would be the same as Baseline Conditions. As identified for the Proposed Project, the No Project Alternative would not substantially affect surface water resources.

11.3.2 Surface Water Quality

The No Project Alternative would not modify existing SWP operations. Therefore, the No Project Alternative would not result in changes to surface water quality of study area surface waterbodies compared to Baseline Conditions that would result in adverse effects on beneficial uses.

11.3.3 Aquatic Biological Resources

The No Project Alternative would not modify existing SWP operations. Therefore, the No Project Alternative would not result in operational changes compared to Baseline Conditions that would result in adverse effects on aquatic biological resources. Impacts would be similar to the Proposed Project.

11.3.4 Other Resources

The No Project Alternative would not modify existing operations and associated reservoir storage, downstream surface water flows, and diversions at SWP facilities and related waterways. Surface water hydrology would be the same as Baseline Conditions. Because SWP operations, hydrology, and water quality would be the same as Baseline Conditions, all other resources addressed in the EIR, including Tribal Cultural Resources, Environmental Justice, and Climate Change Resiliency and Adaptation would be the same under the No Project Alternative as they are under Baseline Conditions, similar to the Proposed Project.

11.4 Alternative 1: May Deployment of SWP-Facilitated Fallowing Inject and No Expansion of the CCF Increased Winter Diversion Window

Alternative 1 is a variation of the Proposed Project that modifies seasonal operations (see Section 2.3.1, "Seasonal Operations") and keeps the period during which increased diversions from the CCF can occur the same as Baseline Conditions. This keeps operations to a U.S. Army Corps of Engineers notice that allows for CCF diversions to increase above 6,680 cubic feet per second (cfs) from mid-December to mid-March (assumed December 15 to March 15). During this window CCF diversions can increase by one-third of the San Joaquin River flow at Vernalis.

This alternative alters the spring Delta outflow component of the Proposed Project (see Section 2.3.3, "Spring Delta Outflow"). Specifically, Alternative 1 modifies the Spring Delta Outflow component of the Proposed Project by limiting flows deployed from the Voluntary Agreement program (implemented through tributary inflow from the fallowing program) to the month of May (rather than March, April, or May under the Proposed Project). All other components of the Proposed Project are included in Alternative 1.

11.4.1   Surface Water Hydrology

The relative incremental changes in surface water hydrology due to Alternative 1 as compared to the Baseline Conditions are similar to those described under the Proposed Project in Chapter 4, "Surface Water Hydrology." The CalSim 3 model was used for quantifying the changes in river flows, Delta channel flows, and exports. Key output parameters for the Baseline Conditions, Proposed Project, and Alternative 1 are presented in Figures 11-1 through 11-13. Operational results from these simulations were analyzed to determine whether the incremental changes between the Baseline Conditions and Proposed Project remain similar with Alternative 1.

CalSim 3 simulation results for the Proposed Project (red lines) and Alternative 1 (blue lines) display noteworthy increases to diversions in some high-flow years and limited changes to flow at some locations between March and May from the Baseline Conditions (black lines). However, the relative incremental changes between the Baseline Conditions and Alternative 1 are similar, on average, when compared to the Proposed Project. For monthly long-term average flow for the Sacramento River at Freeport, Georgiana Slough, and Delta Outflow, the shift in deployment of the 50-thousand-acre-foot fallowing inject results in slightly higher flows in May and slightly lower flows in March and April ~~, as anticipated~~ . There are no observable differences in the monthly long-term average Yolo Bypass, Delta Cross Channel, Qwest, and combined Old and Middle River (OMR) flows, nor monthly long-term average Delta export volumes for Alternative 1. Simulated export exceedances for Alternative 1 for December and March show incremental decreases, relative to the Proposed Project, roughly ~~15~~ 10 percent of the time in December and ~~5~~ 10 percent of the time in March (Figures 11-9 and 11-12, respectively). ~~As expected, these~~ These changes are not observable in January and February. Simulated annual export exceedances also show similar patterns in incremental changes between the Baseline Conditions and Proposed Project compared to those under Alternative 1. Detailed model results for alternatives are provided in Appendix 4C, "Alternatives Appendix."

In sum, surface water flows under the Proposed Project and Alternative 1 are similar. As identified for the Proposed Project, Alternative 1 would not substantially affect surface water resources.
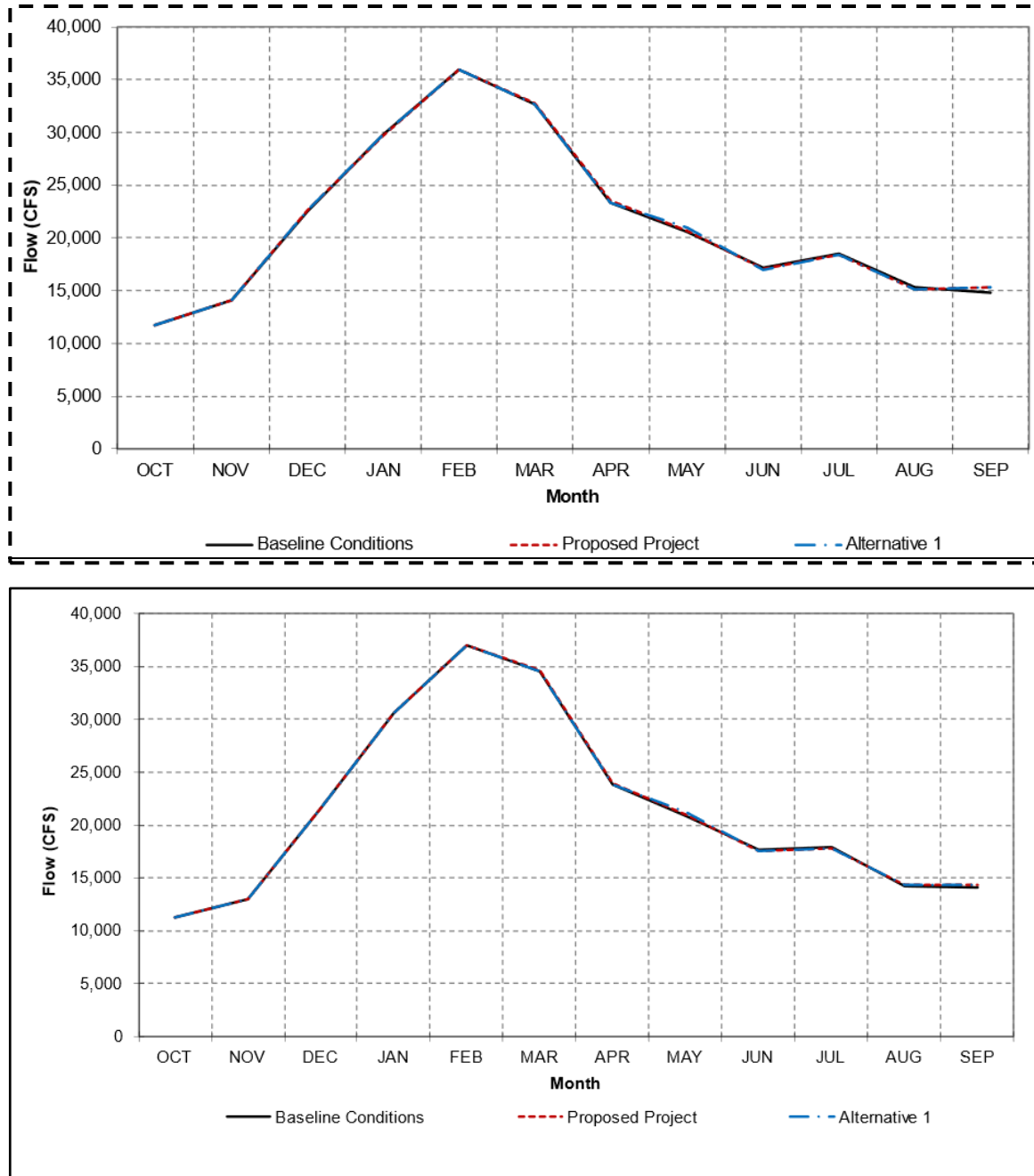
Figure 11-1. Sacramento River at Freeport Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 1
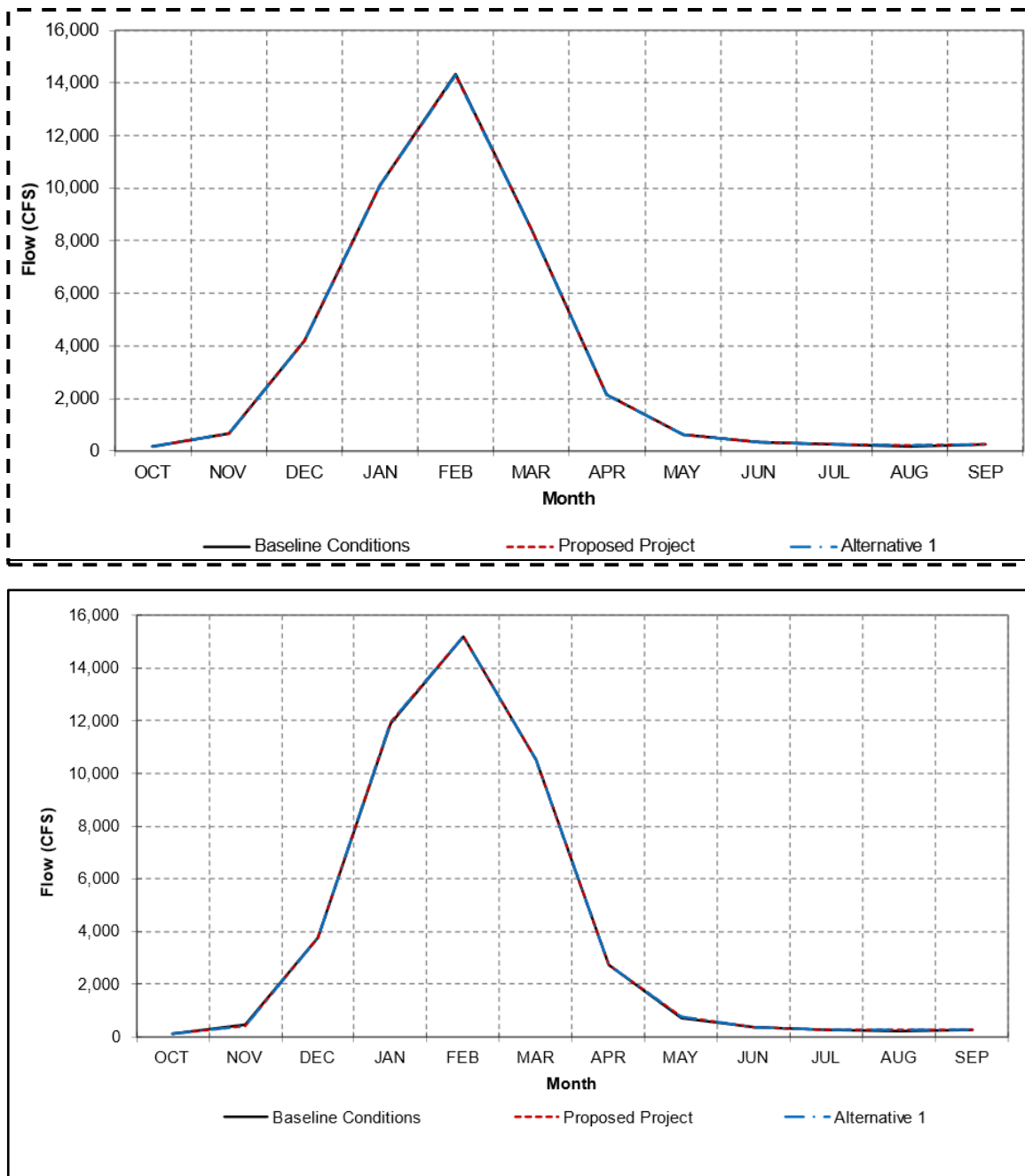
Figure 11-2. Monthly Long-term Average Yolo Bypass Flow for the Baseline Conditions, Proposed Project, and Alternative 1
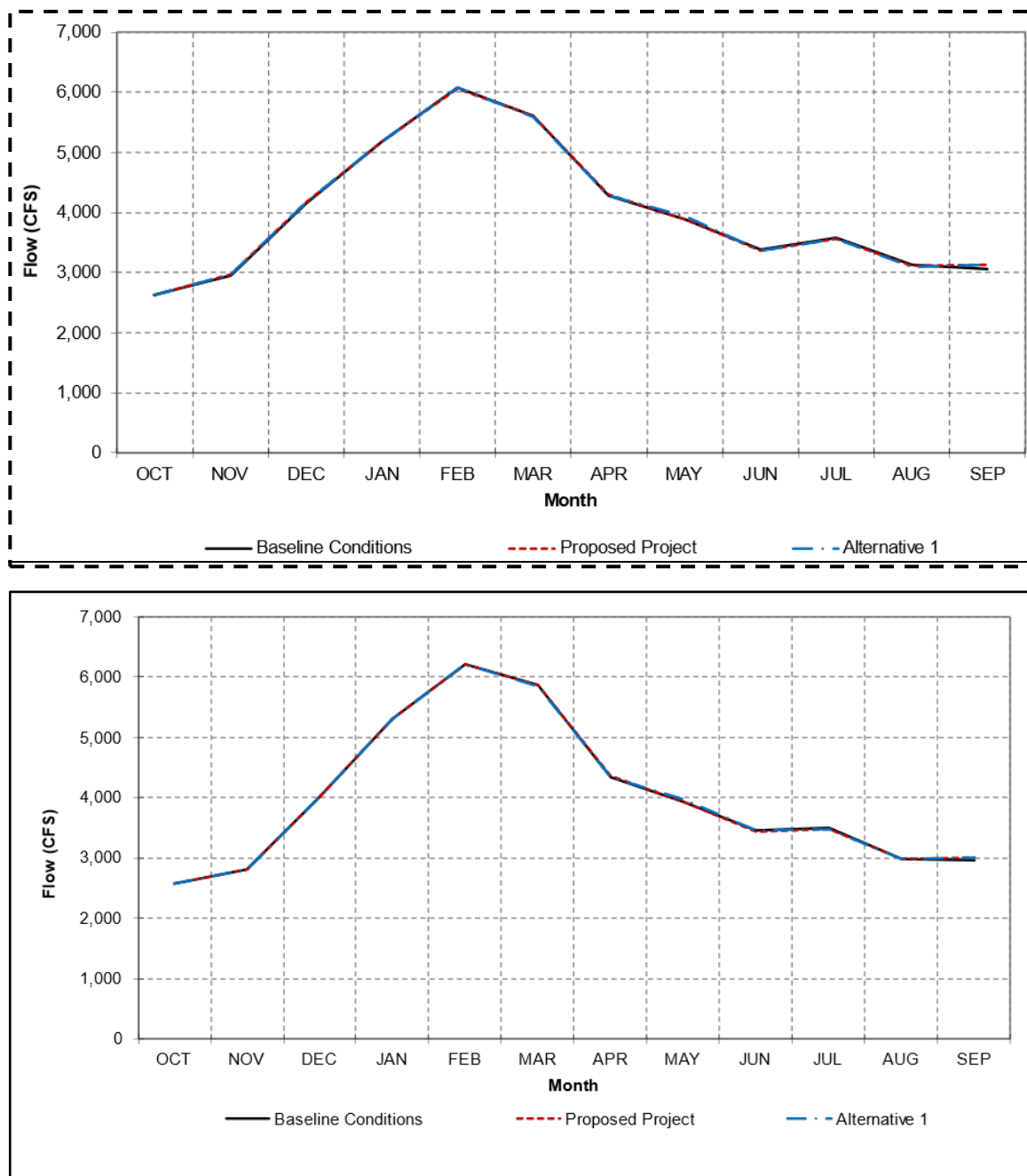
Figure 11-3. Monthly Long-term Average Georgiana Slough Flow for the Baseline Conditions, Proposed Project, and Alternative 1
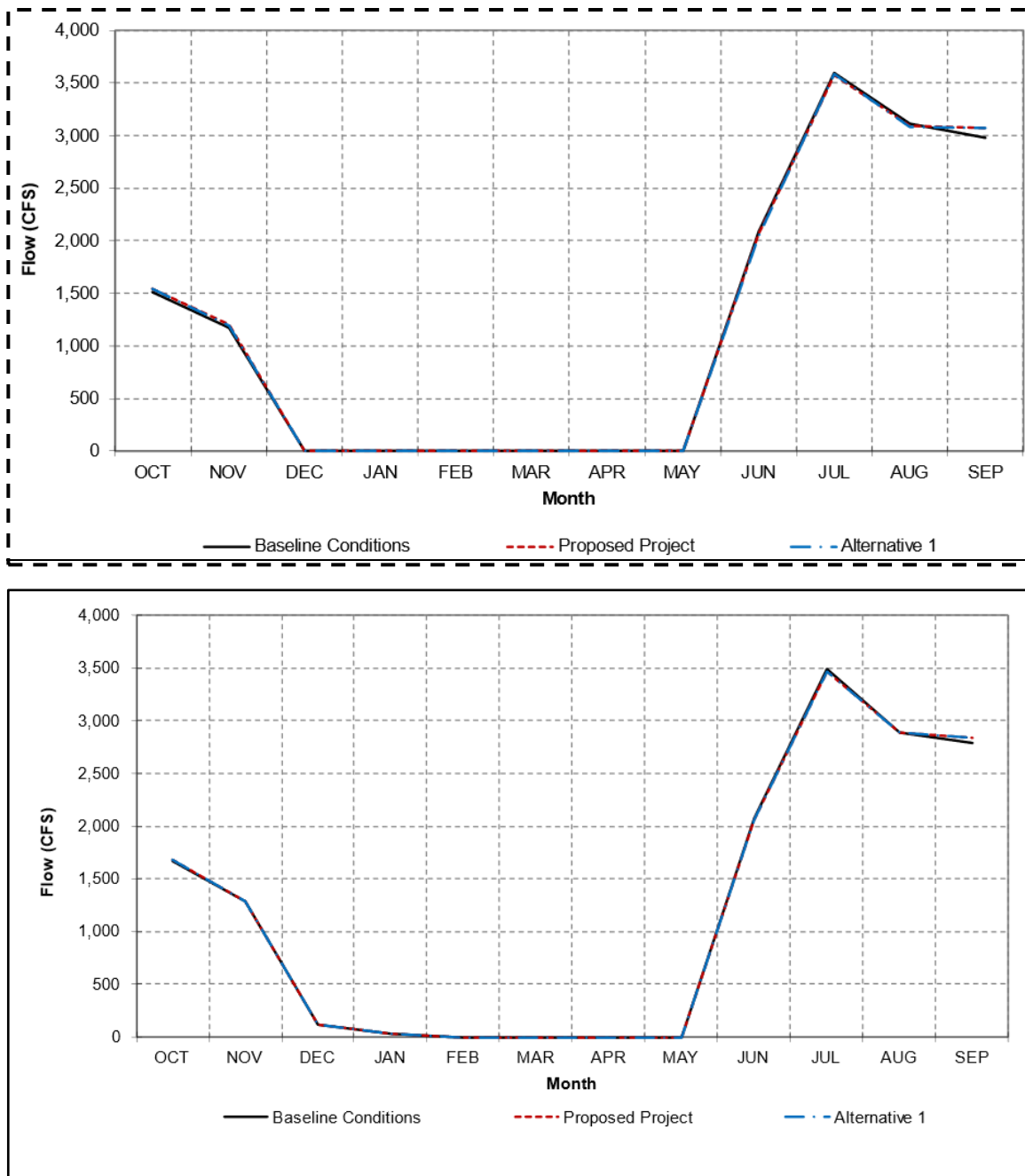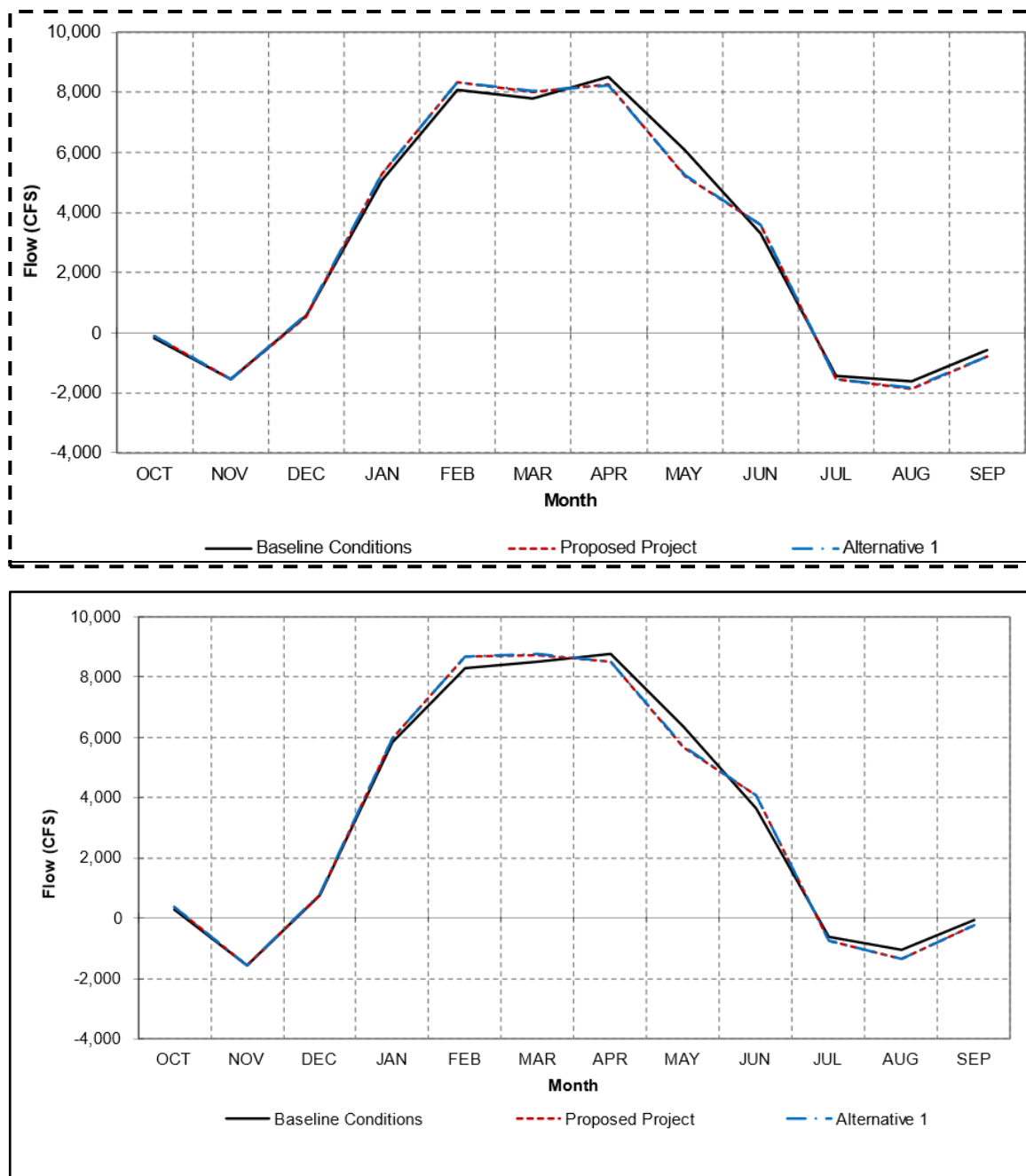
Figure 11-4. Monthly Long-term Average Delta Cross Channel Flow for the Baseline Conditions, Proposed Project, and Alternative 1

Figure 11-5. Monthly Long-term Average Qwest Flow for the Baseline Conditions, Proposed Project, and Alternative 1
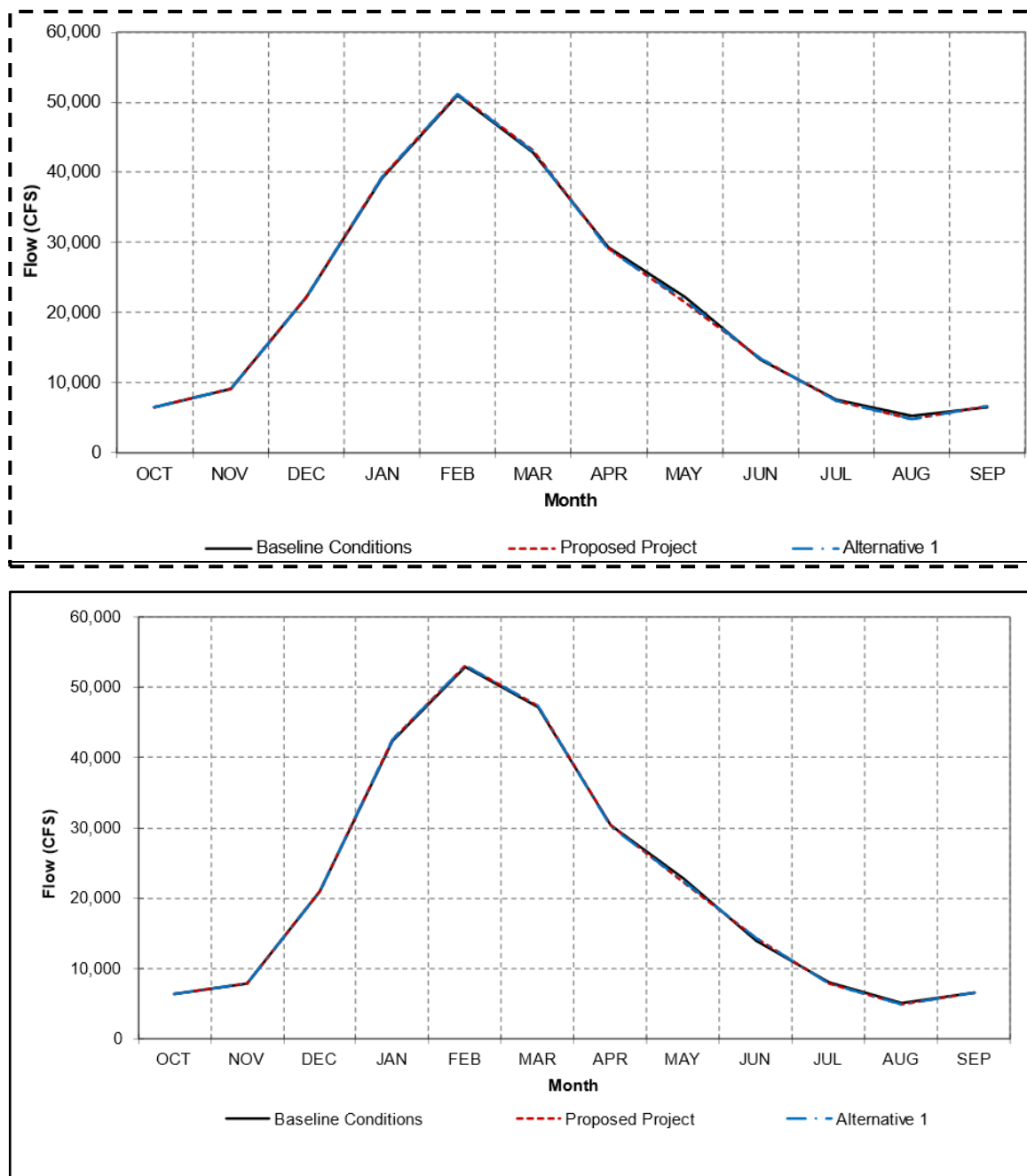
Figure 11-6. Monthly Long-term Average Delta Outflow for the Baseline Conditions, Proposed Project, and Alternative 1
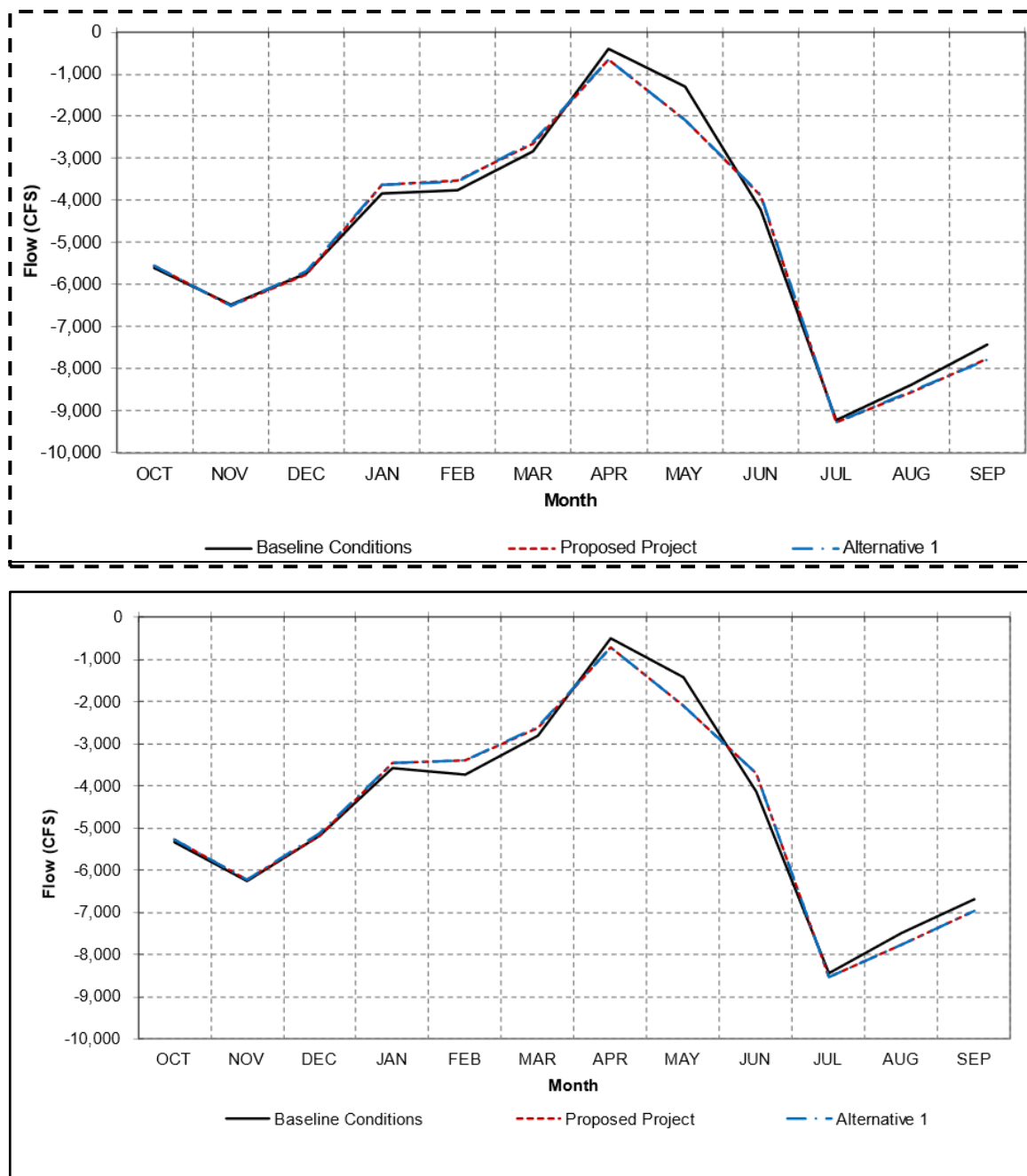
Figure 11-7. Combined Old and Middle River Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 1
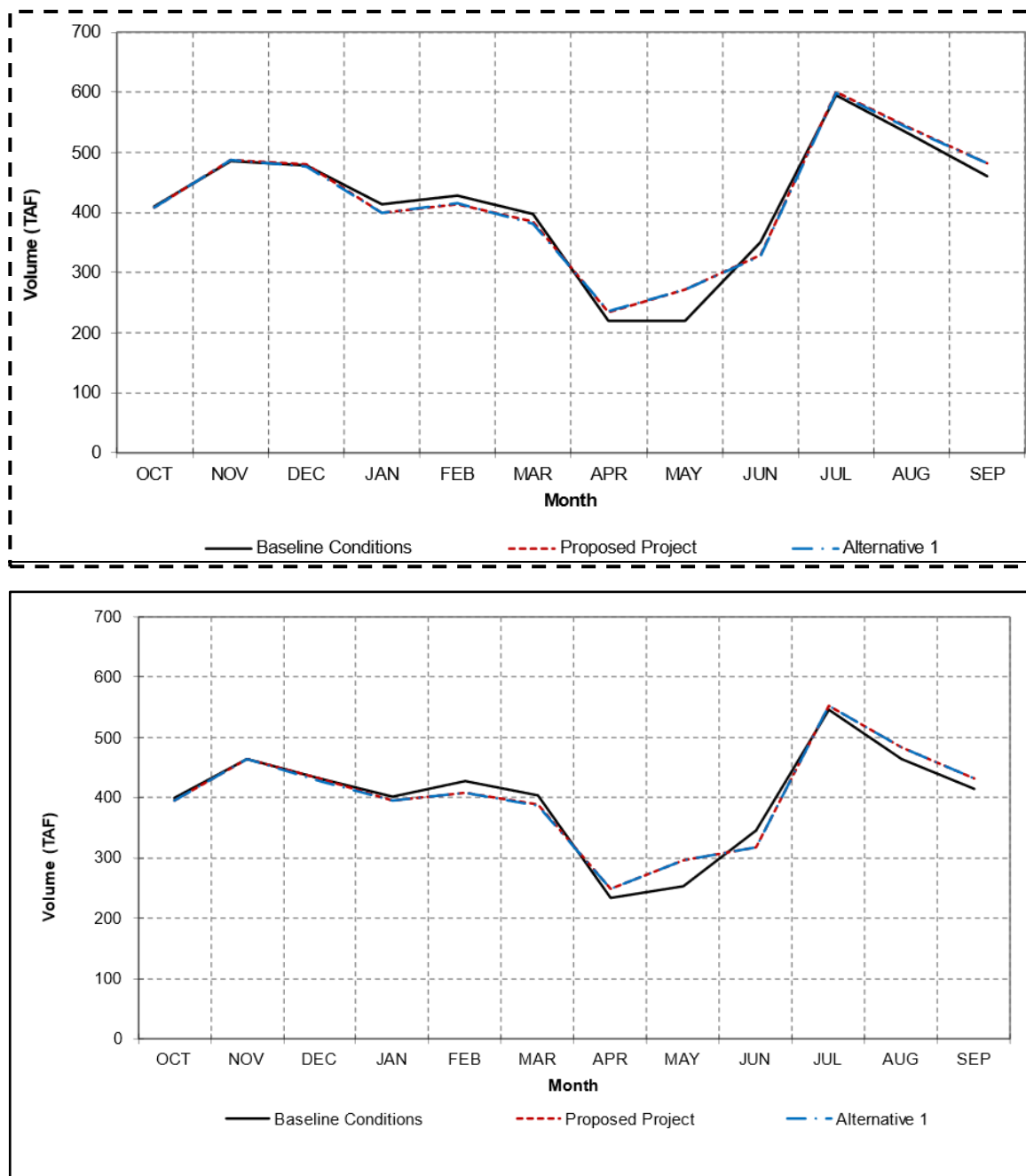
Figure 11-8. Monthly Long-term Average Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1
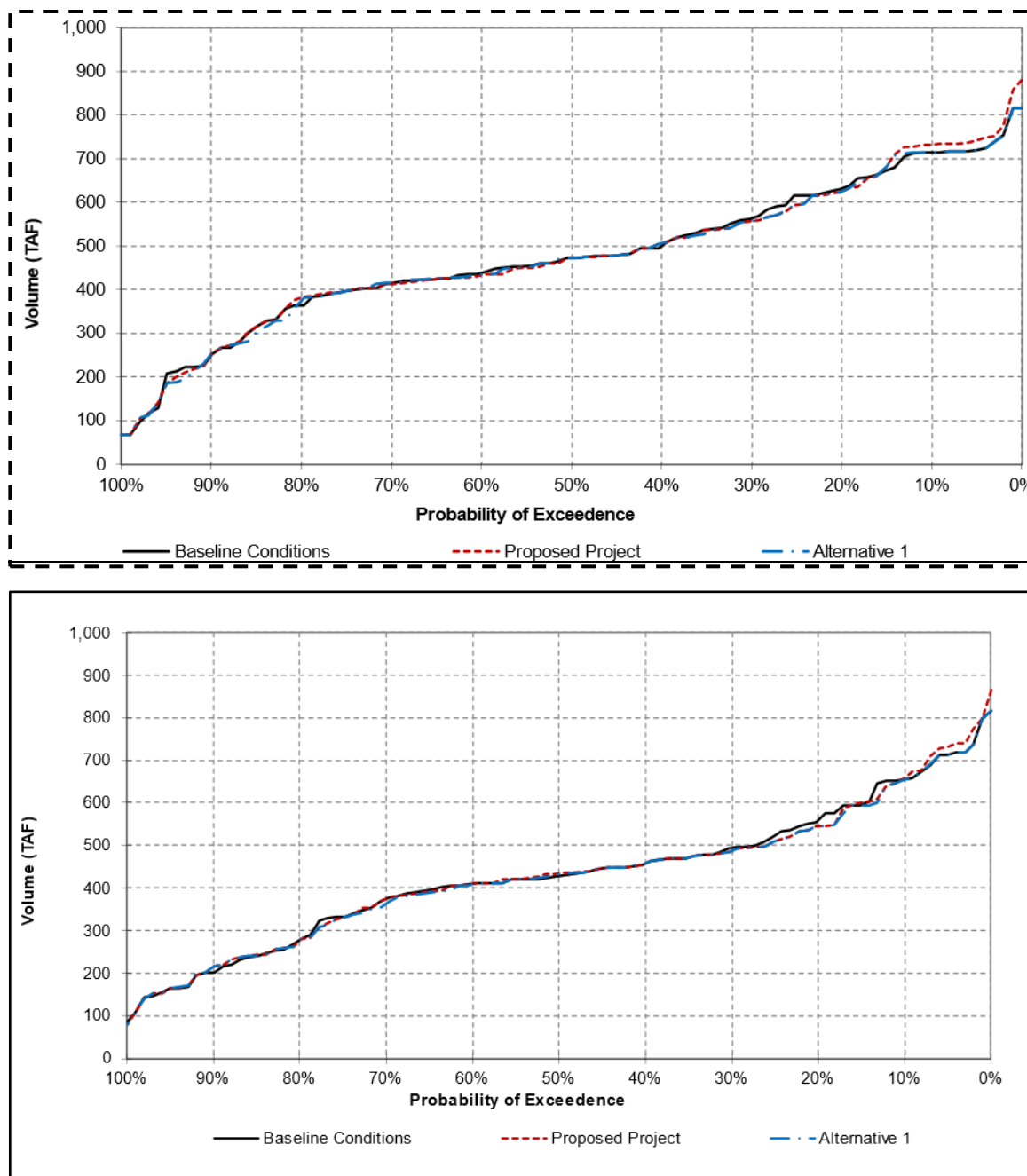
Figure 11-9. December Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1
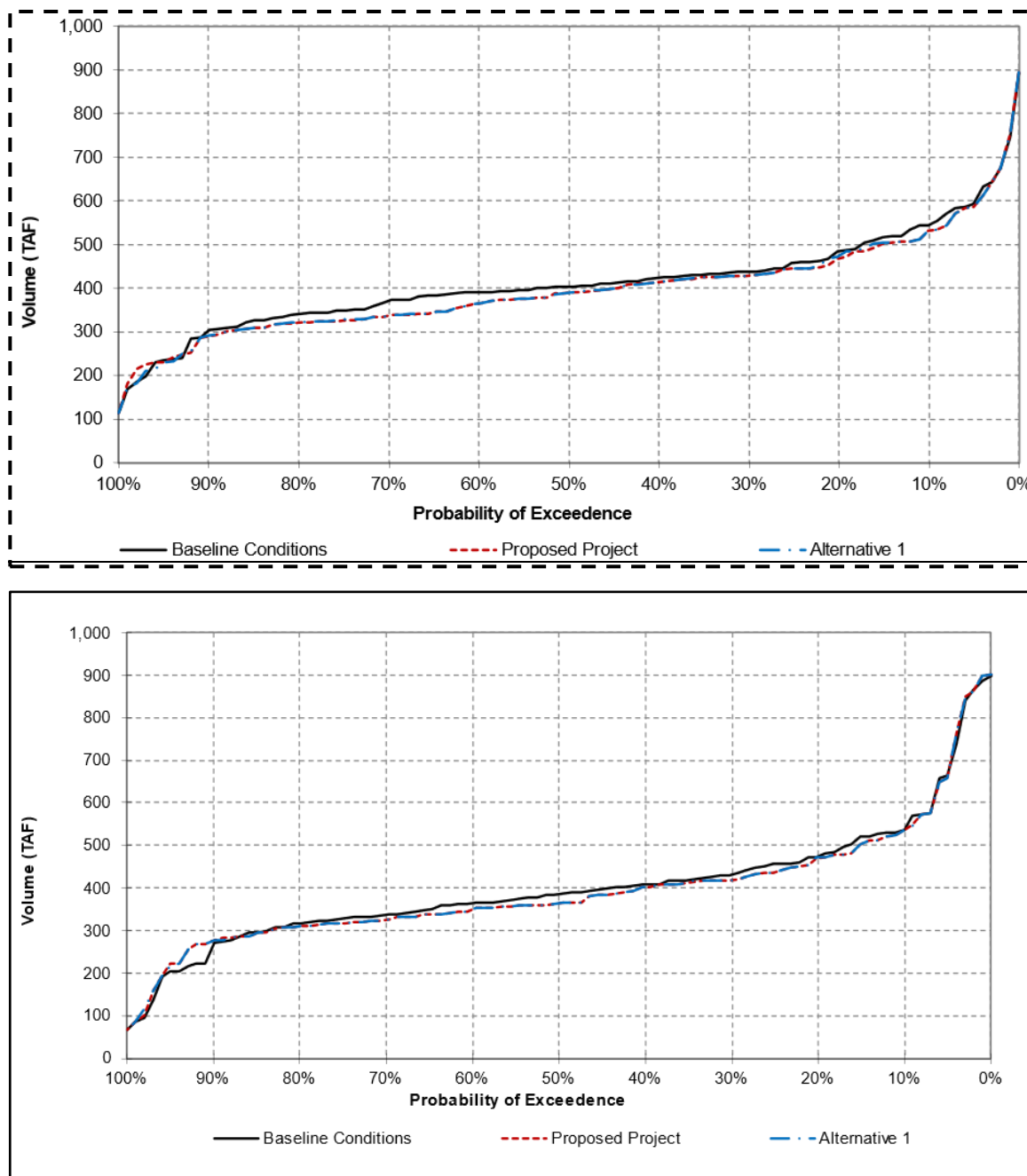
Figure 11-10. January Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1
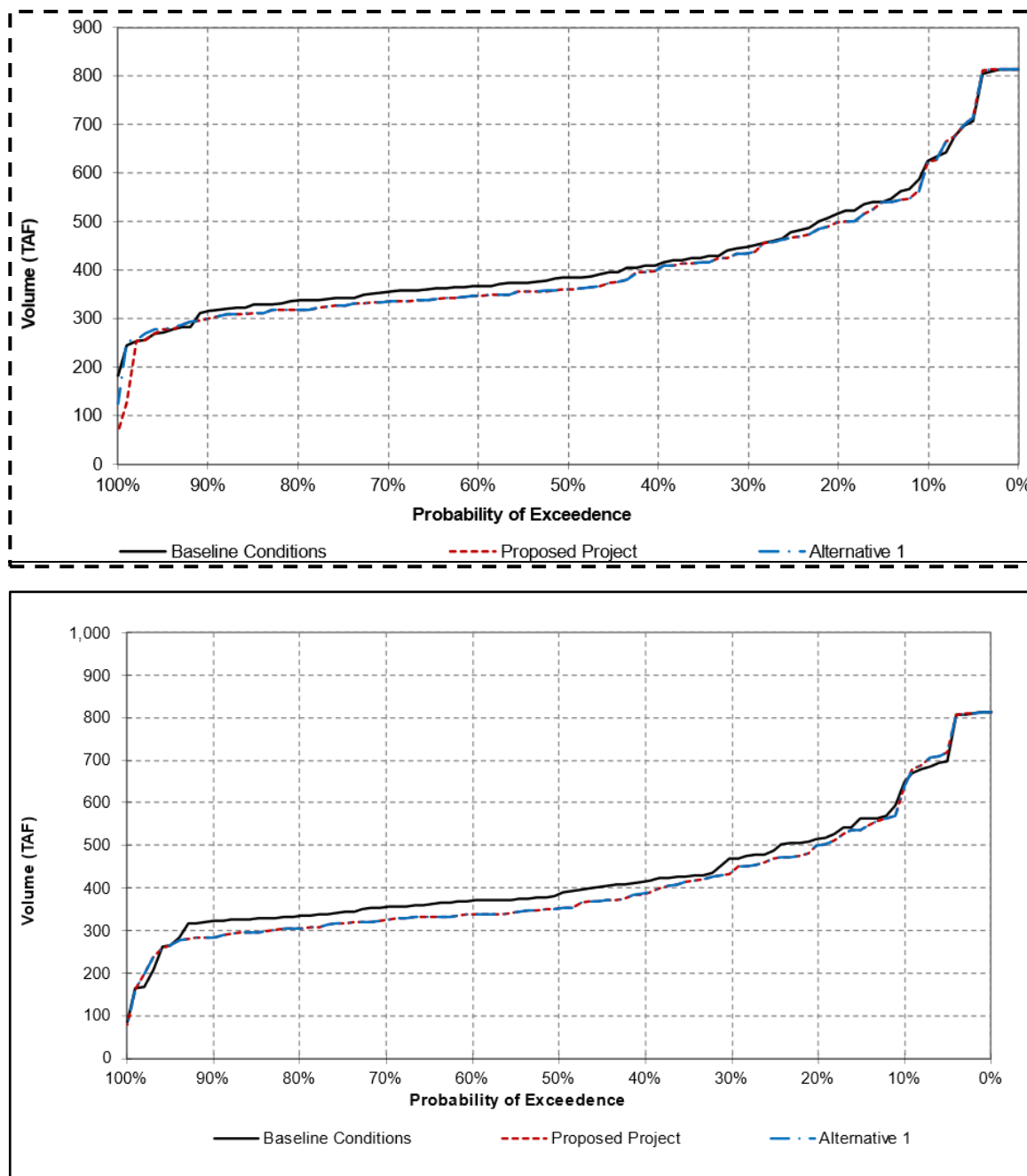
Figure 11-11. February Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1
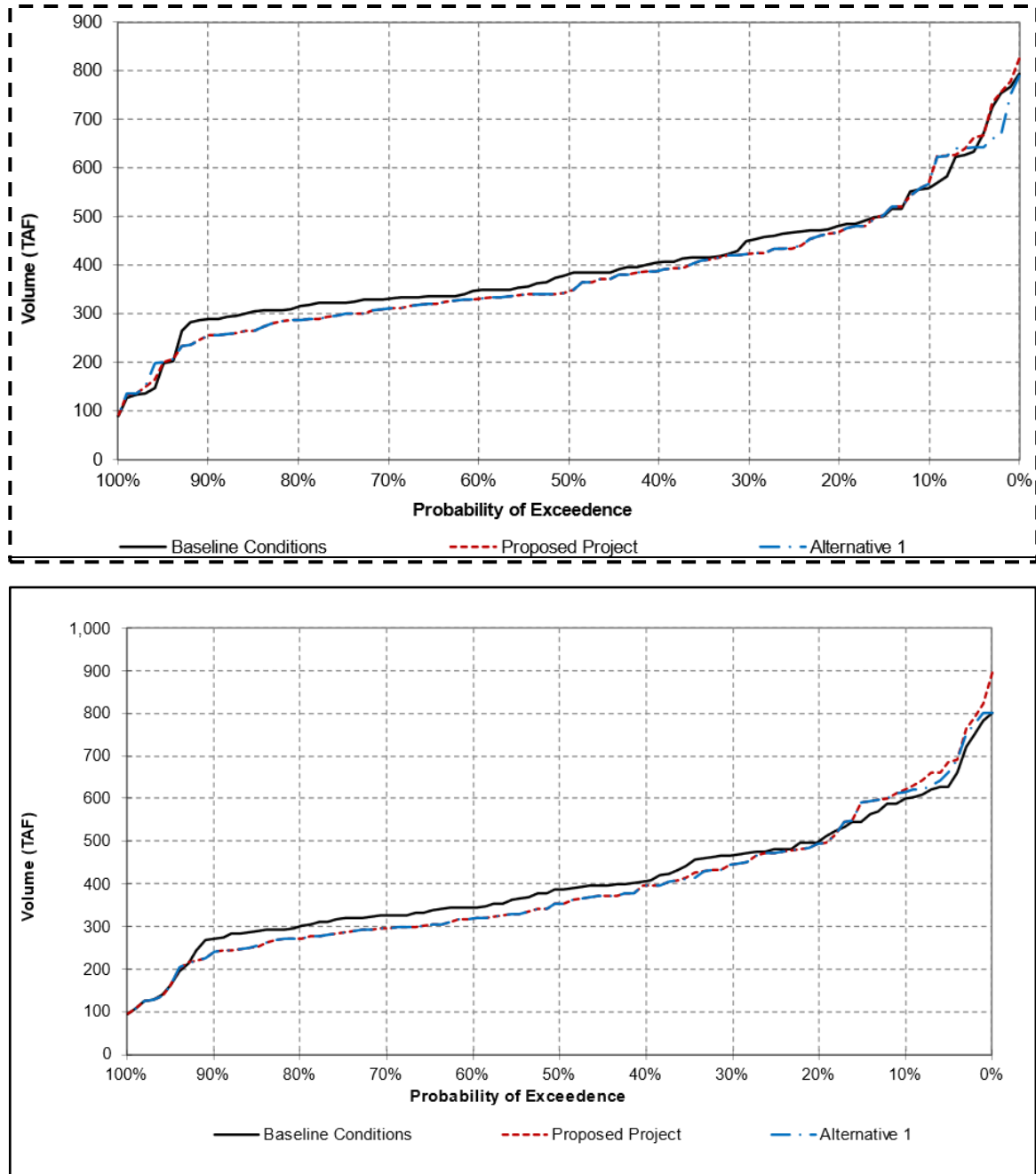
Figure 11-12. March Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1
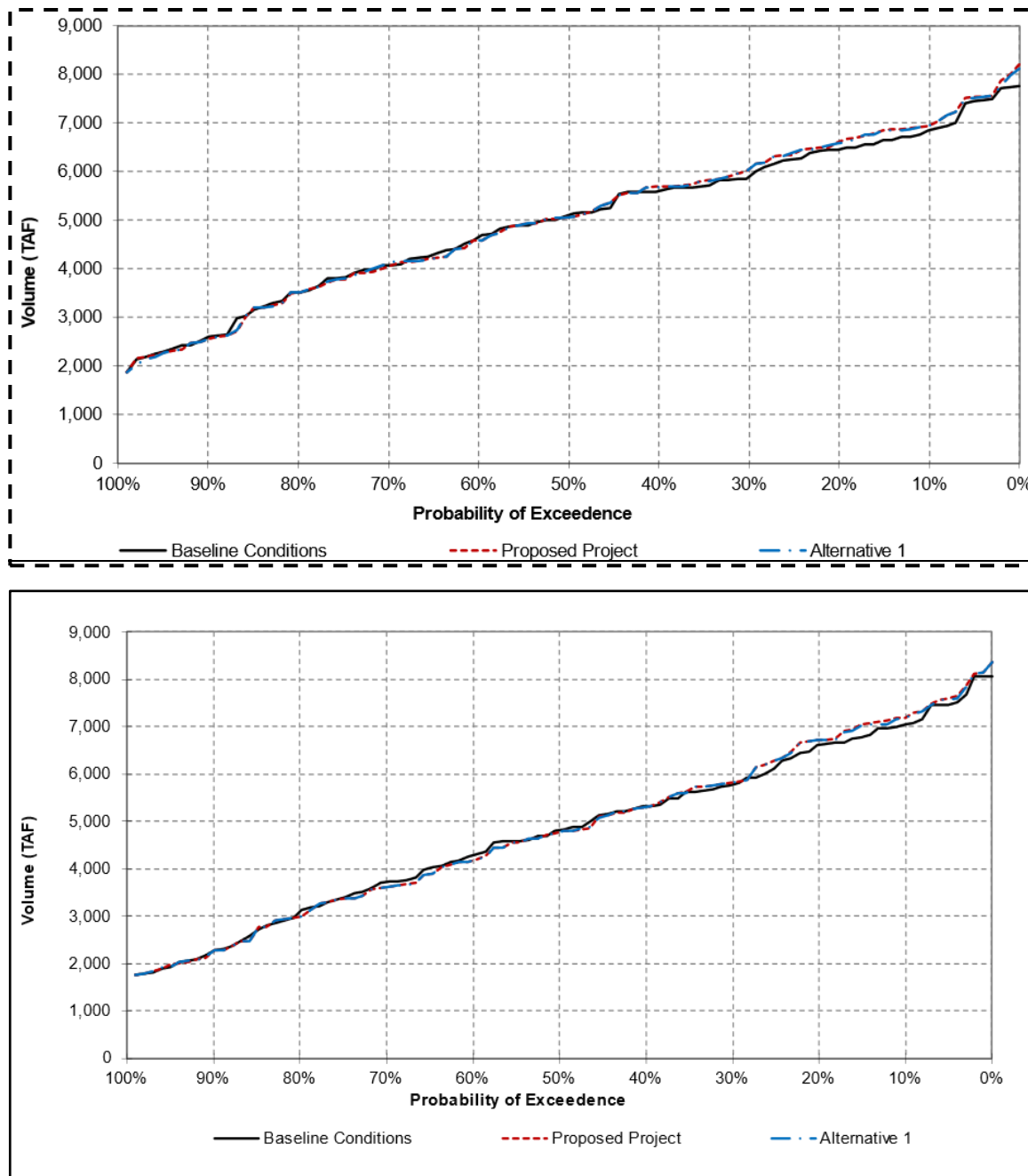
Figure 11-13. Annual Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1

11.4.2   Surface Water Quality

The potential effects of Alternative 1 on surface water quality of study area waterbodies would be similar to those described for the Proposed Project in Chapter 5, "Surface Water Quality." CalSim 3-modeled electrical conductivity (EC) for the Sacramento River at Emmaton, San Joaquin River at Jersey Point, and Old River at Rock Slough under Alternative 1, presented in Tables 11-2 through 11-4 and Figures 11-14 through 11-16, differs little if at all from the Proposed Project. Chloride concentrations, which are correlated with EC, thus also would differ little from the Proposed Project at these locations and throughout the Delta.

As described in Section 11.4.1, "Surface Water Hydrology," Sacramento River, Yolo Bypass, Delta Cross Channel, Qwest, and combined OMR flows, and Delta exports under Alternative 1 would be similar to the Proposed Project. The similar inflows, outflows, and exports would indicate that residence times of water in the various Delta channels under Alternative 1 would not differ substantially from the Proposed Project. Thus, Alternative 1 also would have negligible effects on both the frequency and magnitude of Delta cyanobacteria harmful algae blooms.

Table 11-2. CalSim-Modeled Average Electrical Conductivity (in micromhos/cm) for the Sacramento River at Emmaton by Water Year Type, Water Years 1922–2021, Alternative 1

Water Year Type	Baseline Conditions	Proposed Project	Difference from Baseline Conditions: Proposed Project	Alternative 1	Difference from Baseline Conditions: Alternative 1
Wet	~~488~~ 524	~~500~~ 534	~~12~~ 10 (2%)	~~499~~ 534	~~11~~ 10 (2%)
Above Normal	~~601~~ 610	617	~~16 (3%)~~ 7 (1%)	~~606~~ 616	~~5~~ 6 (1%)
Below Normal	~~699~~ 759	~~699~~ 764	~~0 (0%)~~ 5 (1%)	~~700~~ 763	~~1 (0%)~~ 4 (1%)
Dry	~~896~~ 948	~~908~~ 958	~~12~~ 10 (1%)	~~906~~ 953	~~10~~ 5 (1%)
Critically Dry	~~1,510~~ 1,558	~~1,503~~ 1,572	~~-7 (0%)~~ 14 (1%)	~~1,494~~ 1,570	~~-16 (-1%)~~ 12 (1%)

Source: ~~DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm~~ DRAFT_TrendReport_MultiCalSim_rev12_FEIR_1_7_7v2_9b_9bv2_7.23.0.xlsx.
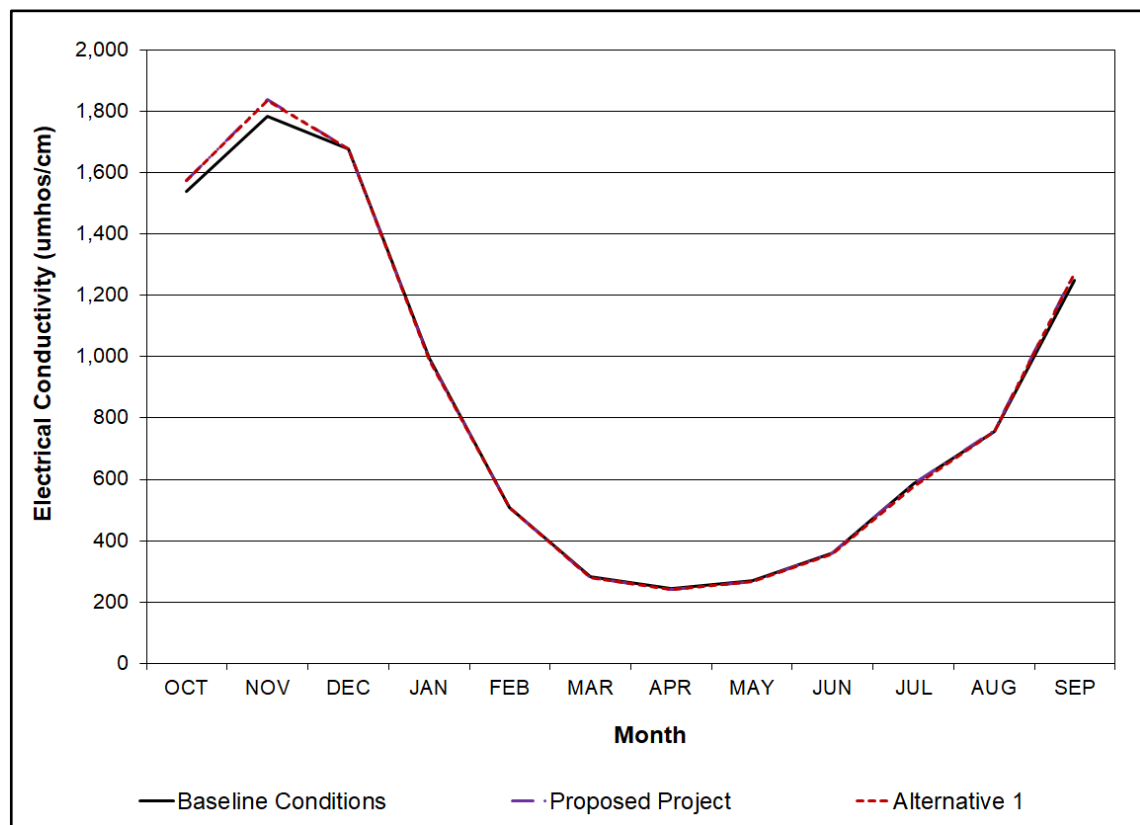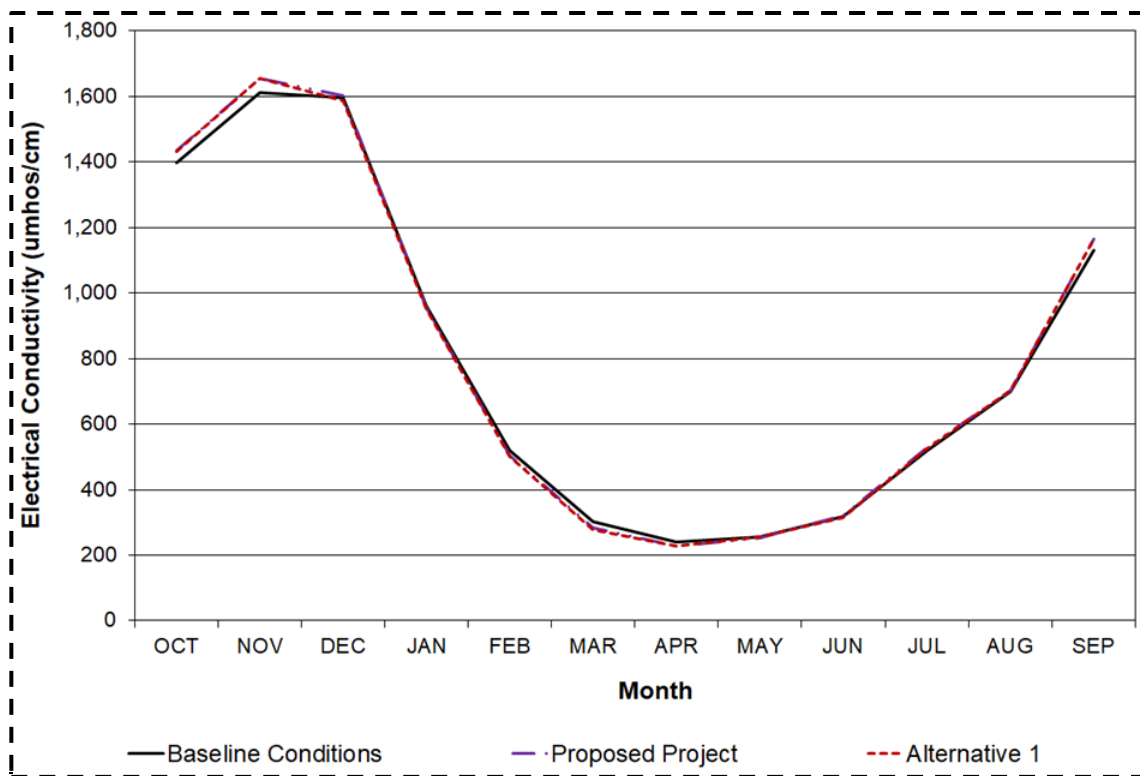
Figure 11-14. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the Sacramento River at Emmaton, Water Years 1922–2021, Alternative 1

Table 11-3. CalSim-Modeled Average Electrical Conductivity (in micromhos/cm) for the San Joaquin River at Jersey Point by Water Year Type, Water Years 1922–2021, Alternative 1

Water Year Type	Baseline Conditions	Proposed Project	Difference from Baseline Conditions: Proposed Project	Alternative 1	Difference from Baseline Conditions: Alternative 1
Wet	~~521~~ 516	~~531~~ 524	~~10~~ 8 (2%)	~~530~~ 524	~~9~~ 8 (2%)
Above Normal	~~591~~ 570	~~602~~ 580	~~11~~ 10 (2%)	~~595~~ 578	4 8 (1%)
Below Normal	~~722~~ 714	~~722~~ 719	~~0 (0%)~~ 5 (1%)	~~722~~ 718	~~0 (0%)~~ 4 (1%)
Dry	~~862~~ 802	~~868~~ 812	~~6~~ 10 (1%)	~~866~~ 809	~~4 (0%)~~ 7 (1%)
Critically Dry	~~1,048~~ 1,025	~~1,039~~ 1,034	~~-9 (-1%)~~ 9 (1%)	~~1,034~~ 1,032	~~-14 (-1%)~~ 7 (1%)

Source: ~~DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm~~ DRAFT_TrendReport_MultiCalSim_rev12_FEIR_1_7_7v2_9b_9bv2_7.23.0.xlsx.
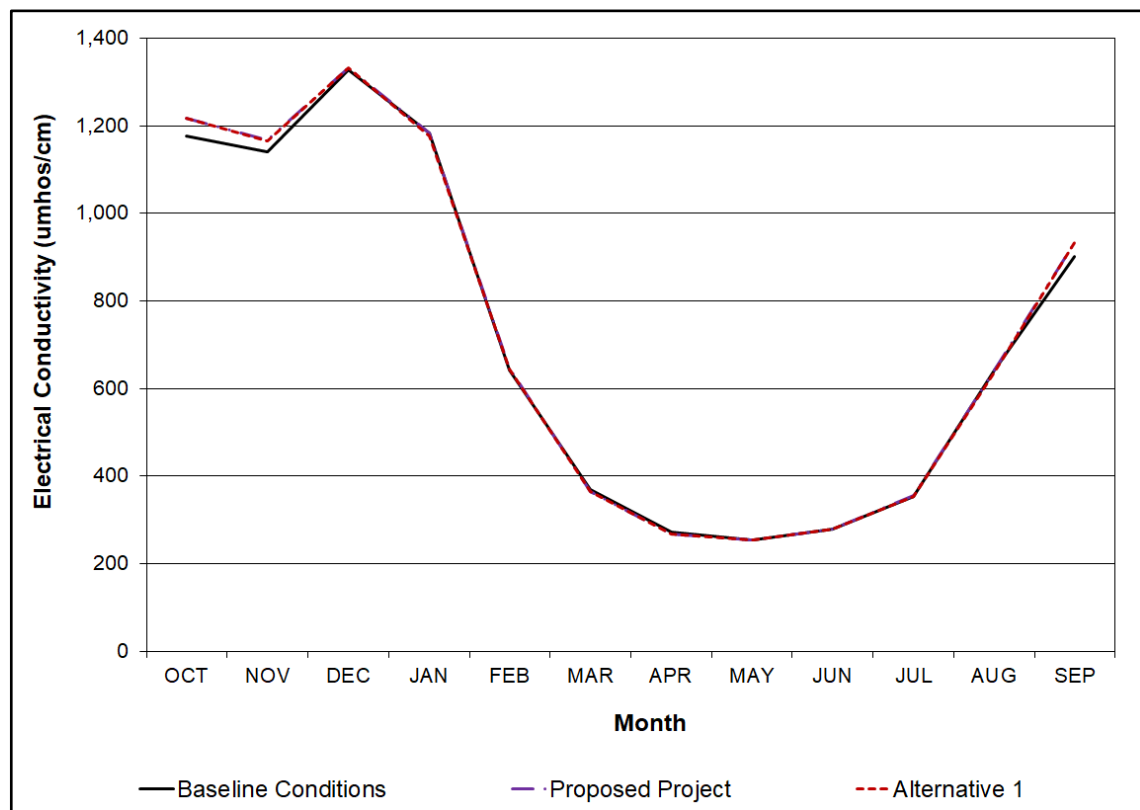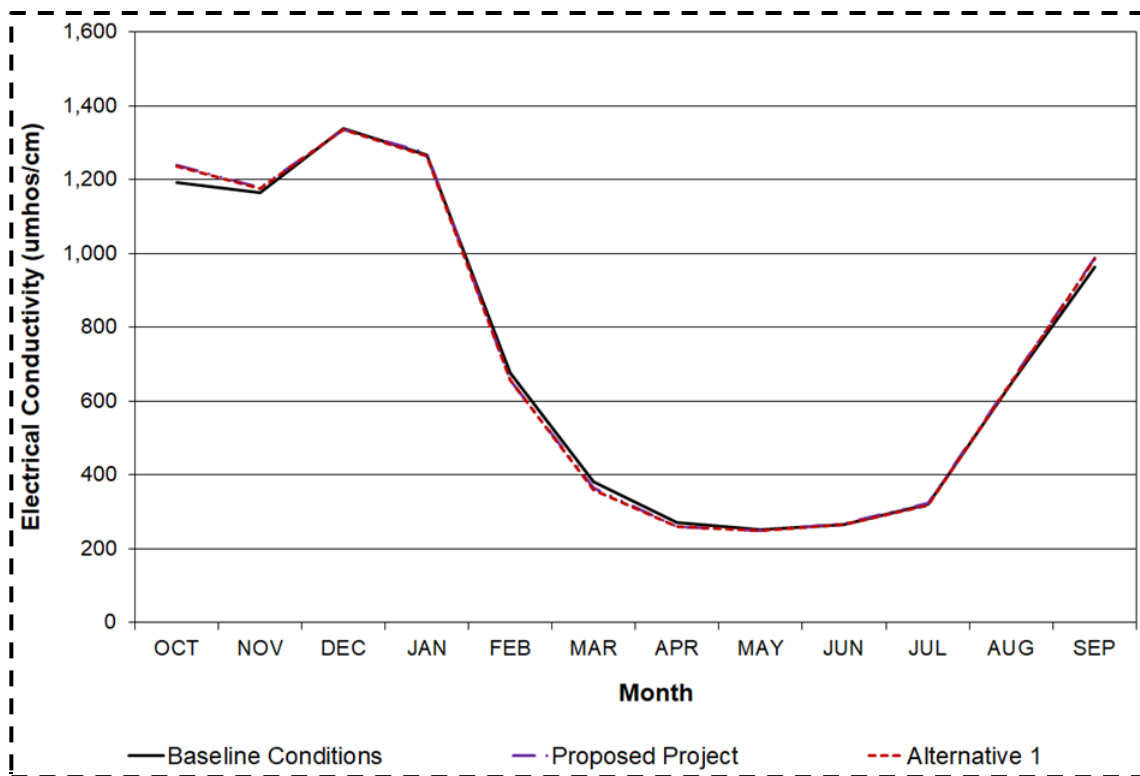
Figure 11-15. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the San Joaquin River at Jersey Point, Water Years 1922–2021, Alternative 1

Table 11-4. CalSim-Modeled Average Electrical Conductivity (in micromhos/cm) for the Old River at Rock Slough by Water Year Type, Water Years 1922–2021, Alternative 1

Water Year Type	Baseline Conditions	Proposed Project	Difference from Baseline Conditions: Proposed Project	Alternative 1	Difference from Baseline Conditions: Alternative 1
Wet	~~347~~ 339	~~348~~ 340	1 (0%)	~~347~~ 340	~~0~~ 1 (0%)
Above Normal	~~386~~ 369	~~385~~ 372	~~-1 (0%)~~ 3 (1%)	~~383~~ 371	~~-3 (-1%)~~ 2 (1%)
Below Normal	~~443~~ 432	~~438~~ 431	~~-5 (-1%)~~ -1 (0%)	~~438~~ 431	~~-5 (-1%)~~ -1 (0%)
Dry	~~496~~ 456	~~495~~ 459	~~-1 (0%)~~ 3 (1%)	~~495~~ 458	~~-1~~ 2 (0%)
Critically Dry	~~572~~ 548	~~566~~ 552	~~-6 (-1%)~~ 4 (1%)	~~564~~ 551	~~-8 (-1%)~~ 3 (1%)

Source: ~~DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm~~
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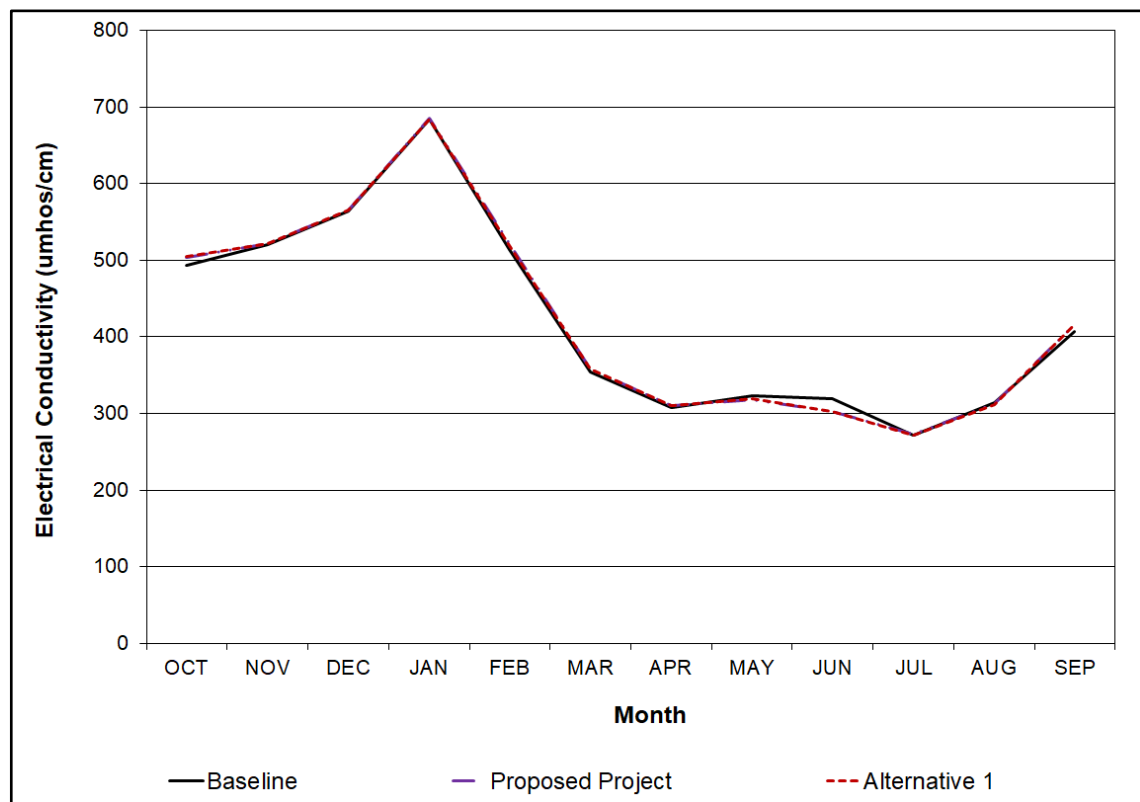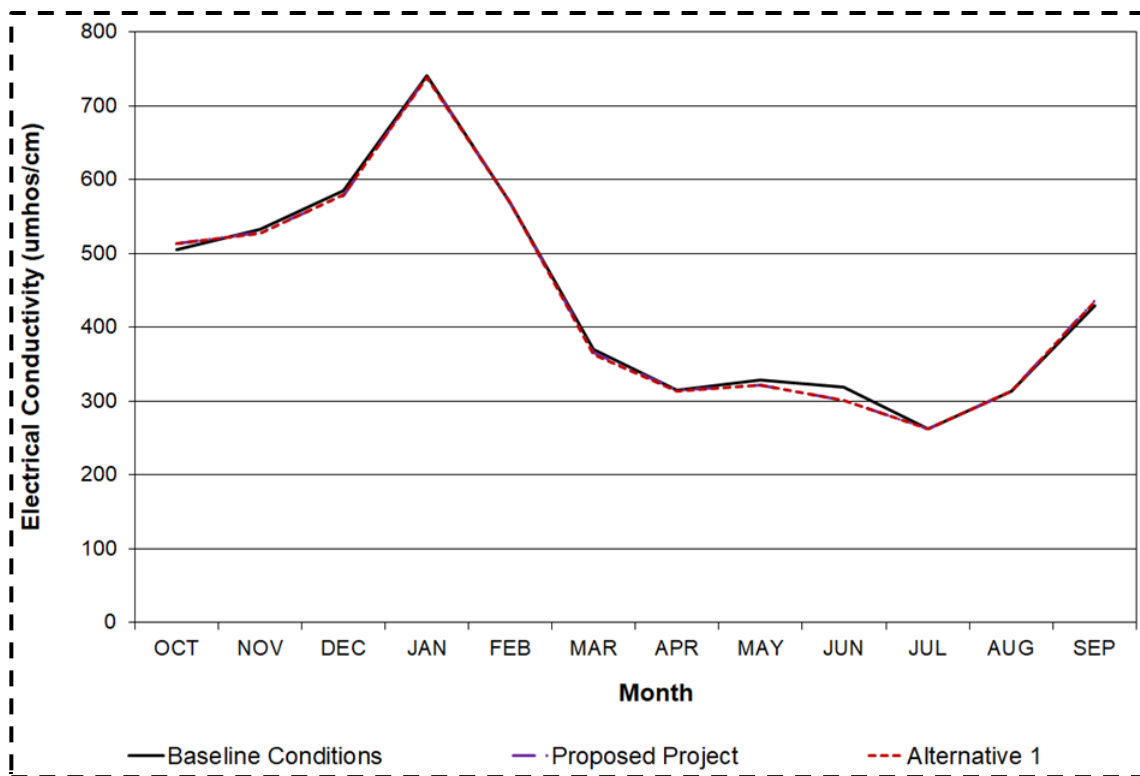
Figure 11-16. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for Old River at Rock Slough, Water Years 1922–2021, Alternative 1

11.4.3   Aquatic Biological Resources

Alternative 1 does not include the approximately two-week increase in CCF diversion capacity during December and March that is included in the Proposed Project. This results in SWP south Delta exports being lower under Alternative 1 than the Proposed Project in a small percentage of years, as indicated by the CalSim modeling (Figures 11-17 and 11-18). Such years would be a subset of Wet years likely to have hydrologically favorable conditions for aquatic biological resources because of greatly increased Delta inflow, for example. This would limit the potential for differences in effects on aquatic biological resources between the Proposed Project and Alternative 1. Thus, for example, there may be slightly lower entrainment risk under Alternative 1 for species overlapping the period with lower SWP south Delta exports, such as winter-run Chinook Salmon (Table 11-5), but the differences would be limited (Tables 11-6 through ~~11-23~~ 11-25) and operational criteria for species protection (e.g., OMR management as described in Chapter 2, "Project Description") would remain in place, minimizing potential negative effects.
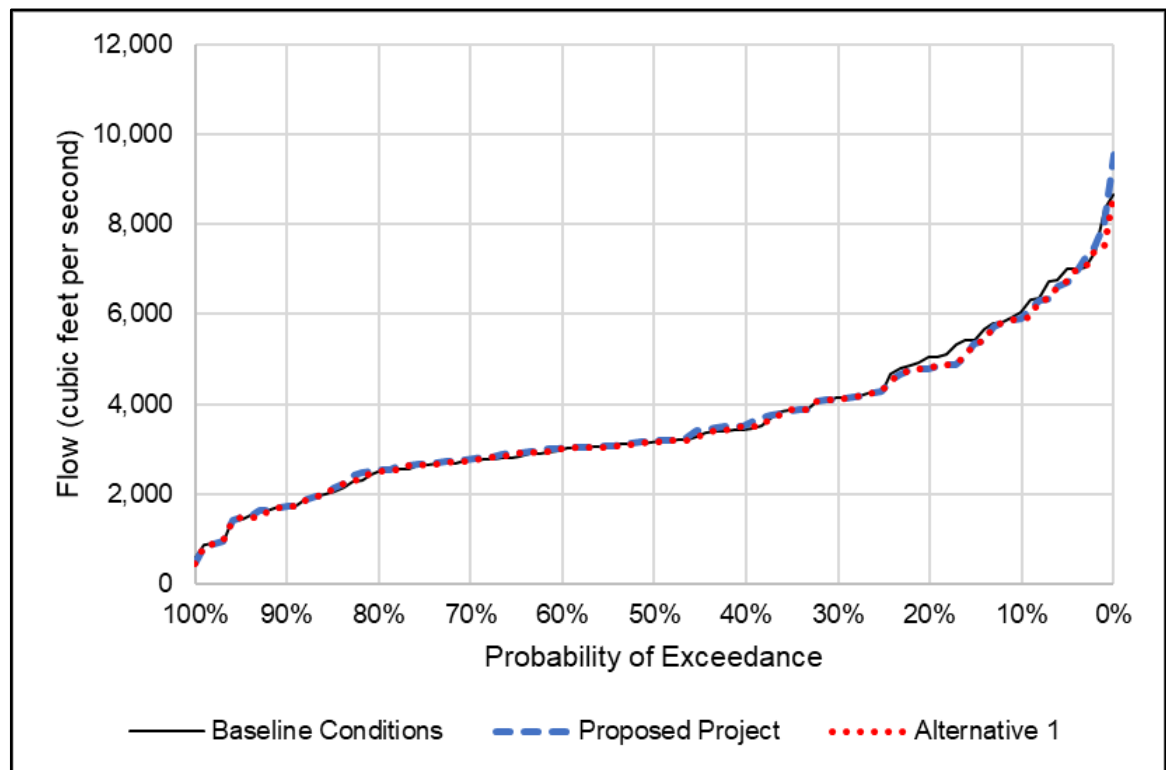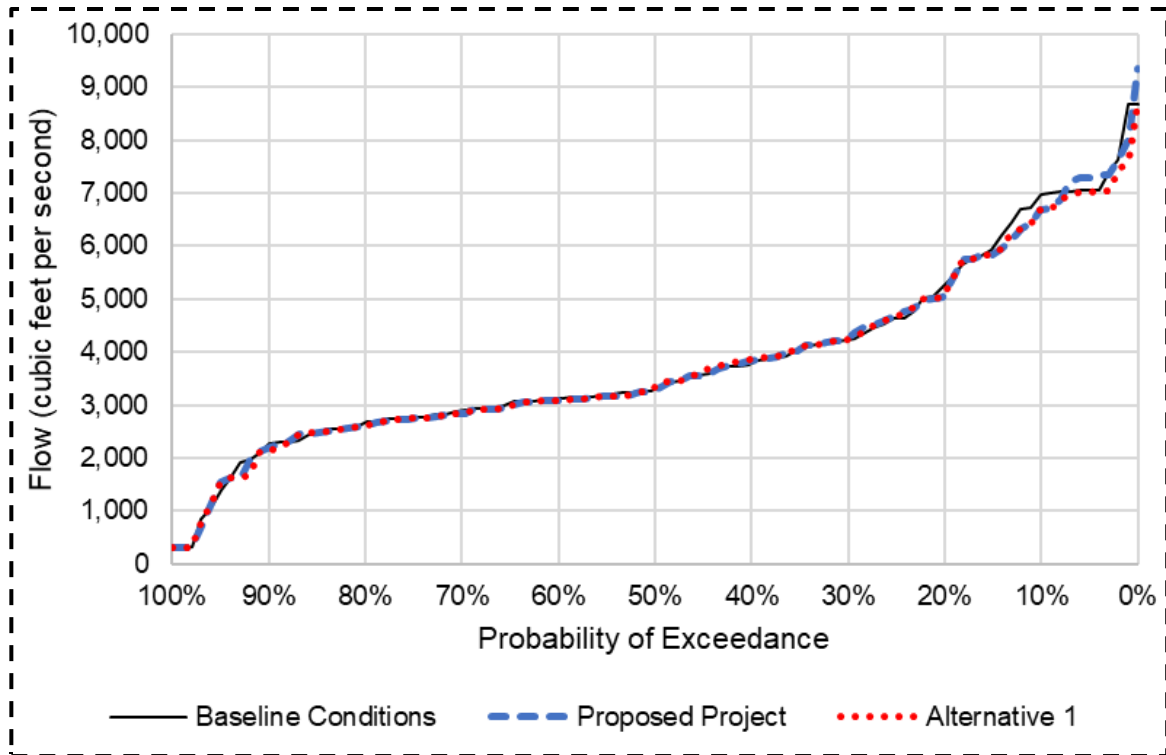
Source: ~~DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm~~
DRAFT_TrendReport_MultiCalSim_rev12_DEIR_FEIR_7_7v2_9b_comp_7.23.xlsx.

Figure 11-17. Mean Modeled SWP South Delta Exports (Baseline Conditions, Proposed Project, and Alternative 1), December
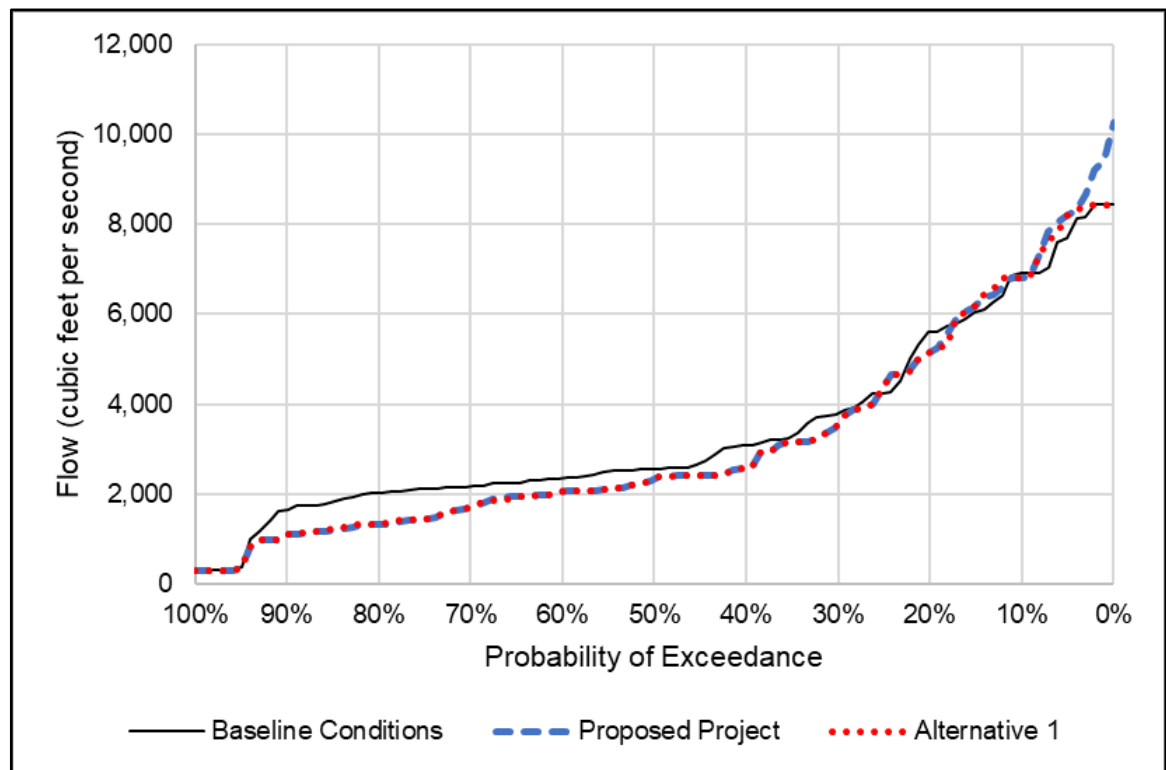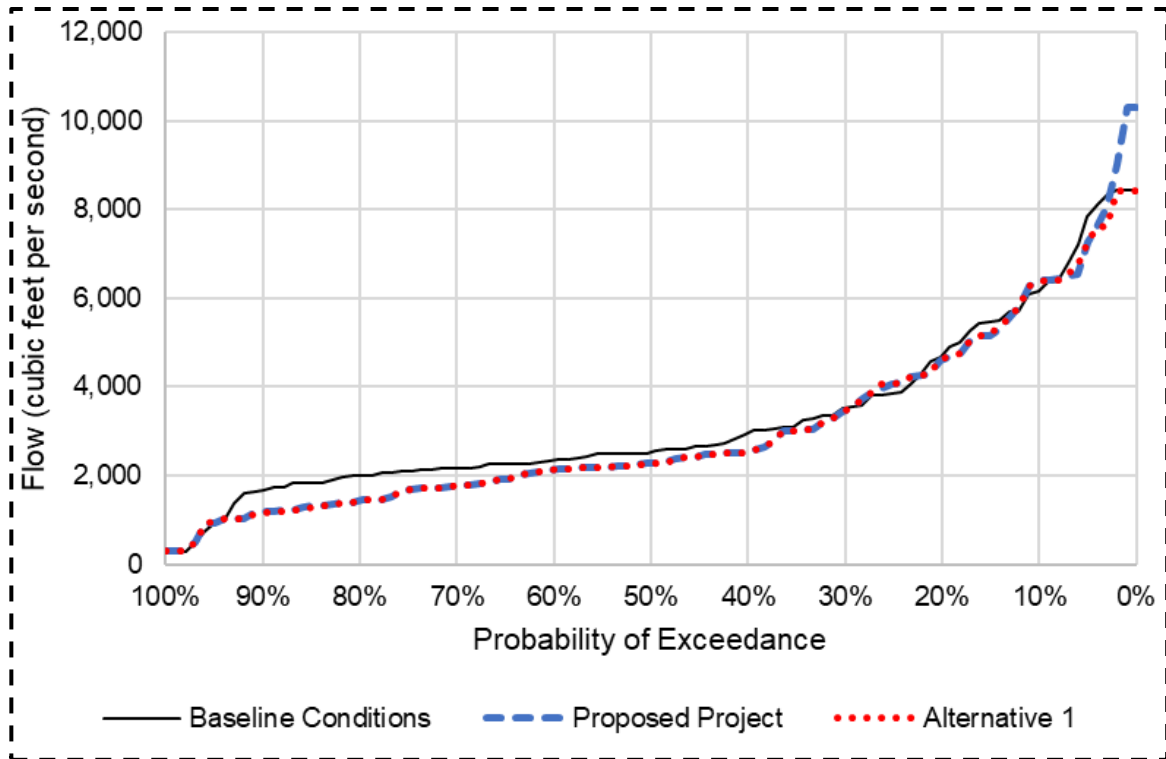
Source: ~~DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm~~
DRAFT_TrendReport_MultiCalSim_rev12_DEIR_FEIR_7_7v2_9b_comp_7.23.xlsx .

Figure 11-18. Mean Modeled SWP South Delta Exports (Baseline Conditions, Proposed Project, and Alternative 1), March

Table 11-5. Mean Number of Genetically Identified Winter-run Chinook Salmon Juveniles Lost (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	806	824 (2%)	808 (0%)	824 (2%)	808 (0%)
	838	869 (4%)	854 (2%)	870 (4%)	855 (2%)
Above Normal	N/A	(-9%)	(-9%)	(-10%)	(-9%)
				(-9%)	
Below Normal	571	473 (-17%)	473 (-17%)	473 (-17%)	473 (-17%)
	596	484 (-19%)	487 (-18%)	487 (-18%)	484 (-19%)
Dry	103	92 (-10%)	92 (-11%)	92 (-11%)	92 (-11%)
	108	85 (-22%)	86 (-21%)	85 (-22%)	86 (-21%)
Critically Dry	10	11 (13%)	11 (13%)	11 (13%)	11 (13%)
	9	10 (9%)	10 (8%)	10 (9%)	10 (8%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2010–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table 11-6. Mean Number of Coded Wire Tagged Winter-run Chinook Salmon Juveniles Lost (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Above Normal	N/A	(0%)	(0%)	(0%)	(0%)
Below Normal	21	18 (-16%)	18 (-16%)	18 (-16%)	18 (-16%)
Dry	4	3 (-22%)	3 (-21%)	3 (-22%)	3 (-21%)
Critically Dry	2	2 (-12%)	2 (-10%)	2 (-10%)	2 (-12%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2010–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-6~~ 11-7 . Mean Number of Genetically Identified Spring-run Chinook Salmon Juveniles Lost (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~67~~ 80	~~92 (38%)~~ 98 (23%)	~~91 (37%)~~ 98 (23%)	~~92 (38%)~~ 98 (23%)	~~91 (37%)~~ 98 (23%)
Above Normal	N/A	~~(48%)~~ (57%)	~~(48%)~~ (57%)	~~(48%)~~ (57%)	~~(48%)~~ (57%)
Below Normal	~~53~~ 57	~~67 (26%)~~ 67 (18%)	67 ~~(26%)~~ (19%)	67 ~~(26%)~~ (19%)	67 ~~(26%)~~ (18%)
Dry	~~23~~ 24	~~25 (7%)~~ 20 (-17%)	~~25 (6%)~~ 20 (-17%)	~~25 (6%)~~ 20 (-17%)	~~25 (6%)~~ 20 (-17%)
Critically Dry	10	~~13 (29%)~~ 12 (22%)	~~13 (29%)~~ 12 (22%)	~~13 (29%)~~ 12 (22%)	~~13 (29%)~~ 12 (22%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2017–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table 11-8. Mean Number of Coded Wire Tagged Spring-run Chinook Salmon Juveniles Lost (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Above Normal	N/A	(0%)	(0%)	(0%)	(0%)
Below Normal	1	1 (48%)	1 (48%)	1 (48%)	1 (48%)
Dry	1	1 (-17%)	1 (-17%)	1 (-17%)	1 (-17%)
Critically Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2017–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-7~~ 11-9 . Mean Number of Fall-run Chinook Salmon Juveniles Lost (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~22,328~~ 25,108	~~26,594 (19%)~~ 27,662 (10%)	~~26,565 (19%)~~ 27,654 (10%)	~~26,582 (19%)~~ 27,650 (10%)	~~26,575 (19%)~~ 27,645 (10%)
Above Normal	N/A	~~(20%)~~ (23%)	~~(20%)~~ (23%)	~~(19%)~~ (23%)	~~(20%)~~ (23%)
Below Normal	~~3,673~~ 4,393	~~6,869 (87%)~~ 7,842 (79%)	~~6,867 (87%)~~ 7,850 (79%)	~~6,867 (87%)~~ 7,850 (79%)	~~6,868 (87%)~~ 7,842 (79%)
Dry	~~4,054~~ 4,300	~~4,923 (21%)~~ 4,774 (11%)	~~4,904 (21%)~~ 4,776 (11%)	~~4,906 (21%)~~ 4,778 (11%)	~~4,913 (21%)~~ 4,775 (11%)
Critically Dry	~~541~~ 553	~~709 (31%)~~ 680 (23%)	~~709 (31%)~~ 679 (23%)	~~709 (31%)~~ 680 (23%)	~~709 (31%)~~ 679 (23%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-8~~ 11-10 . Mean Number of Late-fall-run Chinook Salmon Juveniles Lost (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~1,411~~ 1,451	~~1,396~~ 1,442 (-1%)	~~1,390~~ 1,436 (-1%)	~~1,397~~ 1,439 (-1%)	~~1,390 (-2%)~~ 1,437 (-1%)
Above Normal	N/A	(-1%)	~~(-2%)~~ (-1%)	~~(0%)~~ (-1%)	~~(-2%)~~ (-1%)
Below Normal	~~412~~ 409	~~399 (-3%)~~ 385 (-6%)	~~399 (-3%)~~ 384 (-6%)	~~399 (-3%)~~ 384 (-6%)	~~398 (-3%)~~ 385 (-6%)
Dry	~~782~~ 714	~~741 (-5%)~~ 685 (-4%)	~~741 (-5%)~~ 687 (-4%)	~~743 (-5%)~~ 687 (-4%)	~~742 (-5%)~~ 687 (-4%)
Critically Dry	~~477~~ 455	~~462 (-3%)~~ 445 (-2%)	~~458~~ 438 (-4%)	~~458~~ 438 (-4%)	~~460 (-3%)~~ 447 (-2%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table 11-9 11-11 . Mean Number of Steelhead Lost (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	5,482 5,818	5,801 (6%) 6,126 (5%)	5,770 6,100 (5%)	5,798 (6%) 6,125 (5%)	5,771 6,102 (5%)
Above Normal	N/A	(6%) (5%)	(5%)	(5%)	(6%) (5%)
Below Normal	3,911 4,124	3,872 (-1%) 3,972 (-4%)	3,874 (-1%) 3,982 (-3%)	3,874 (-1%) 3,982 (-3%)	3,872 (-1%) 3,972 (-4%)
Dry	2,087 2,174	2,035 (-2%) 1,900 (-13%)	2,031 (-3%) 1,906 (-12%)	2,031 (-3%) 1,900 (-13%)	2,032 (-3%) 1,906 (-12%)
Critically Dry	822 773	873 (6%) 790 (2%)	869 (6%) 793 (3%)	869 (6%) 793 (3%)	870 (6%) 791 (2%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table 11-10 11-12 . Mean Number of Green Sturgeon Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	1	1 (2%) (5%)	1 (-1%) (2%)	1 (2%) (5%)	1 (-1%) (2%)
Above Normal	N/A	(-13%)	(-13%)	(-13%)	(-13%)
Below Normal	1	1 (-4%) (-5%)	1 (-4%) (-5%)	1 (-4%) (-5%)	1 (-4%) (-5%)
Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Critically Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table 11-11 11-13. Mean Number of White Sturgeon Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~19~~ 21	~~20 (4%)~~ 21 (2%)	~~20 (4%)~~ 21 (2%)	~~20 (4%)~~ 21 (2%)	~~20 (4%)~~ 21 (2%)
Above Normal	N/A	~~(1%)~~ (2%)	~~(1%)~~ (2%)	~~(1%)~~ (2%)	~~(1%)~~ (2%)
Below Normal	11	~~11 (-4%)~~ 10 (-5%)	~~11 (-4%)~~ 10 (-6%)	~~11 (-4%)~~ 10 (-6%)	~~11 (-4%)~~ 10 (-5%)
Dry	~~3~~ 4	4 ~~(18%)~~ (17%)	4 (17%)	4 (17%)	4 ~~(18%)~~ (17%)
Critically Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table 11-12 11-14. Mean Number of Lamprey Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~863~~ 952	~~863 (0%)~~ 943 (-1%)	~~862 (0%)~~ 942 (-1%)	~~863 (0%)~~ 940 (-1%)	~~863 (0%)~~ 942 (-1%)
Above Normal	N/A	~~(-2%)~~ (-3%)	~~(-2%)~~ (-3%)	~~(-2%)~~ (-3%)	~~(-2%)~~ (-3%)
Below Normal	~~167~~ 174	~~163 (-2%)~~ 168 (-3%)	~~163~~ 168 (-3%)	~~163~~ 168 (-3%)	~~163 (-2%)~~ 168 (-3%)
Dry	~~120~~ 119	~~118 (-2%)~~ 107 (-10%)	~~118 (-2%)~~ 108 (-10%)	~~118 (-2%)~~ 107 (-10%)	~~118 (-2%)~~ 108 (-10%)
Critically Dry	~~125~~ 123	~~145 (15%)~~ 136 (11%)	~~144 (15%)~~ 137 (11%)	~~144 (15%)~~ 137 (11%)	~~144 (15%)~~ 136 (11%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-13~~ 11-15 . Mean Number of Sacramento Hitch Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	1	~~1 (5%)~~ 2 (12%)	~~1 (5%)~~ 2 (12%)	~~1 (5%)~~ 2 (12%)	~~1 (5%)~~ 2 (12%)
Above Normal	N/A	~~(100%)~~ (72%)	~~(88%)~~ (72%)	~~(86%)~~ (72%)	~~(101%)~~ (72%)
Below Normal	~~7~~ 6	~~7 (-3%)~~ 6 (-2%)	~~7 (-3%)~~ 6 (-2%)	~~7 (-3%)~~ 6 (-2%)	~~7 (-3%)~~ 6 (-2%)
Dry	1	1 - ~~(1%)~~ (4%)	1 ~~(1%)~~ (3%)	1 ~~(0%)~~ (3%)	1 ~~(1%)~~ (3%)
Critically Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-14~~ 11-16 . Mean Number of Hardhead Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	1	1 ~~(5%)~~ (12%)	1 ~~(5%)~~ (12%)	1 ~~(5%)~~ (12%)	1 ~~(5%)~~ (12%)
Above Normal	N/A	~~(100%)~~ (72%)	~~(88%)~~ (72%)	~~(86%)~~ (72%)	~~(101%)~~ (72%)
Below Normal	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Critically Dry	2	2 ~~(1%)~~ (0%)	2 ~~(1%)~~ (0%)	2 (0%)	2 ~~(1%)~~ (0%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-15~~ 11-17 . Mean Number of Central California Roach Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Above Normal	N/A	~~0~~ (0%)	~~0~~ (0%)	~~0~~ (0%)	~~0~~ (0%)
Below Normal	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Critically Dry	0	0 ~~(-5%)~~ (-12%)	0 ~~(-5%)~~ (-10%)	0 ~~(-5%)~~ (-10%)	0 ~~(-6%)~~ (-12%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-16~~ 11-18 . Mean Number of Sacramento Splittail Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~650,024~~ 760,088	~~854,297 (31%)~~ 897,948 (18%)	~~853,414 (31%)~~ 897,982 (18%)	~~853,804 (31%)~~ 897,562 (18%)	~~853,759 (31%)~~ 897,559 (18%)
Above Normal	N/A	~~(38%)~~ (45%)	~~(38%)~~ (45%)	~~(38%)~~ (45%)	~~(38%)~~ (45%)
Below Normal	~~6,440~~ 6,681	~~6,486 (1%)~~ 6,677 (0%)	~~6,451~~ 6,677 (0%)	~~6,453~~ 6,676 (0%)	~~6,485 (1%)~~ 6,677 (0%)
Dry	~~568~~ 586	~~594 (5%)~~ 562 (-4%)	~~592 (4%)~~ 563 (-4%)	~~592 (4%)~~ 563 (-4%)	~~593 (5%)~~ 563 (-4%)
Critically Dry	~~245~~ 233	~~239 (-2%)~~ 231 (-1%)	~~238 (-3%)~~ 229 (-2%)	~~238 (-3%)~~ 230 (-1%)	~~238 (-3%)~~ 231 (-1%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-17~~ 11-19 . Mean Number of Starry Flounder Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~68~~ 72	~~73 (8%)~~ 76 (5%)	~~73 (7%)~~ 76 (4%)	~~73 (8%)~~ 76 (5%)	~~73 (7%)~~ 76 (4%)
Above Normal	N/A	(8%)	(8%)	(8%)	(8%)
Below Normal	~~134~~ 143	~~155~~ 166 (16%)	~~155 (15%)~~ 166 (16%)	~~155 (15%)~~ 166 (16%)	~~155~~ 166 (16%)
Dry	~~17~~ 16	~~19 (15%)~~ 17 (7%)	~~19 (15%)~~ 17 (7%)	~~19 (15%)~~ 17 (7%)	~~19 (15%)~~ 17 (7%)
Critically Dry	1	1 ~~(-1%)~~ (0%)	1 (0%)	1 (0%)	1 ~~(-1%)~~ (0%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-18~~ 11-20 . Mean Number of Striped Bass Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, and Alternative 2 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~334,139~~ 336,539	~~336,672 (1%)~~ 337,103 (0%)	~~335,937 (1%)~~ 336,558 (0%)	~~336,648 (1%)~~ 337,129 (0%)	~~335,972 (1%)~~ 336,602 (0%)
Above Normal	N/A	(1%)	(1%)	(1%)	(1%)
Below Normal	~~357,342~~ 355,939	~~367,797~~ 365,328 (3%)	~~366,775~~ 365,282 (3%)	~~366,863~~ 365,248 (3%)	~~367,682~~ 365,349 (3%)
Dry	~~113,048~~ 108,574	~~111,194 (-2%)~~ 105,240 (-3%)	~~110,994 (-2%)~~ 105,350 (-3%)	~~111,020 (-2%)~~ 105,651 (-3%)	~~111,337 (-2%)~~ 105,319 (-3%)
Critically Dry	~~33,928~~ 33,427	~~34,518 (2%)~~ 34,600 (4%)	~~34,421 (1%)~~ 34,489 (3%)	~~34,423 (1%)~~ 34,544 (3%)	~~34,463 (2%)~~ 34,617 (4%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-19~~ 11-21 . Mean Number of American Shad Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~342,074~~ 343,792	~~350,797 (3%)~~ 351,253 (2%)	~~350,459~~ 351,026 (2%)	~~350,803 (3%)~~ 351,177 (2%)	~~350,470~~ 351,054 (2%)
Above Normal	N/A	~~(2%)~~ (3%)	~~(2%)~~ (3%)	(3%)	~~(2%)~~ (3%)
Below Normal	~~258,010~~ 236,540	~~257,564~~ 235,363 (0%)	~~257,661 (0%)~~ 235,100 (-1%)	~~257,823 (0%)~~ 235,129 (-1%)	~~257,332~~ 235,390 (0%)
Dry	~~107,352~~ 91,475	~~105,332 (-2%)~~ 90,597 (-1%)	~~105,695 (-2%)~~ 90,715 (-1%)	~~105,776 (-1%)~~ 91,022 (0%)	~~105,561 (-2%)~~ 90,656 (-1%)
Critically Dry	~~17,821~~ 17,705	~~17,410~~ 17,334 (-2%)	~~17,279 (-3%)~~ 17,268 (-2%)	~~17,286 (-3%)~~ 17,292 (-2%)	~~17,342 (-3%)~~ 17,369 (-2%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-20~~ 11-22 . Mean Number of Threadfin Shad Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~517,704~~ 517,332	~~534,190~~ 532,615 (3%)	~~533,968~~ 532,547 (3%)	~~534,209~~ 532,587 (3%)	~~533,947~~ 532,578 (3%)
Above Normal	N/A	~~(3%)~~ (4%)	~~(3%)~~ (4%)	~~(3%)~~ (4%)	~~(3%)~~ (4%)
Below Normal	~~1,464,036~~ 1,356,633	~~1,444,340 (-1%)~~ 1,330,976 (-2%)	~~1,444,533 (-1%)~~ 1,330,394 (-2%)	~~1,444,788 (-1%)~~ 1,330,466 (-2%)	~~1,443,871 (-1%)~~ 1,331,248 (-2%)
Dry	~~960,634~~ 726,453	~~970,990 (1%)~~ 743,103 (2%)	~~982,256~~ 742,570 (2%)	~~981,386 (2%)~~ 752,094 (4%)	~~978,142~~ 742,528 (2%)
Critically Dry	~~159,786~~ 163,867	~~159,176 (0%)~~ 162,475 (-1%)	~~158,774 (-1%)~~ 163,193 (0%)	~~158,789 (-1%)~~ 163,632 (0%)	~~158,829~~ 162,305 (-1%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-21~~ 11-23 . Mean Number of Largemouth Bass Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method
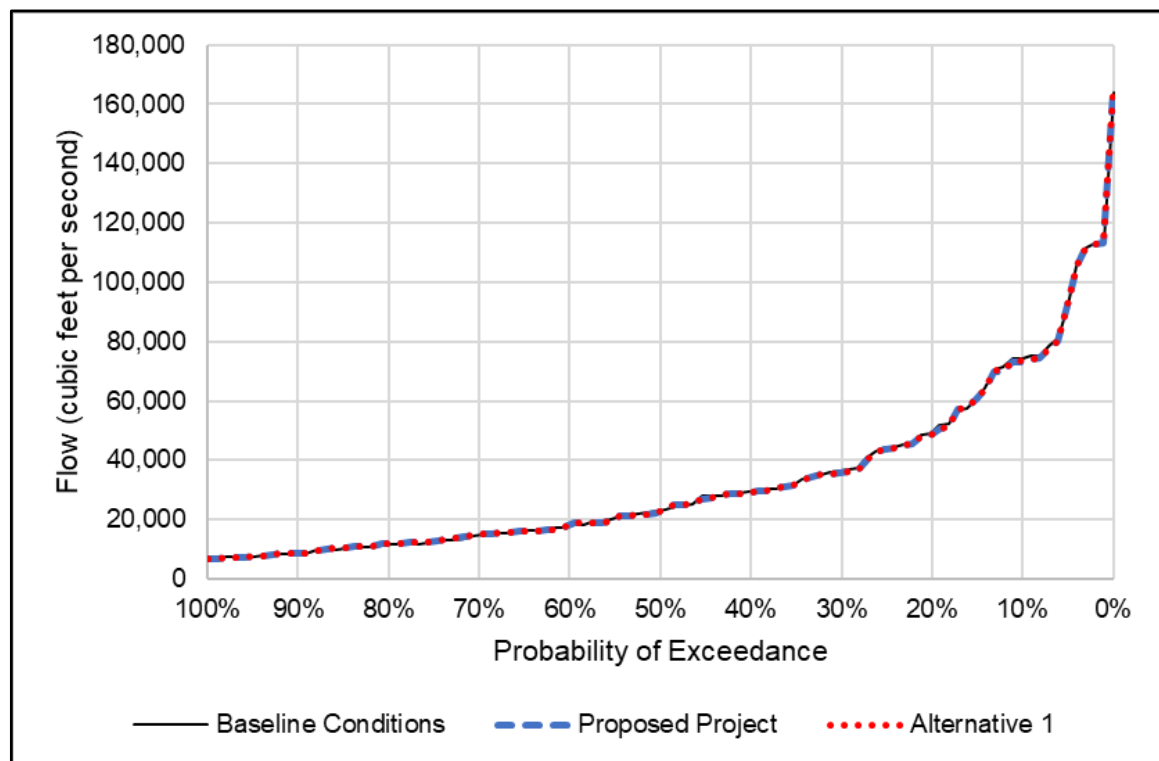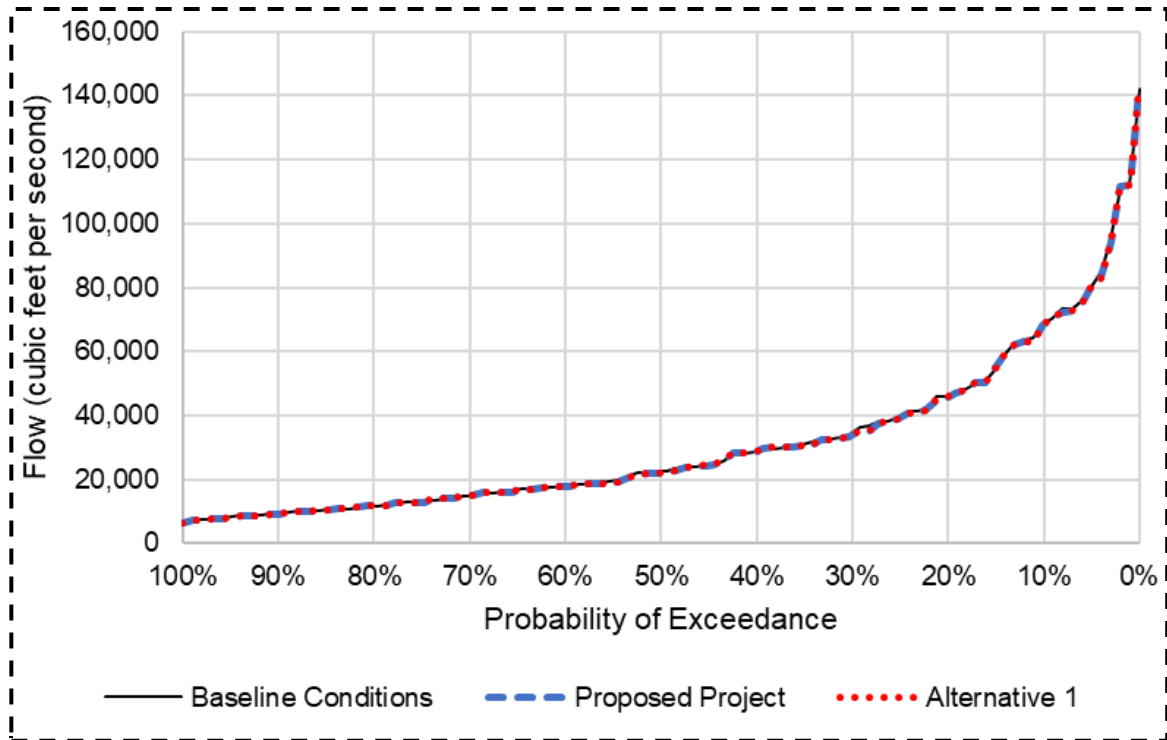
Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~21,379~~ 21,680	~~21,409 (0%)~~ 21,336 (-2%)	~~21,397 (0%)~~ 21,335 (-2%)	~~21,409 (0%)~~ 21,336 (-2%)	~~21,397 (0%)~~ 21,336 (-2%)
Above Normal	N/A	(0%)	(0%)	(0%)	(0%)
Below Normal	~~16,846~~ 16,958	~~19,794 (17%)~~ 20,157 (19%)	~~19,773 (17%)~~ 20,162 (19%)	~~19,776 (17%)~~ 20,161 (19%)	~~19,792 (17%)~~ 20,160 (19%)
Dry	~~14,163~~ 12,615	~~14,408 (2%)~~ 12,734 (1%)	~~14,448 (2%)~~ 12,737 (1%)	~~14,439~~ 12,818 (2%)	~~14,464 (2%)~~ 12,733 (1%)
Critically Dry	~~12,230~~ 11,664	~~11,548 (-6%)~~ 11,392 (-2%)	~~11,536 (-6%)~~ 11,408 (-2%)	~~11,535 (-6%)~~ 11,738 (1%)	~~11,541 (-6%)~~ 11,396 (-2%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-22~~ 11-24 . Mean Number of Smallmouth Bass Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	7	7 ~~(0%)~~ (-1%)	7 ~~(0%)~~ (-1%)	7 ~~(0%)~~ (-1%)	7 ~~(0%)~~ (-1%)
Above Normal	N/A	(-6%)	~~(-7%)~~ (-6%)	~~(-7%)~~ (-6%)	~~(-7%)~~ (-6%)
Below Normal	8	~~8 (-3%)~~ 7 (-6%)	~~8 (-3%)~~ 7 (-6%)	~~8 (-3%)~~ 7 (-6%)	~~8 (-3%)~~ 7 (-6%)
Dry	8	8 ~~(1%)~~ (4%)	8 ~~(1%)~~ (3%)	8 ~~(0%)~~ (3%)	8 ~~(1%)~~ (3%)
Critically Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

Table ~~11-23~~ 11-25 . Mean Number of Spotted Bass Salvaged (Fish Per Year) at the State Water Project South Delta Export Facility for Baseline Conditions, Proposed Project, Alternative 1, Alternative 2, and Alternative 3 Scenarios Grouped by Water Year Type, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Based on the Salvage-Density Method

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Above Normal	N/A	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Below Normal	2	1 ~~(-20%)~~ (-22%)	1 ~~(-20%)~~ (-21%)	1 ~~(-20%)~~ (-21%)	1 ~~(-20%)~~ (-22%)
Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Critically Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)

Note: N/A indicates there were no Above Normal years in the historical record for the 2009–2022 period used to provide loss density data for the analysis; for Above Normal years, the Wet year pattern was used, with only the percentage difference shown. Absolute and percentage values are rounded; as a result, differences between absolutes and differences between percentages may not always appear consistent.

As described in Chapter 6, "Aquatic Biological Resources," several aquatic species have statistically significant relationships with Delta outflow, with varying degrees of overlap with the spring period for which outflow would differ between the Proposed Project (flexible deployment of SWP-facilitated fallowing inject, assumed to occur evenly during March through May) and Alternative 1 (May deployment of SWP-facilitated fallowing inject). However, because the several-month averaging periods typically include the full spring period, there would not be differences in mean outflow in most cases and so the effects of Alternative 1 would be similar to those of the Proposed Project. Examples include March through May (relevant for Delta Smelt and Longfin Smelt zooplankton prey; Table ~~11-24~~ 11-26 , Figure 11-19), March through June (relevant for Starry Flounder; Table ~~11-25~~ 11-27 and Figure 11-20), and February through June (relevant for American Shad; Table ~~11-26~~ 11-28 and Figure 11-21). An exception is Striped Bass, for which the outflow period is April through June, with the result being that, relative to Baseline Conditions, April through June outflow under Alternative 1 would be marginally higher than the Proposed Project (Table ~~11-27~~ 11-29 and Figure 11-22). However, the differences are small and as shown in Chapter 6, there would be little difference expected between scenarios given the broadness of the prediction intervals for the statistically significant regression between Delta outflow and the fall midwater trawl abundance index (Figure 6-120).

Table ~~11-24~~ 11-26 . Mean Modeled March–May Delta Outflow under the Proposed Project, Alternative 1, Alternative 2, Alternative 3, and Baseline Conditions Modeling Scenarios, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Grouped by Water Year Type

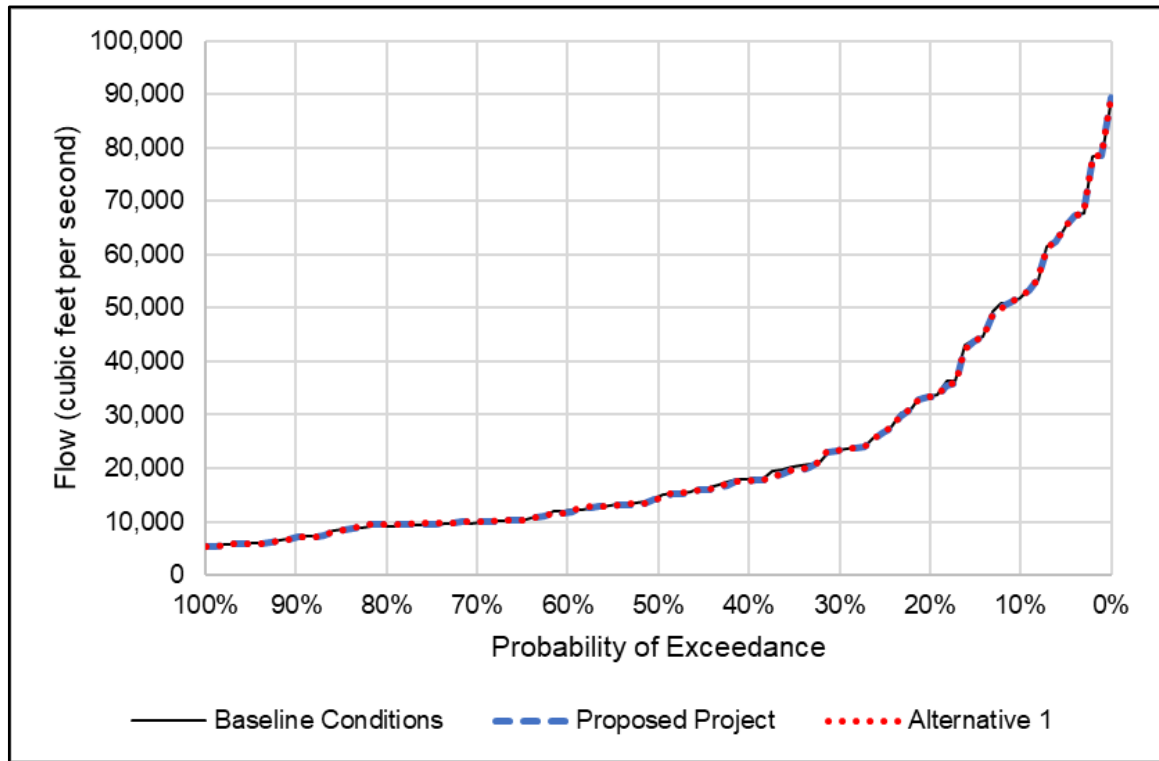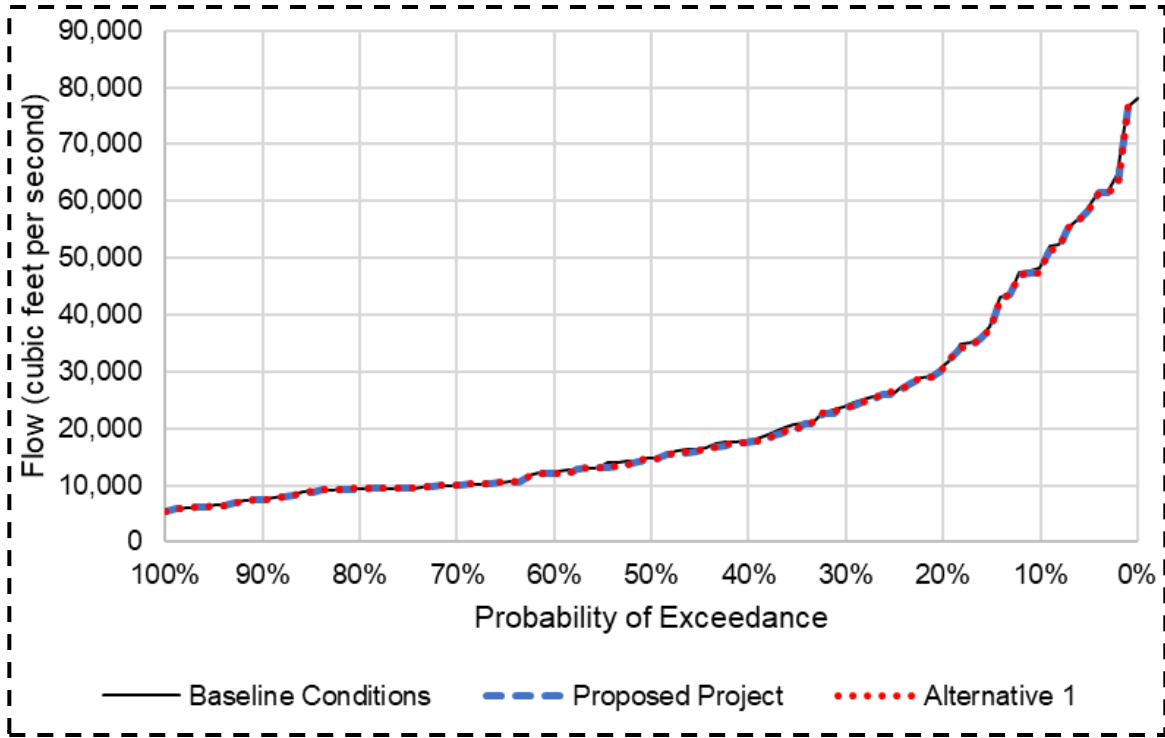| Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~59,121~~ 64,637	~~58,526~~ 64,082 (-1%)	~~58,559~~ 64,129 (-1%)	~~58,513~~ 49,353 (-1%)	~~58,564~~ 64,125 (-1%)
Above Normal	~~36,887~~ 35,887	~~36,600~~ 35,679 (-1%)	~~36,644~~ 35,671 (-1%)	~~36,639 (-1%)~~ 26,265 (-2%)	~~36,613~~ 35,676 (-1%)
Below Normal	~~23,120~~ 24,099	~~22,980 (-1%)~~ 24,038 (0%)	~~23,007~~ 24,040 (0%)	~~22,995 (-1%)~~ 19,970 (-2%)	~~22,980 (-1%)~~ 24,039 (0%)
Dry	~~14,912~~ 14,757	~~15,144 (2%)~~ 15,130 (3%)	~~15,187 (2%)~~ 15,133 (3%)	~~15,191 (2%)~~ 12,781 (3%)	~~15,142 (2%)~~ 15,130 (3%)
Critically Dry	~~9,573~~ 9,295	~~9,449~~ 9,218 (-1%)	~~9,436~~ 9,219 (-1%)	~~9,436 (-1%)~~ 7,997 (-2%)	~~9,435~~ 9,221 (-1%)

Source: ~~DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm~~
 DRAFT_TrendReport_MultiCalSim_rev12_DEIR_FEIR_7_7v2_9b_comp_7.23.xlsx .

Figure 11-19. Mean Modeled March–May Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 1

Table ~~11-25~~ 11-27 . Mean Modeled March–June Delta Outflow under the Proposed Project, Alternative 1, Alternative 2, Alternative 3, and Baseline Conditions Modeling Scenarios, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Grouped by Water Year Type

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~50,807~~ 55,391	~~50,433 (-1%)~~ 55,120 (0%)	~~50,457 (-1%)~~ 55,156 (0%)	~~50,423 (-1%)~~ 55,120 (0%)	~~50,461 (-1%)~~ 55,153 (0%)
Above Normal	~~31,287~~ 30,664	~~31,184~~ 30,693 (0%)	~~31,192~~ 30,687 (0%)	~~31,189~~ 30,690 (0%)	~~31,179~~ 30,691 (0%)
Below Normal	~~19,561~~ 20,223	~~19,550~~ 20,294 (0%)	~~19,536~~ 20,296 (0%)	~~19,527~~ 20,295 (0%)	~~19,550~~ 20,295 (0%)
Dry	~~12,901~~ 12,826	~~13,085 (1%)~~ 13,140 (2%)	~~13,088 (1%)~~ 13,142 (2%)	~~13,091 (1%)~~ 13,130 (2%)	~~13,085 (1%)~~ 13,140 (2%)
Critically Dry	~~8,486~~ 8,239	~~8,393~~ 8,181 (-1%)	~~8,383~~ 8,182 (-1%)	~~8,383~~ 8,182 (-1%)	~~8,382~~ 8,183 (-1%)
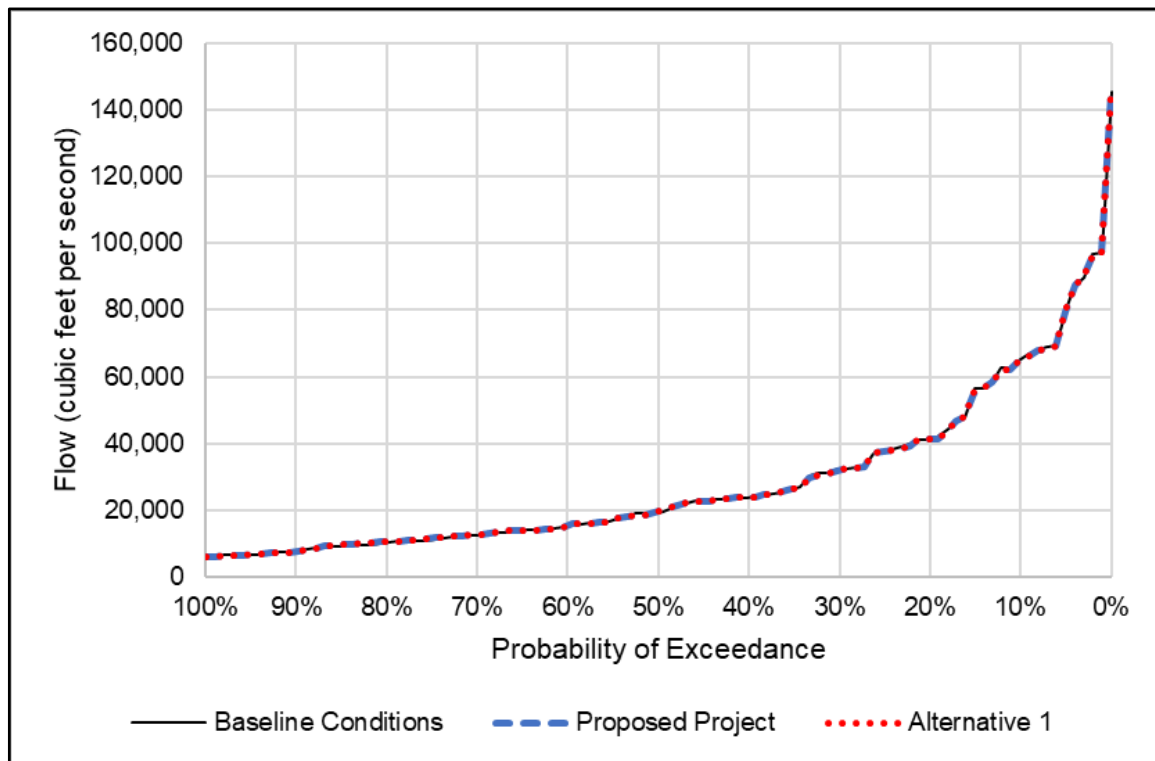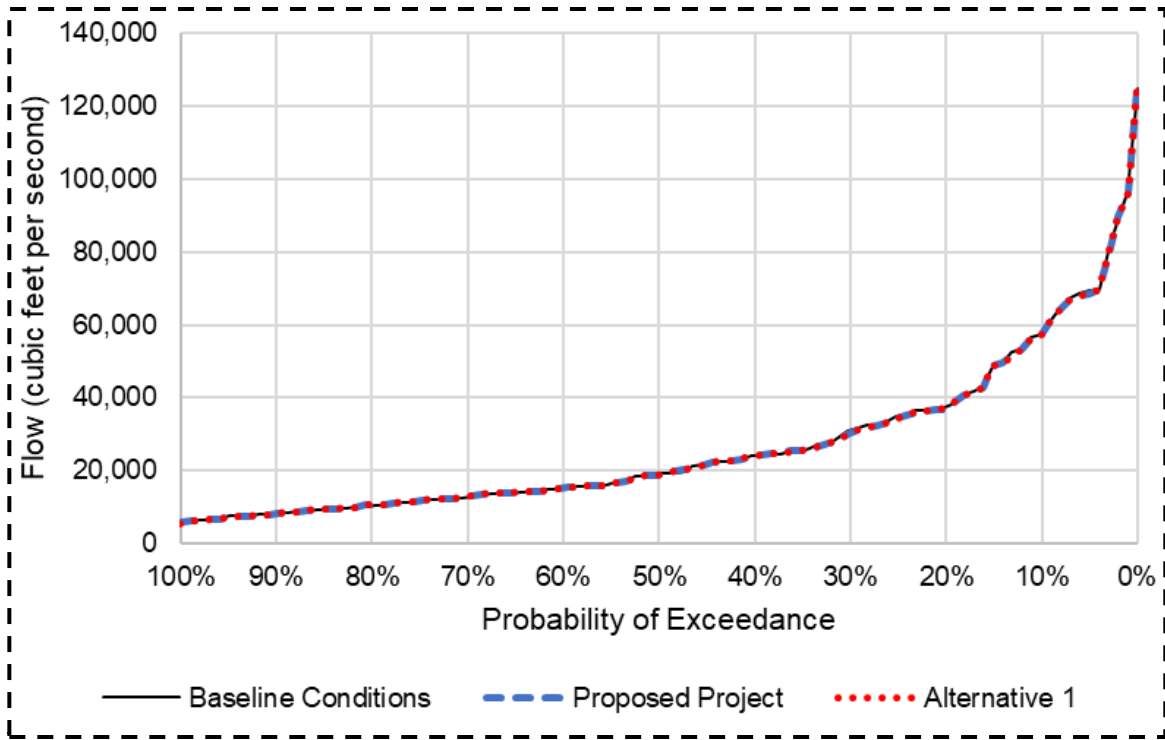
Source: ~~DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm~~
DRAFT_TrendReport_MultiCalSim_rev12_DEIR_FEIR_7_7v2_9b_comp_7.23.xlsx .

Figure 11-20. Mean Modeled March–June Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 1

Table ~~11-26~~ 11-28 . Mean Modeled February–June Delta Outflow under the Proposed Project, Alternative 1, Alternative 2, Alternative 3, and Baseline Conditions Modeling Scenarios, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Grouped by Water Year Type

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~60,374~~ 64,808	~~60,055 (-1%)~~ 64,618 (0%)	~~60,080~~ 64,654 (0%)	~~60,048 (-1%)~~ 64,623 (0%)	~~60,081~~ 64,646 (0%)
Above Normal	~~36,558~~ 35,073	~~36,531~~ 35,159 (0%)	~~36,526~~ 35,163 (0%)	~~36,540~~ 35,158 (0%)	~~36,533~~ 35,166 (0%)
Below Normal	~~22,102~~ 23,038	~~22,097 (0%)~~ 23,160 (1%)	~~22,090 (0%)~~ 23,165 (1%)	~~22,082 (0%)~~ 23,160 (1%)	~~22,098 (0%)~~ 23,164 (1%)
Dry	~~14,516~~ 14,609	~~14,763~~ 14,947 (2%)	~~14,786~~ 14,948 (2%)	~~14,785~~ 14,937 (2%)	~~14,784~~ 14,947 (2%)
Critically Dry	~~9,507~~ 9,254	~~9,511~~ 9,285 (0%)	~~9,526~~ 9,285 (0%)	~~9,523~~ 9,285 (0%)	~~9,527~~ 9,286 (0%)
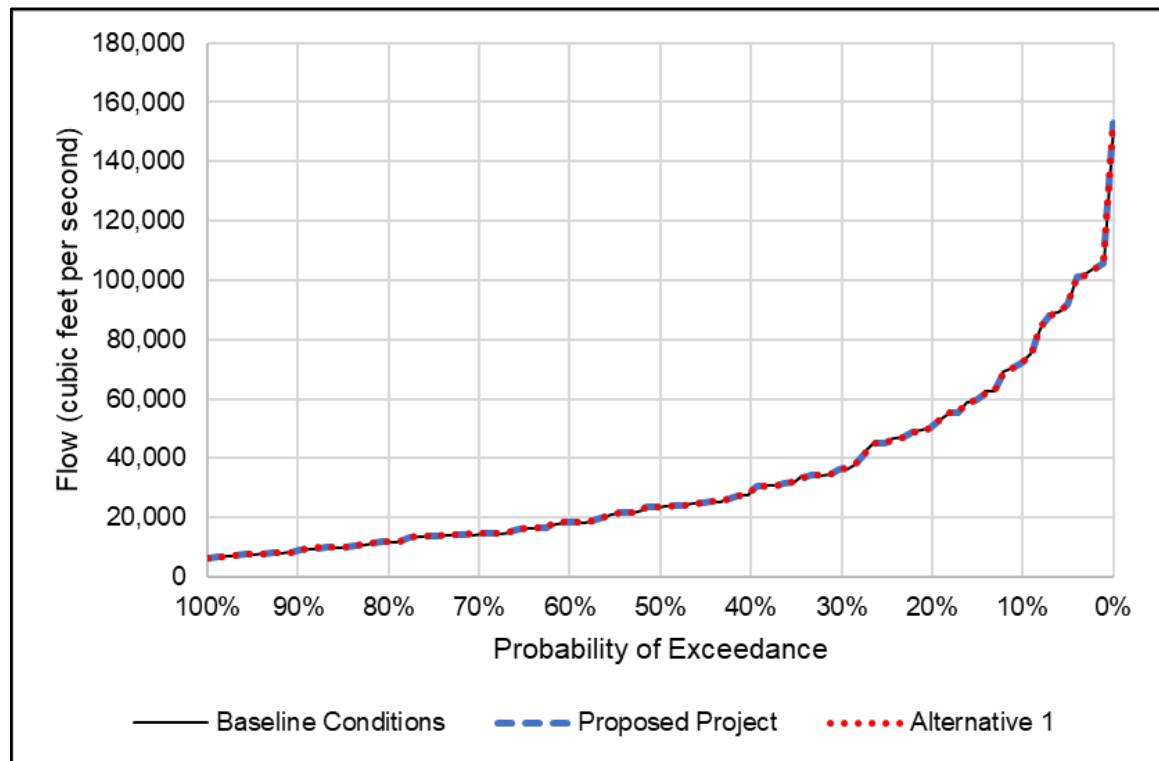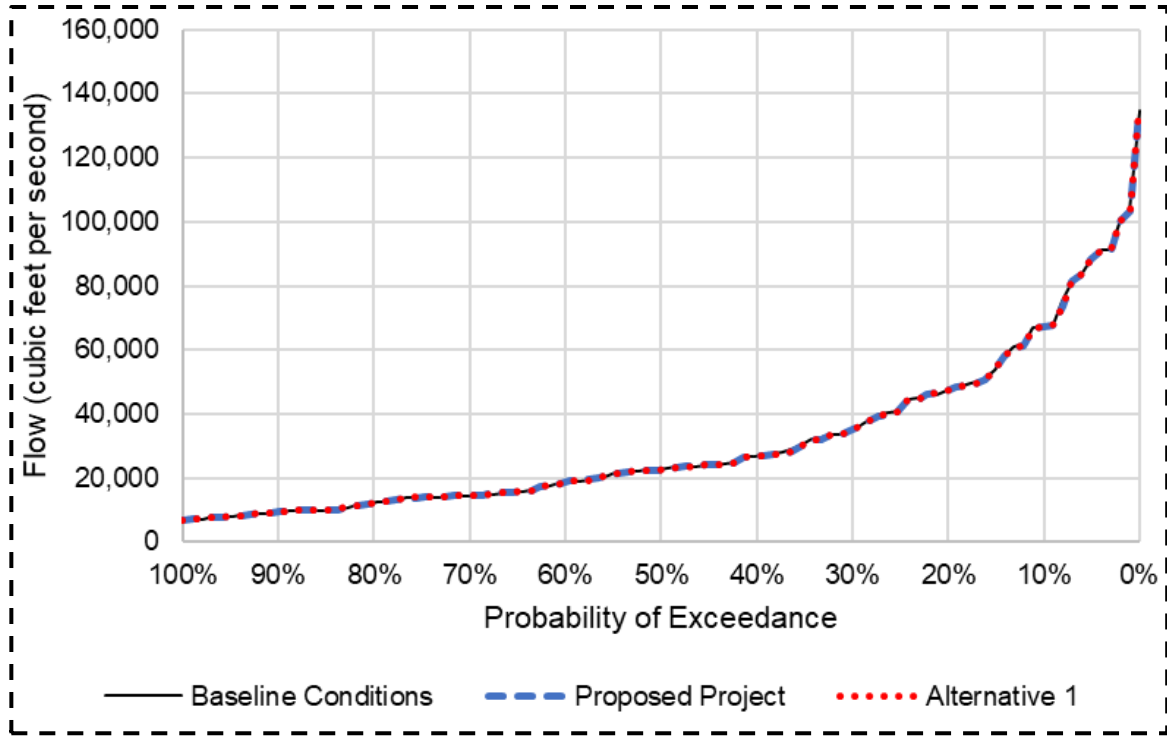
Source: ~~DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm~~
DRAFT_TrendReport_MultiCalSim_rev12_DEIR_FEIR_7_7v2_9b_comp_7.23.xlsx .

Figure 11-21. Mean Modeled February–June Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 1

Table 11-27 11-29 . Mean Modeled April–June Delta Outflow under the Proposed Project, Alternative 1, Alternative 2, Alternative 3, and Baseline Conditions Modeling Scenarios, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Grouped by Water Year Type

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	40,194 42,457	39,737 42,194 (-1%)	39,723 42,192 (-1%)	39,728 42,194 (-1%)	39,724 42,192 (-1%)
Above Normal	22,832 22,730	22,538 22,548 (-1%)	22,633 (1%) 22,681 (0%)	22,640 (1%) 22,684 (0%)	22,519 22,546 (-1%)
Below Normal	16,587 16,447	16,309 (2%) 16,220 (-1%)	16,358 16,292 (-1%)	16,346 16,292 (-1%)	16,309 (2%) 16,221 (-1%)
Dry	10,801 10,608	10,839 (0%) 10,787 (2%)	10,933 (1%) 10,883 (3%)	10,933 (1%) 10,888 (3%)	10,839 (0%) 10,787 (2%)
Critically Dry	7,338 7,106	7,222 (2%) 7,007 (-1%)	7,223 (2%) 7,008 (-1%)	7,223 (2%) 7,009 (-1%)	7,222 (2%) 7,007 (-1%)

Source: ~~DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm~~
DRAFT_TrendReport_MultiCalSim_rev12_DEIR_FEIR_7_7v2_9b_comp_7.23.xlsx .

Figure 11-22. Mean Modeled April–June Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 1

For listed species, the effects of Alternative 1 generally would be similar to those for the Proposed Project. As noted above, the switch in SWP-facilitated fallowing inject from evenly distributed during March through May (Proposed Project) to a May-only inject (Alternative 1) would not result in differences in results for analyses with longer Delta outflow periods that encompass both March and May. Thus, the Longfin Smelt Delta outflow-abundance analyses including December through May and March through May Delta outflow periods give results for Alternative 1 (Figures 11-23, 11-24, and 11-25; Tables ~~11-28, 11-29, and 11-30~~ 11-30, 11-31, and 11-32) that are very similar to those previously described for the Proposed Project in Chapter 6 (~~Figures 6-50, 6-50a, and 6-50b~~ Figures 6-53, 6-54, and 6-55; Tables 6-26, 6-27, and 6-28).
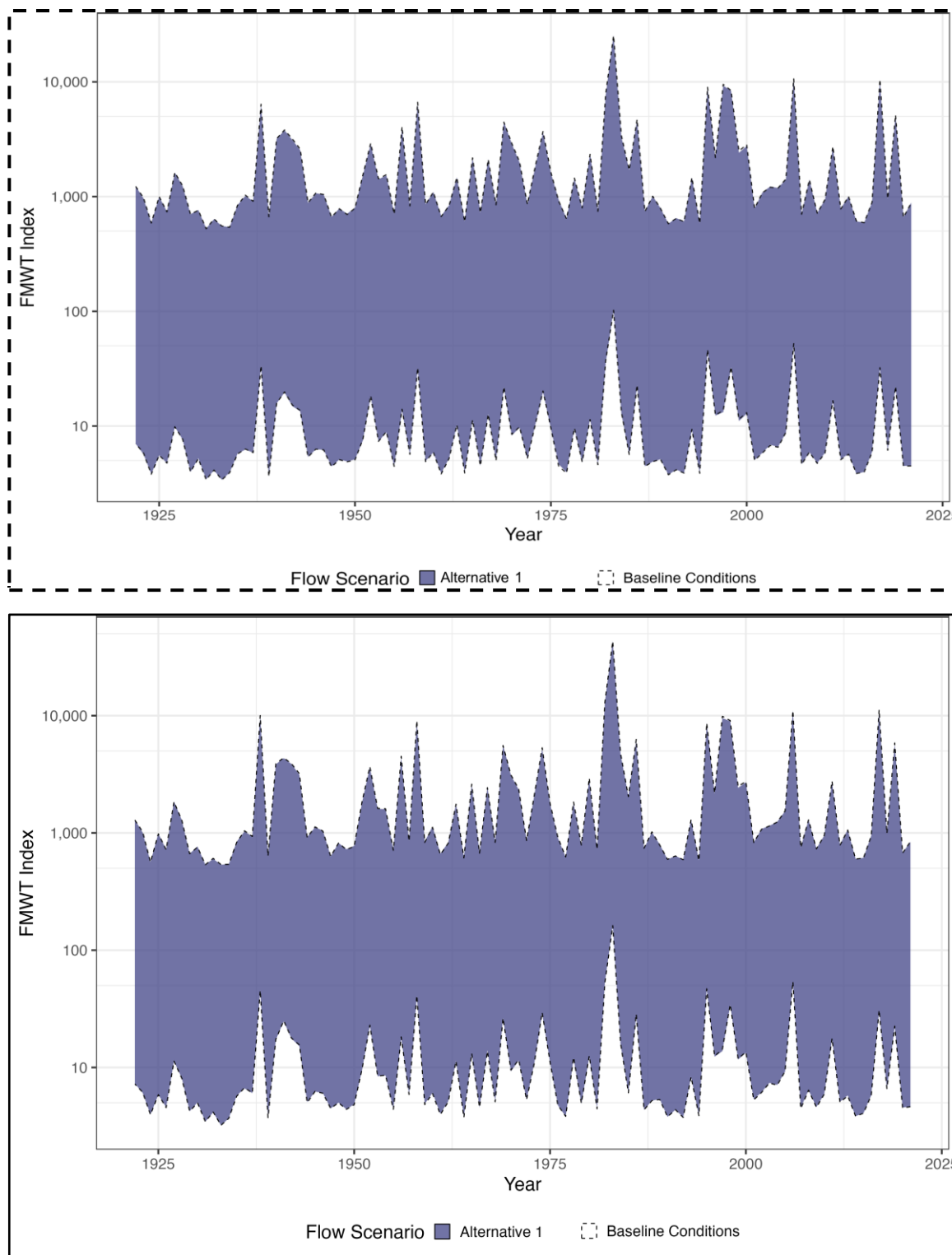
Figure 11-23. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Fall Midwater Trawl Index from Application of the Delta Outflow-Abundance Index Method for Alternative 1 and Baseline Conditions Scenarios
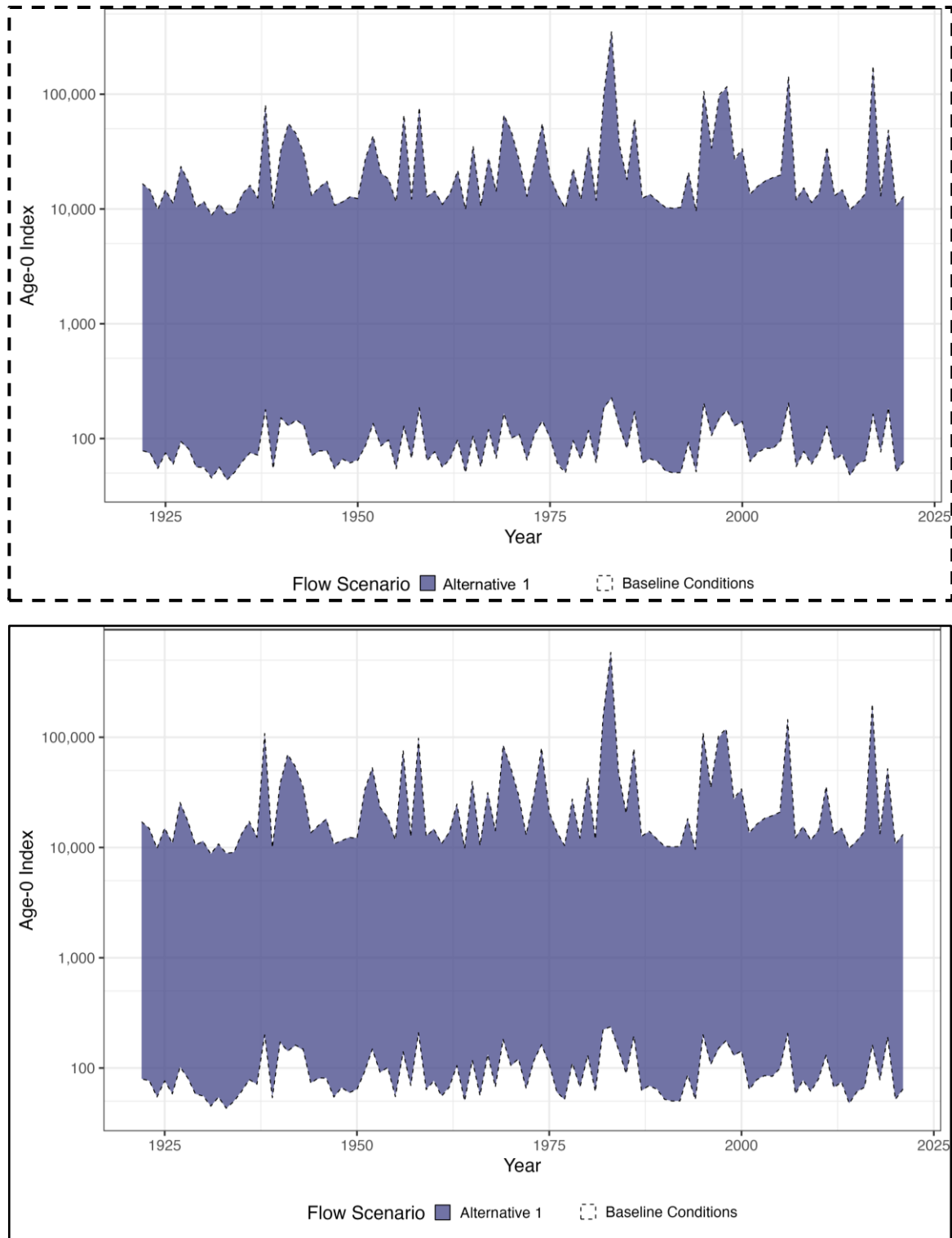
Figure 11-24. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Midwater Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 1 and Baseline Conditions Scenarios
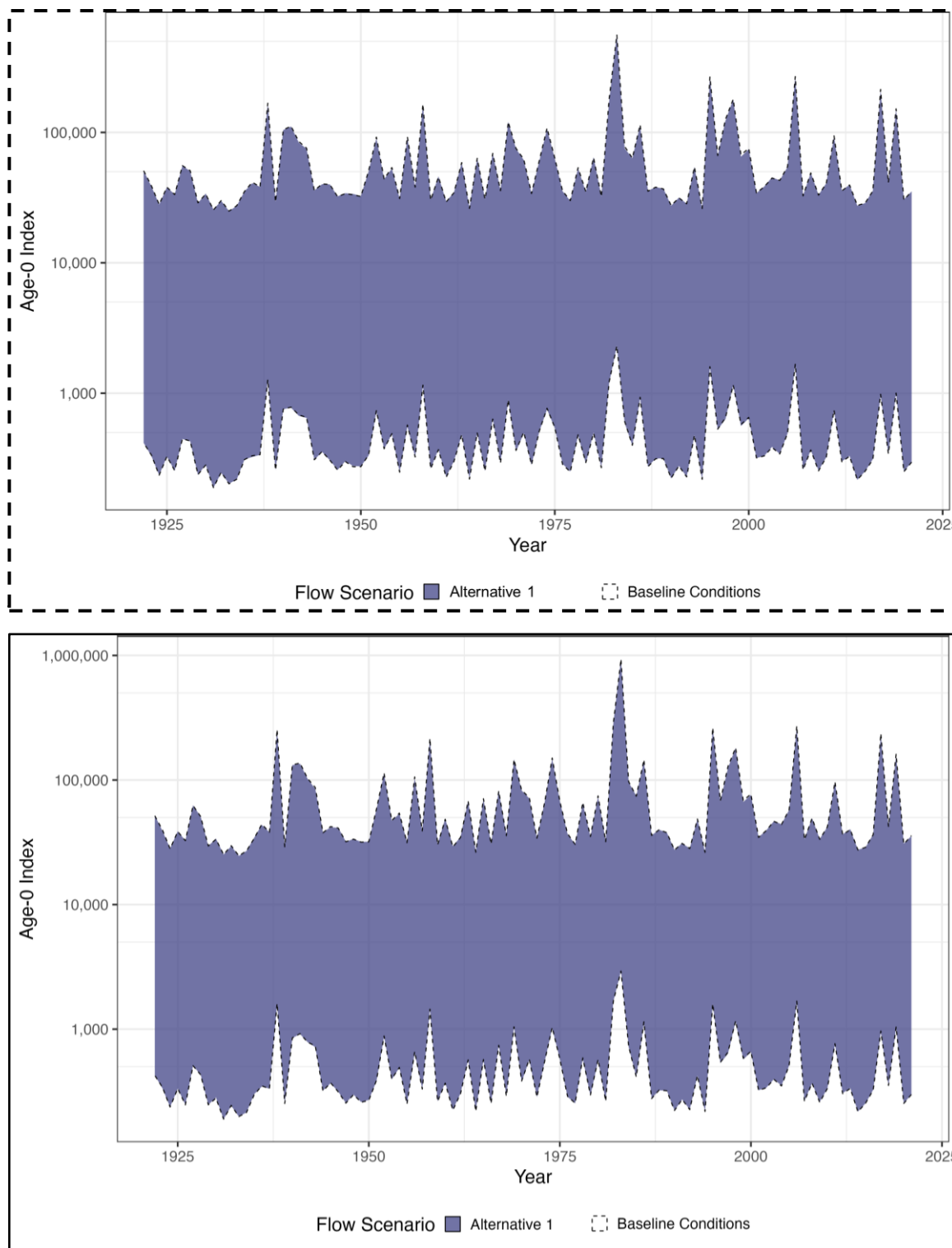
Figure 11-25. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Otter Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 1 and Baseline Conditions Scenarios

Table 11-28 11-30 . Mean Predicted Longfin Smelt Fall Midwater Trawl Index under the Proposed Project/Alternative 1/Alternative 2/Alternative 3 and Baseline Conditions Modeling Scenarios, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Grouped by Water Year Type

| Water Year Type | Baseline Conditions | Proposed Project | Alternative 1 | Alternative 2 | Alternative 3 | Proposion of Posterior Distribution Less Under | | | |
						Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	330.6 393.0	327.5(-0.9%) 387.4 (-1.4%)	330.4 (-0.1%) 387.8 (-1.3%)	327.6 (-0.9%) 386.3 (-1.7%)	326.1(-1.4%) 388.5 (-1.1%)	0.506 0.512	0.502 0.508	0.515 0.512	0.509 0.506
Above Normal	120.5 116.8	119.7 116.0 (-0.7%)	120.7 (0.2%) 115.9 (-0.8%)	115.7 (-0.9%) 119.6 (-0.7%)	119.5(-0.8%) 116.4 (-0.3%)	0.504 0.506	0.497 0.502	0.510 0.504	0.501 0.500
Below Normal	72.6 74.1	72.4(-0.3%) 73.9 (-0.2%)	72.6 (0.0%) 73.8 (-0.4%)	72.0 (-0.8%) 73.8 (-0.4%)	72.3(-0.4%) 74.3 (0.3%)	0.502 0.500	0.497	0.505 0.498	0.498 0.496
Dry	59.8 61.2	60.0(0.3%) 61.5 (0.4%)	60.2 (0.5%) 61.4 (0.3%)	59.7 (0.2%) 61.4 (0.3%)	59.9(0.2%) 61.8 (1.0%)	0.497 0.494	0.492 0.493	0.495 0.493	0.492 0.493
Critically Dry	52.6	52.6 (0.0%) (-0.1%)	52.8 (0.3%) 52.5 (-0.2%)	52.3 (-0.6%) 52.5 (-0.2%)	52.6(0.0%) 52.9 (0.6%)	0.500	0.495 0.499	0.498 0.499	0.494 0.499

Table 11-29 11-31 . Mean Predicted Longfin Smelt Bay Midwater Trawl Age-0 Index under the Proposed Project/Alternative 1/Alternative 2/Alternative 3 and Baseline Conditions Modeling Scenarios, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Grouped by Water Year Type
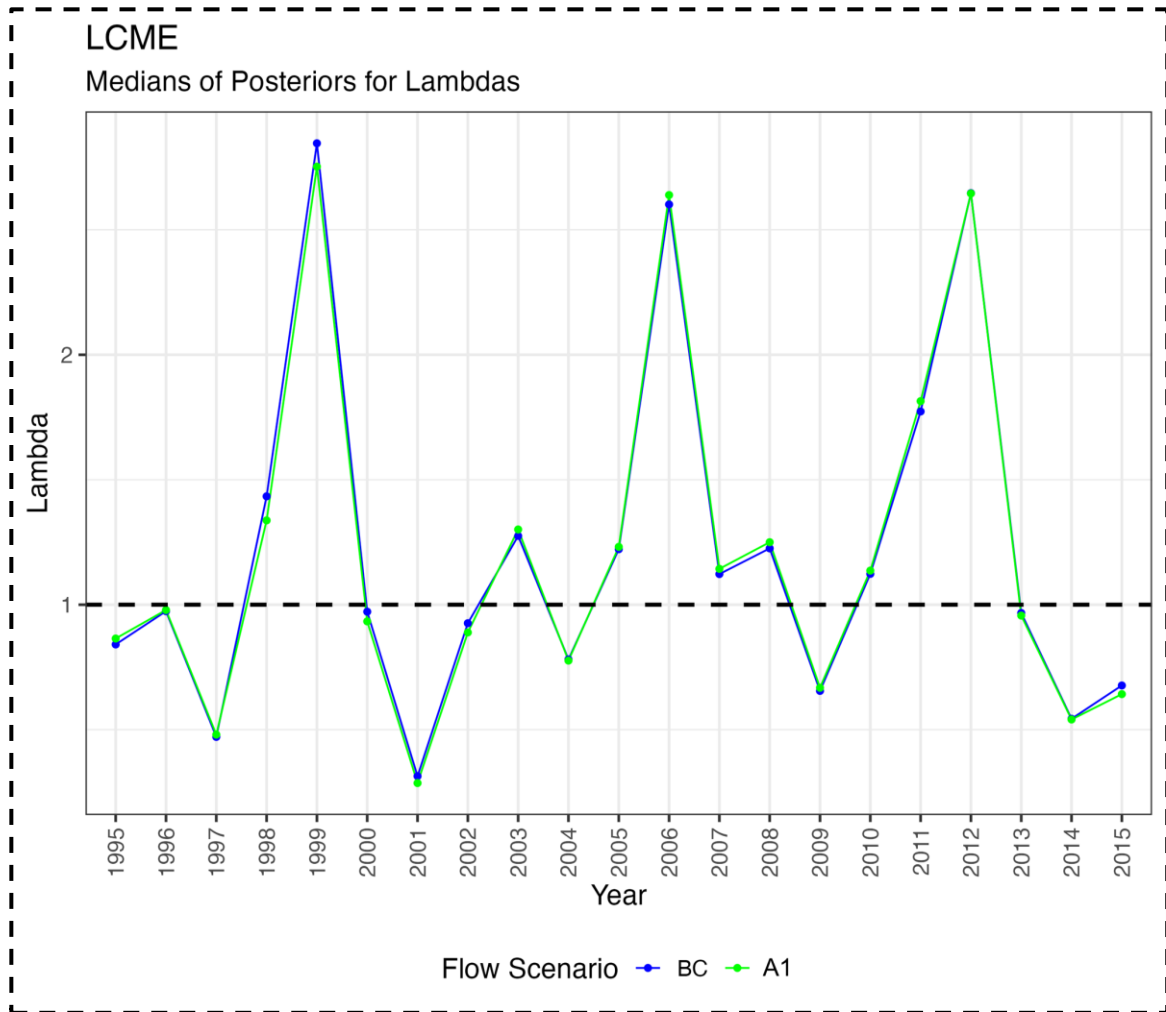
| Water Year Type | Baseline Conditions | Proposed Project | Alternative 1 | Alternative 2 | Alternative 3 | Proportion of Posterior Distribution Less Under | | | |
						Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	12,386.7 14,236.1	14,262.9 (0.2%) 12,332.2(-0.4%)	12,410.8 (0.2%) 14,273.8 (0.3%)	12,332.9 (-0.4%) 14,233.2 (0.0%)	12,468.7(0.7%) 14,261.0 (0.2%)	0.509 0.501	0.502 0.506	0.507 0.508	0.501 0.502
Above Normal	5,149.9 5,010.8	5,144.5(-0.1%) 5,031.5 (0.4%)	5,181.7 (0.6%) 5,036.0 (0.5%)	5,164.3 (0.3%) 5,021.5 (0.2%)	5,196.6(0.9%) 5,038.0 (0.5%)	0.504 0.499	0.498 0.499	0.503 0.506	0.496 0.494
Below Normal	3,271 3,329.7	3,275.7(0.1%) 3,353.6 (0.7%)	3,289.5 (0.6%) 3,360.2 (0.9%)	3,283.5 (0.4%) 3,350.5 (0.6%)	3,302.5 3,362.1 (1.0%)	0.501 0.496	0.497 0.494	0.503 0.501	0.494
Dry	2,713.2 2,774.7	2,731.3(0.7%) 2,805.9 (1.1%)	2,741.1 (1.0%) 2,812.4 (1.4%)	2,738.3 (0.9%) 2,804.7 (1.1%)	2,751.0(1.4%) 2,815.1 (1.5%)	0.495 0.492	0.493 0.491	0.496	0.489 0.491
Critically Dry	2,417.4 2,419.6	2,427.1(0.4%) 2,433.3 (0.6%)	2,436.8 (0.8%) 2,441.0 (0.9%)	2,435.6 (0.8%) 2,432.6 (0.5%)	2,447.4(1.2%) 2,442.0 (0.9%)	0.499 0.495	0.493 0.496	0.498 0.499	0.492 0.496

Table ~~11-30~~ 11-32 . Mean Predicted Longfin Smelt Bay Otter Trawl Age-0 Index under the Proposed Project/Alternative 1/Alternative 2/Alternative 3 and Baseline Conditions Modeling Scenarios, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Grouped by Water Year Type

Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3	Proportion of Posterior Distribution Less Under			
						Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	~~13,216.6~~ 15,093.7	~~13,174.3~~ 15,054.9 (-0.3%)	~~13,191.1 (-0.2%)~~ 15,013.6 (-0.5%)	~~13,213.4 (0.0%)~~ 15,194.5 (0.7%)	~~13,125.6(-0.7%)~~ 15,046.5 (-0.3%)	~~0.501~~ 0.497	~~0.497~~ 0.501	0.501	~~0.506~~ 0.501
Above Normal	~~5,726.2~~ 5,590.4	~~5,740.9~~ 5,608.4 (0.3%)	~~5,755.4 (0.5%)~~ 5,592.7 (0.0%)	~~5,775.4~~ 5,639.5 (0.9%)	~~5,735.8(0.2%)~~ 5,617.9 (0.5%)	~~0.502~~ 0.493	~~0.492~~ 0.502	~~0.494~~ 0.497	~~0.501~~ 0.498
Below Normal	~~3,799.1~~ 3,872.1	~~3,815.5(0.4%)~~ 3,897.3 (0.7%)	~~3,819.4~~ 3,893.0 (0.5%)	~~3,838.4 (1.0%)~~ 3,919.0 (1.2%)	~~3,818.3(0.5%)~~ 3,907.3 (0.9%)	~~0.500~~ 0.490	~~0.491~~ 0.499	~~0.491~~ 0.492	~~0.497~~ 0.499
Dry	~~3,234.6~~ 3,290.1	~~3,264.3(0.9%)~~ 3,326.6 (1.1%)	~~3,267.1~~ 3,322.5 (1.0%)	~~3,286.0 (1.6%)~~ 3,345.4 (1.7%)	~~3,268.3(1.0%)~~ 3,334.5 (1.3%)	~~0.492~~ 0.486	~~0.487~~ 0.492	~~0.484~~ 0.486	~~0.492~~ 0.495
Critically Dry	~~2,912.1~~ 2,913.1	~~2,933.4(0.7%)~~ 2,929.9 (0.6%)	~~2,934.6 (0.8%)~~ 2,929.1 (0.5%)	~~2,953.7 (1.4%)~~ 2,946.1 (1.1%)	~~2,940.1(1.0%)~~ 2,938.4 (0.9%)	~~0.494~~ 0.492	~~0.489~~ 0.496	~~0.485~~ 0.492	~~0.495~~ 0.500

Delta Smelt Life Cycle Model with Entrainment (LCME) modeling results also suggest that Alternative 1 would result in similar differences from Baseline Conditions as the Proposed Project (Table ~~11-31~~ 11-33 ; Figures 11-26 and 6-43). This reflects the similarity in inputs to the LCME model (i.e., OMR flows and June through August Delta outflow) under the Proposed Project and Alternative 1.

Table 11-31 11-33 . Delta Smelt LCME Modeling Results for Proposed Project/Alternative 1/Alternative 2/Alternative 3 compared to Baseline Conditions

Cohort Year	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3	Proportion of Posterior Distribution Less Under			
						Proposed Project	Alternative 1	Alternative 2	Alternative 3
1995	0.841	0.865 (3%)	0.865 (3%)	0.865 (3%)	0.865 (3%)	0.494	0.494	0.494	0.494
	0.818	0.872 (7%)	0.871 (6%)	0.872 (7%)	0.872 (7%)	0.488	0.488	0.489	0.488
1996	0.974	0.979 (0%)	0.979 (0%)	0.978 (0%)	0.977 (0%)	0.499	0.499	0.500	0.500
	0.979	1.004 (3%)	1.004 (3%)	1.004 (3%)	1.004 (3%)	0.494	0.494	0.496	0.495
1997	0.471	0.476 (1%)	0.480 (2%)	0.476 (1%)	0.480 (2%)	0.500	0.498	0.497	0.495
	0.460	0.473 (3%)	0.476 (3%)	0.473 (3%)	0.476 (4%)	0.497	0.496	0.493	0.491
1998	1.434	1.335 (-7%)	1.337 (-7%)	1.335 (-7%)	1.337 (-7%)	0.512	0.511	0.514	0.513
	1.520	1.401 (-8%)	1.405 (-8%)	1.401 (-8%)	1.405 (-8%)	0.513	0.513	0.515	0.511
1999	2.846	2.747 (-4%)	2.753	2.746 (-4%)	2.753	0.506	0.505	0.505	0.505
	2.813	2.718 (-3%)	2.723 (-3%)	2.718 (-3%)	2.723 (-3%)				0.506
2000	0.972	0.942 (-3%)	0.933	0.941 (-3%)	0.933	0.510	0.511	0.510	0.512
	0.928	0.887 (-4%)	0.895 (-4%)	0.887 (-4%)	0.895 (-4%)	0.512	0.510	0.513	0.507
2001	0.314	0.288 (-8%)	0.286 (-9%)	0.286 (-9%)	0.288 (-8%)	0.515	0.515	0.515	0.515
	0.316	0.296 (-6%)	0.295 (-7%)	0.295 (-7%)	0.296 (-7%)	0.512	0.512	0.512	0.510
2002	0.926	0.902 (-3%)	0.889 (-4%)	0.889 (-4%)	0.902 (-3%)	0.503	0.506	0.507	0.504
		0.909 (-2%)	0.909 (-2%)	0.909 (-2%)	0.909 (-2%)	0.502	0.502	0.503	
2003	1.275	1.322 (4%)	1.301 (2%)	1.301 (2%)	1.322 (4%)	0.495	0.498	0.498	0.495
	1.213	1.304 (8%)	1.303 (7%)	1.303 (7%)	1.304 (8%)	0.488	0.488	0.489	0.486
2004	0.781	0.774	0.776	0.776	0.774	0.503	0.503	0.502	0.502
	0.784	0.777 (-1%)	0.775 (-1%)	0.775 (-1%)	0.777 (-1%)		0.504	0.503	0.503
2005	1.222	1.238 (1%)	1.231	1.231	1.238 (1%)	0.496	0.497	0.498	0.497
	1.218	1.240 (2%)	1.234 (1%)	1.234 (1%)	1.240 (2%)	0.495	0.496	0.496	
2006	2.602	2.638 (1%)	2.639 (1%)	2.639 (1%)	2.638 (1%)	0.495	0.495	0.496	0.496
	2.644	2.702 (2%)	2.703 (2%)	2.702 (2%)	2.702 (2%)	0.493	0.493	0.494	0.493
2007	1.123	1.143	1.143	1.143	1.143	0.497	0.496	0.495	0.495
	1.067	1.088 (2%)	1.088 (2%)	1.088 (2%)	1.088 (2%)	0.496		0.494	
2008	1.225	1.250 (2%)	1.250 (2%)	1.249 (2%)	1.253 (2%)	0.498	0.498	0.499	0.499
	1.147	1.156 (1%)	1.157 (1%)	1.156 (1%)	1.157 (1%)	0.500	0.500	0.501	0.498
2009	0.655	0.668 (2%)	0.668 (2%)	0.668 (2%)	0.668 (2%)	0.497	0.497	0.496	0.496
	0.652	0.669 (3%)	0.669 (3%)	0.669 (3%)	0.669 (3%)	0.496	0.496	0.494	0.495

Cohort Year	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3	Proportion of Posterior Distribution Less Under			
						Proposed Project	Alternative 1	Alternative 2	Alternative 3
2010	1.123 1.117	1.136 1.133 (1%)	1.136 1.133 (1%)	1.136 (1%) 1.134 (2%)	1.136 1.133 (1%)	0.496 0.495	0.496 0.495	0.496	0.496 0.494
2011	1.773 1.772	1.814 (2%) 1.833 (3%)	1.814 (2%) 1.833 (3%)	1.815 (2%) 1.833 (3%)	1.814 (2%) 1.833 (3%)	0.496 0.494	0.496 0.494	0.497 0.495	0.497 0.493
2012	2.647 2.672	2.645 (0%) 2.695 (1%)	2.645 (0%) 2.695 (1%)	2.645 (0%) 2.695 (1%)	2.645 (0%) 2.695 (1%)	0.501 0.498	0.501 0.498	0.500 0.497	0.500 0.497
2013	0.967 0.992	0.962 (0%) 0.980 (-1%)	0.957 (-1%) 0.975 (-2%)	0.957 (-1%) 0.975 (-2%)	0.962 (0%) 0.980 (-1%)	0.502 0.503	0.503 0.504	0.499 0.500	0.498 0.503
2014	0.543 0.523	0.541 (-1%) (3%)	0.541 (-1%) (3%)	0.541 (-1%) (3%)	0.541 (-1%) (3%)	0.501 0.495	0.501 0.495	0.501 0.494	0.501 0.493
2015	0.677 0.632	0.642 (-5%) 0.644 (2%)	0.642 (-5%) 0.644 (2%)	0.642 (-5%) 0.644 (2%)	0.642 (-5%) 0.644 (2%)	0.509 0.497	0.509 0.497	0.510 0.498	0.510 0.495

Note: BC = Baseline Conditions; median is 50th percentile of posterior distribution by year. Broken line indicates lambda = 1, i.e., the population replacement rate. A1 = Alternative 1.

Figure 11-26. Median Population Growth Rate (Lambda) from Delta Smelt LCME Modeling for Baseline Conditions and Alternative 1

Greater May Sacramento River inflow under Alternative 1 could create marginally more favorable hydrodynamic conditions in the lower San Joaquin River relative to the Proposed Project, which would slightly reduce the potential for negative effects such as entrainment risk for Delta Smelt and Longfin Smelt (Table 11-32 11-34). However, the differences between scenarios are small and entrainment risk would be limited under all alternatives by the same protective operational criteria such as OMR management, as described in Chapter 2, "Project Description."

Table ~~11-32~~ 11-34. Mean Modeled January–May QWEST Flow (cfs) under the Proposed Project/Alternative 1/Alternative 2/Alternative 3 and Baseline Conditions Modeling Scenarios, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Grouped by Water Year Type

Month	Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
January	Wet	~~13,437~~ 15,695	~~13,642 (2%)~~ 15,820 (1%)	~~13,611~~ 15,823 (1%)	~~13,643 (2%)~~ 15,821 (1%)	~~13,612~~ 15,821 (1%)
January	Above Normal	~~7,297~~ 6,198	~~7,448 (2%)~~ 6,379 (3%)	~~7,451 (2%)~~ 6,384 (3%)	~~7,451 (2%)~~ 6,383 (3%)	~~7,448 (2%)~~ 6,383 (3%)
January	Below Normal	~~1,694~~ 1,793	~~1,891 (12%)~~ 1,972 (10%)	~~1,883 (11%)~~ 1,974 (10%)	~~1,883 (11%)~~ 1,969 (10%)	~~1,896 (12%)~~ 1,977 (10%)
January	Dry	~~-166~~ -316	~~-10 (94%)~~ -308 (3%)	~~-13 (92%)~~ -309 (2%)	~~-15 (91%)~~ -305 (4%)	~~-11 (93%)~~ -309 (2%)
January	Critically Dry	~~-606~~ -97	~~-158 (74%)~~ -30 (69%)	~~-66 (89%)~~ -36 (63%)	~~-65 (89%)~~ -42 (57%)	~~-157 (74%)~~ -50 (49%)
February	Wet	~~17,812~~ 18,943	~~17,759~~ 19,022 (0%)	~~17,760~~ 19,026 (0%)	~~17,759~~ 19,024 (0%)	~~17,761~~ 19,023 (0%)
February	Above Normal	~~10,365~~ 8,536	~~10,749 (4%)~~ 8,946 (5%)	~~10,743 (4%)~~ 8,955 (5%)	~~10,780 (4%)~~ 8,950 (5%)	~~10,778 (4%)~~ 8,955 (5%)
February	Below Normal	~~5,156~~ 5,318	~~5,419 (5%)~~ 5,800 (9%)	~~5,422 (5%)~~ 5,801 (9%)	~~5,420 (5%)~~ 5,800 (9%)	~~5,419 (5%)~~ 5,801 (9%)
February	Dry	~~1,918~~ 1,685	~~2,518 (31%)~~ 2,274 (35%)	~~2,387 (24%)~~ 2,274 (35%)	~~2,393 (25%)~~ 2,273 (35%)	~~2,387 (24%)~~ 2,274 (35%)
February	Critically Dry	~~624~~ 396	~~874 (40%)~~ 831 (110%)	~~892 (43%)~~ 831 (110%)	~~889 (42%)~~ 831 (110%)	~~894 (43%)~~ 831 (110%)
March	Wet	~~16,867~~ 18,821	~~16,750 (-1%)~~ 18,519 (-2%)	~~16,886 (0%)~~ 18,657 (-1%)	~~16,738 (-1%)~~ 18,509 (-2%)	~~16,898 (0%)~~ 18,651 (-1%)
March	Above Normal	~~9,445~~ 8,887	~~9,844 (4%)~~ 9,316 (5%)	~~9,795~~ 9,259 (4%)	~~9,794~~ 9,259 (4%)	~~9,844 (4%)~~ 9,316 (5%)
March	Below Normal	~~4,891~~ 5,512	~~5,542~~ 6,248 (13%)	~~5,514~~ 6,219 (13%)	~~5,514~~ 6,219 (13%)	~~5,542~~ 6,248 (13%)
March	Dry	~~1,996~~ 1,801	~~2,363 (18%)~~ 2,362 (31%)	~~2,324 (16%)~~ 2,324 (29%)	~~2,325 (16%)~~ 2,316 (29%)	~~2,362 (18%)~~ 2,362 (31%)
March	Critically Dry	~~1,388~~ 1,159	~~1,429 (3%)~~ 1,273 (10%)	~~1,392 (0%)~~ 1,272 (10%)	~~1,392 (0%)~~ 1,272 (10%)	~~1,395 (1%)~~ 1,277 (10%)
April	Wet	~~15,380~~ 16,008	~~15,557 (-3%)~~ ~~15,172 (-1%)~~	~~15,168 (-1%)~~ 15,548 (-3%)	~~15,173 (-1%)~~ 15,558 (-3%)	~~15,172 (-1%)~~ 15,544 (-3%)
April	Above Normal	~~8,649~~ 8,330	~~8,057 (-7%)~~ 7,810 (-6%)	~~7,934 (-8%)~~ 7,779 (-7%)	~~7,952 (-8%)~~ 7,780 (-7%)	~~8,062 (-7%)~~ 7,810 (-6%)
April	Below Normal	~~7,897~~ 8,028	~~7,457 (-6%)~~ 7,669 (-4%)	~~7,402 (-6%)~~ 7,610 (-5%)	~~7,398 (-6%)~~ 7,609 (-5%)	~~7,457 (-6%)~~ 7,669 (-4%)
April	Dry	~~4,004~~ 3,873	~~3,978 (-1%)~~ 4,051 (5%)	~~3,948 (-1%)~~ 4,012 (4%)	~~3,949 (-1%)~~ 4,014 (4%)	~~3,981 (-1%)~~ 4,051 (5%)
April	Critically Dry	~~2,603~~ 2,667	~~2,467 (-5%)~~ 2,561 (-4%)	~~2,469 (-5%)~~ 2,561 (-4%)	~~2,469 (-5%)~~ 2,561 (-4%)	~~2,467 (-5%)~~ 2,561 (-4%)
May	Wet	~~11,221~~ 11,654	~~9,818 (-13%)~~ 10,748 (-8%)	~~9,822 (-12%)~~ 10,749 (-8%)	~~9,820 (-12%)~~ 10,751 (-8%)	~~9,820 (-12%)~~ 10,751 (-8%)
May	Above Normal	~~5,257~~ 5,510	~~4,152 (-21%)~~ 4,424 (-20%)	~~4,235 (-19%)~~ 4,511 (-18%)	~~4,235 (-19%)~~ 4,511 (-18%)	~~4,152 (-21%)~~ 4,424 (-20%)

Month	Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
May	Below Normal	5,591 5,776	4,579 (-18%) 4,669 (-19%)	4,668 (-17%) 4,756 (-18%)	4,668 (-17%) 4,756 (-18%)	4,579 (-18%) 4,669 (-19%)
May	Dry	2,980 3,084	2,711 (-9%) 2,789 (-10%)	2,798 (-6%) 2,867 (-7%)	2,797 (-6%) 2,866 (-7%)	2,711 (-9%) 2,789 (-10%)
May	Critically Dry	1,811 1,854	1,568 (-13%) 1,668 (-10%)	1,567 (-13%) 1,669 (-10%)	1,567 (-13%) 1,669 (-10%)	1,568 (-13%) 1,668 (-10%)

Marginally lower Sacramento River inflow in March through April under Alternative 1 compared to the Proposed Project (Table 11-33 11-35) would have greater temporal overlap with outmigrating juvenile winter-run Chinook Salmon and a portion of outmigrating juvenile spring-run Chinook Salmon (see Tables 6A-2, 6A-4a, 6A-4b, 6A-6, 6A-7a, and 6A-7b in Appendix 6A, "Environmental Setting Background Information"), which could slightly decrease through-Delta survival potential under Alternative 1 compared to the Proposed Project. However, the differences would be small relative to the variability in potential outcomes indicated by uncertainty in available statistical relationships between flow and survival (see discussion in Chapter 6, "Aquatic Biological Resources"). More inflow in May under Alternative 1 compared to the Proposed Project would result in a potential for greater outmigration survival of juvenile fall-run Chinook Salmon from the Sacramento River Basin in that month (see Tables 6A-10a and 6A-10b in Appendix 6A), whereas in April, through-Delta survival under Alternative 1 may be more similar to Baseline Conditions than under the Proposed Project, albeit with the same caveats regarding statistical uncertainty as mentioned above. Through-Delta survival from the San Joaquin River Basin under Alternative 1 would be similar to the Proposed Project as there would not be differences in San Joaquin River at Vernalis flow (Table 11-34 11-36).

Table 11-33 11-35. Mean Modeled September–June Sacramento River at Freeport Flow (cfs) under the Proposed Project/Alternative 1/Alternative 2/Alternative 3 and Baseline Conditions Modeling Scenarios, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Grouped by Water Year Type

Month	Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
September	Wet	19,574 19,512	20,557 (5%) 20,322 (4%)	20,555 (5%) 20,323 (4%)	20,556 (5%) 20,321 (4%)	20,555 (5%) 20,322 (4%)
September	Above Normal	18,945 17,693	20,658 (9%) 19,287 (9%)	20,728 19,258 (9%)	20,726 19,293 (9%)	20,661 19,251 (9%)
September	Below Normal	14,947 13,312	14,902 (0%) 12,753 (-4%)	14,923 (0%) 12,744 (-4%)	14,929 (0%) 12,752 (-4%)	14,886 (0%) 12,766 (-4%)
September	Dry	10,808 10,077	10,837 10,088 (0%)	10,887 (1%) 10,079 (0%)	10,884 (1%) 10,080 (0%)	10,835 10,088 (0%)
September	Critically Dry	8,516 8,013	8,522 7,991 (0%)	8,516 8,034 (0%)	8,517 8,036 (0%)	8,517 7,989 (0%)
October	Wet	14,238 13,245	14,178 (0%) 13,157 (-1%)	14,147 13,161 (-1%)	14,147 13,157 (-1%)	14,177 (0%) 13,162 (-1%)
October	Above Normal	10,754 11,006	10,839 (1%) 10,922 (-1%)	10,793 (0%) 10,922 (-1%)	10,790 (0%) 10,922 (-1%)	10,824 (1%) 10,921 (-1%)
October	Below Normal	12,008 11,460	12,046 (0%) 11,338 (-1%)	12,057 (0%) 11,346 (-1%)	12,056 (0%) 11,344 (-1%)	12,046 (0%) 11,340 (-1%)

Month	Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
October	Dry	~~11,242~~ 10,780	~~11,218 (0%)~~ 10,922 (1%)	~~11,223 (0%)~~ 10,935 (1%)	~~11,220 (0%)~~ 10,931 (1%)	~~11,220 (0%)~~ 10,935 (1%)
October	Critically Dry	~~8,193~~ 8,464	~~8,233~~ 8,499 (0%)	~~8,232 (0%)~~ 8,533 (1%)	~~8,228 (0%)~~ 8,533 (1%)	~~8,230~~ 8,497 (0%)
November	Wet	~~19,275~~ 16,201	~~19,333~~ 16,166 (0%)	~~19,329~~ 16,179 (0%)	~~19,330~~ 16,168 (0%)	~~19,333~~ 16,182 (0%)
November	Above Normal	~~12,798~~ 12,935	~~12,876 (1%)~~ 12,825 (-1%)	~~12,833 (0%)~~ 12,854 (-1%)	~~12,825 (0%)~~ 12,849 (-1%)	~~12,883 (1%)~~ 12,842 (-1%)
November	Below Normal	~~13,863~~ 12,330	~~13,704 (-1%)~~ 12,302 (0%)	~~13,672 (-1%)~~ 12,318 (0%)	~~13,675 (-1%)~~ 12,317 (0%)	~~13,703 (-1%)~~ 12,303 (0%)
November	Dry	~~12,156~~ 12,430	~~12,232 (1%)~~ 12,457 (0%)	~~12,228 (1%)~~ 12,468 (0%)	~~12,229 (1%)~~ 12,427 (0%)	~~12,232 (1%)~~ 12,460 (0%)
November	Critically Dry	~~8,304~~ 8,880	~~8,346 (1%)~~ 8,891 (0%)	~~8,514 (3%)~~ 8,877 (0%)	~~8,487 (2%)~~ 8,866 (0%)	~~8,345 (1%)~~ 8,886 (0%)
December	Wet	~~38,326~~ 34,067	~~38,325~~ 34,106 (0%)	~~38,318~~ 34,083 (0%)	~~38,332~~ 34,120 (0%)	~~38,308~~ 34,084 (0%)
December	Above Normal	~~19,238~~ 20,839	~~19,295~~ 20,821 (0%)	~~19,331~~ 20,783 (0%)	~~19,306~~ 20,827 (0%)	~~19,254~~ 20,777 (0%)
December	Below Normal	~~16,409~~ 16,072	~~16,624~~ 16,165 (1%)	~~16,562 (1%)~~ 16,100 (0%)	~~16,640~~ 16,168 (1%)	~~16,552 (1%)~~ 16,096 (0%)
December	Dry	~~16,120~~ 16,510	~~15,913~~ 16,405 (-1%)	~~15,917~~ 16,397 (-1%)	~~15,928~~ 16,389 (-1%)	~~15,916~~ 16,397 (-1%)
December	Critically Dry	~~12,175~~ 11,881	~~12,414 (2%)~~ 11,839 (0%)	~~12,319 (1%)~~ 11,842 (0%)	~~12,314 (1%)~~ 11,838 (0%)	~~12,400 (2%)~~ 11,839 (0%)
January	Wet	~~49,611~~ 52,284	~~49,620~~ 52,280 (0%)	~~49,625~~ 52,286 (0%)	~~49,622~~ 52,283 (0%)	~~49,624~~ 52,281 (0%)
January	Above Normal	~~40,840~~ 41,115	~~40,836~~ 41,092 (0%)	~~40,854~~ 41,092 (0%)	~~40,853~~ 41,092 (0%)	~~40,837~~ 41,092 (0%)
January	Below Normal	~~22,233~~ 22,837	~~22,278~~ 22,756 (0%)	~~22,279~~ 22,784 (0%)	~~22,279~~ 22,748 (0%)	~~22,313~~ 22,786 (0%)
January	Dry	~~16,110~~ 15,725	~~15,964 (-1%)~~ 15,753 (0%)	~~15,965 (-1%)~~ 15,748 (0%)	~~15,970 (-1%)~~ 15,719 (0%)	~~15,963 (-1%)~~ 15,751 (0%)
January	Critically Dry	~~13,504~~ 12,986	~~13,529~~ 12,972 (0%)	~~13,574 (1%)~~ 12,973 (0%)	~~13,576 (1%)~~ 12,971 (0%)	~~13,525~~ 12,969 (0%)
February	Wet	~~58,955~~ 60,733	~~58,946~~ 60,704 (0%)	~~58,956~~ 60,717 (0%)	~~58,943~~ 60,708 (0%)	~~58,959~~ 60,712 (0%)
February	Above Normal	~~44,381~~ 43,249	~~44,348~~ 43,198 (0%)	~~44,305~~ 43,234 (0%)	~~44,343~~ 43,199 (0%)	~~44,354~~ 43,233 (0%)
February	Below Normal	~~28,831~~ 30,324	~~28,645 (-1%)~~ 30,260 (0%)	~~28,651 (-1%)~~ 30,267 (0%)	~~28,646 (-1%)~~ 30,256 (0%)	~~28,649 (-1%)~~ 30,269 (0%)
February	Dry	~~21,943~~ 22,893	~~21,854 (0%)~~ 22,731 (-1%)	~~22,123 (1%)~~ 22,730 (-1%)	~~22,093 (1%)~~ 22,725 (-1%)	~~22,125 (1%)~~ 22,731 (-1%)
February	Critically Dry	~~15,633~~ 15,621	~~15,836 (1%)~~ 15,599 (0%)	~~15,956 (2%)~~ 15,598 (0%)	~~15,940 (2%)~~ 15,598 (0%)	~~15,961 (2%)~~ 15,594 (0%)
March	Wet	~~51,700~~ 56,175	~~51,704~~ 56,174 (0%)	~~51,704~~ 56,178 (0%)	~~51,703~~ 56,176 (0%)	~~51,704~~ 56,176 (0%)
March	Above Normal	~~44,719~~ 44,036	~~44,896 (0%)~~ 44,296 (1%)	~~44,554~~ 43,881 (0%)	~~44,544~~ 43,885 (0%)	~~44,907 (0%)~~ 44,292 (1%)

Month	Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
March	Below Normal	~~26,880~~ 29,268	~~27,027~~ 29,512 (1%)	~~26,832~~ 29,310 (0%)	~~26,831~~ 29,309 (0%)	~~27,026~~ 29,513 (1%)
March	Dry	~~20,280~~ 20,669	~~20,572~~ 20,883 (1%)	~~20,309~~ 20,610 (0%)	~~20,317 (0%)~~ 20,553 (-1%)	~~20,573~~ 20,884 (1%)
March	Critically Dry	~~13,458~~ 13,294	~~13,381 (-1%)~~ 13,235 (0%)	~~13,378 (-1%)~~ 13,234 (0%)	~~13,377 (-1%)~~ 13,234 (0%)	~~13,375 (-1%)~~ 13,239 (0%)
April	Wet	~~41,478~~ 43,114	~~41,478~~ 43,115 (0%)	~~41,477~~ 43,117 (0%)	~~41,477~~ 43,115 (0%)	~~41,478~~ 43,116 (0%)
April	Above Normal	~~25,970~~ 24,747	~~26,201 (1%)~~ 24,926 (1%)	~~26,034~~ 24,703 (0%)	~~26,033~~ 24,711 (0%)	~~26,202~~ 24,922 (1%)
April	Below Normal	~~17,525~~ 17,217	~~17,917 (2%)~~ 17,648 (3%)	~~17,528~~ 17,227 (0%)	~~17,496~~ 17,227 (0%)	~~17,916 (2%)~~ 17,648 (3%)
April	Dry	~~12,680~~ 12,247	~~12,881~~ 12,532 (2%)	~~12,639~~ 12,251 (0%)	~~12,641~~ 12,270 (0%)	~~12,869 (1%)~~ 12,531 (2%)
April	Critically Dry	~~9,842~~ 9,633	~~9,834~~ 9,616 (0%)	~~9,834~~ 9,615 (0%)	~~9,835~~ 9,616 (0%)	~~9,834~~ 9,615 (0%)
May	Wet	~~34,789~~ 36,030	~~34,790~~ 36,028 (0%)	~~34,788~~ 36,029 (0%)	~~34,788~~ 36,028 (0%)	~~34,790~~ 36,030 (0%)
May	Above Normal	~~23,271~~ 23,721	~~23,470~~ 23,920 (1%)	~~24,116 (4%)~~ 24,528 (3%)	~~24,116 (4%)~~ 24,529 (3%)	~~23,469~~ 23,920 (1%)
May	Below Normal	~~17,000~~ 16,738	~~16,918~~ 16,701 (0%)	~~17,572~~ 17,314 (3%)	~~17,567~~ 17,314 (3%)	~~16,918~~ 16,701 (0%)
May	Dry	~~11,993~~ 11,638	~~12,229 (2%)~~ 11,965 (3%)	~~12,849 (7%)~~ 12,519 (8%)	~~12,848 (7%)~~ 12,517 (8%)	~~12,231 (2%)~~ 11,966 (3%)
May	Critically Dry	~~8,603~~ 8,114	~~8,650 (1%)~~ 8,128 (0%)	~~8,650 (1%)~~ 8,132 (0%)	~~8,651 (1%)~~ 8,132 (0%)	~~8,650 (1%)~~ 8,127 (0%)
June	Wet	~~25,726~~ 27,074	~~25,757~~ 27,082 (0%)	~~25,757~~ 27,083 (0%)	~~25,757~~ 27,082 (0%)	~~25,757~~ 27,083 (0%)
June	Above Normal	~~18,576~~ 19,219	~~18,535~~ 19,221 (0%)	~~18,431 (-1%)~~ 19,220 (0%)	~~18,434 (-1%)~~ 19,220 (0%)	~~18,472 (-1%)~~ 19,221 (0%)
June	Below Normal	~~13,942~~ 13,661	~~13,889 (0%)~~ 13,559 (-1%)	~~13,752~~ 13,561 (-1%)	~~13,751~~ 13,561 (-1%)	~~13,889 (0%)~~ 13,559 (-1%)
June	Dry	~~13,111~~ 13,384	~~12,655~~ 13,007 (-3%)	~~12,478 (-5%)~~ 13,008 (-3%)	~~12,484 (-5%)~~ 13,008 (-3%)	~~12,612 (-4%)~~ 13,007 (-3%)
June	Critically Dry	~~9,802~~ 9,504	~~9,696 (-1%)~~ 9,589 (1%)	~~9,602 (-2%)~~ 9,607 (1%)	~~9,601 (-2%)~~ 9,607 (1%)	~~9,668 (-1%)~~ 9,603 (1%)

Table 11-34 11-36 . Mean Modeled January–May San Joaquin River at Vernalis Flow (cfs) under the Proposed Project/Alternative 1/Alternative 2/Alternative 3 and Baseline Conditions Modeling Scenarios, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) Expressed as a Percentage Difference (parentheses), Grouped by Water Year Type

Month	Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
January	Wet	7,549 8,706	7,544 8,696 (0%)	7,544 8,696 (0%)	7,545 8,696 (0%)	7,545 8,695 (0%)
January	Above Normal	3,596 2,763	3,591 2,753 (0%)	3,591 2,763 (0%)	3,591 2,760 (0%)	3,592 2,760 (0%)
January	Below Normal	2,527 2,217	2,524 2,215 (0%)	2,525 2,215 (0%)	2,524 2,215 (0%)	2,524 2,215 (0%)
January	Dry	1,990 1,581	1,984 1,579 (0%)	1,984 1,579 (0%)	1,984 1,579 (0%)	1,984 1,579 (0%)
January	Critically Dry	1,865 1,468	1,861 1,466 (0%)	1,864 1,466 (0%)	1,865 1,466 (0%)	1,864 1,466 (0%)
February	Wet	10,551 11,277	10,547 11,272 (0%)	10,547 11,273 (0%)	10,547 11,273 (0%)	10,547 11,272 (0%)
February	Above Normal	6,027 4,920	6,030 4,910 (0%)	6,031 4,919 (0%)	6,030 4,917 (0%)	6,033 4,917 (0%)
February	Below Normal	4,114 3,929	4,111 3,927 (0%)	4,112 3,927 (0%)	4,111 3,927 (0%)	4,111 3,927 (0%)
February	Dry	2,317 1,871	2,312 1,869 (0%)	2,312 1,869 (0%)	2,313 1,869 (0%)	2,312 1,869 (0%)
February	Critically Dry	2,204 1,779	2,200 1,776 (0%)	2,202 1,776 (0%)	2,202 1,776 (0%)	2,201 1,776 (0%)
March	Wet	11,407 12,158	11,402 12,152 (0%)	11,401 12,152 (0%)	11,401 12,153 (0%)	11,401 12,152 (0%)
March	Above Normal	5,884 5,448	5,881 5,441 (0%)	5,880 5,444 (0%)	5,880 5,443 (0%)	5,880 5,443 (0%)
March	Below Normal	4,179 4,287	4,176 4,284 (0%)	4,176 4,285 (0%)	4,176 4,285 (0%)	4,176 4,284 (0%)
March	Dry	2,311 1,905	2,308 1,902 (0%)	2,308 1,902 (0%)	2,308 1,902 (0%)	2,307 1,902 (0%)
March	Critically Dry	2,100 1,682	2,097 1,680 (0%)	2,097 1,680 (0%)	2,097 1,680 (0%)	2,097 1,680 (0%)
April	Wet	11,918 12,523	11,912 12,519 (0%)	11,912 12,522 (0%)	11,912 12,520 (0%)	11,912 12,522 (0%)
April	Above Normal	6,777 6,611	6,785 6,607 (0%)	6,774 6,608 (0%)	6,774 6,608 (0%)	6,784 6,608 (0%)
April	Below Normal	5,216 5,523	5,212 5,520 (0%)	5,212 5,520 (0%)	5,212 5,520 (0%)	5,212 5,520 (0%)
April	Dry	2,817 2,766	2,812 2,762 (0%)	2,812 2,763 (0%)	2,812 2,762 (0%)	2,812 2,763 (0%)
April	Critically Dry	2,363 2,353	2,361 2,351 (0%)	2,361 2,351 (0%)	2,361 2,351 (0%)	2,361 2,351 (0%)
May	Wet	9,664 10,643	9,655 10,639 (0%)	9,655 10,640 (0%)	9,655 10,640 (0%)	9,655 10,640 (0%)
May	Above Normal	5,170 5,518	5,167 5,513 (0%)	5,166 5,514 (0%)	5,166 5,514 (0%)	5,167 5,513 (0%)

Month	Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
May	Below Normal	~~4,162~~ 4,782	~~4,158~~ 4,777 (0%)	~~4,157~~ 4,778 (0%)	~~4,158~~ 4,778 (0%)	~~4,157~~ 4,777 (0%)
May	Dry	~~2,338~~ 2,723	~~2,333~~ 2,718 (0%)	~~2,333~~ 2,719 (0%)	~~2,333~~ 2,718 (0%)	~~2,333~~ 2,718 (0%)
May	Critically Dry	~~1,763~~ 2,189	~~1,761~~ 2,188 (0%)	~~1,761~~ 2,188 (0%)	~~1,761~~ 2,188 (0%)	~~1,761~~ 2,188 (0%)

Effects related to other Project activities (Delta Smelt Summer and Fall Habitat Actions; John E. Skinner Delta Fish Protective Facility; Habitat Restoration; Delta Smelt Supplementation; Water Transfers; Agricultural Barriers; Barker Slough Pumping Plant; CCF Weed Management; Suisun Marsh Operations; Monitoring and Special Studies; and Drought-related Actions) would be as described for the Proposed Project in Chapter 6.

Like the Proposed Project, the impact on aquatic biological resources from Alternative 1 would be less than significant.

11.4.4　Other Resources

Alternative 1 keeps the period during which increased diversions from the CCF can occur the same as Baseline Conditions and modifies the Spring Delta Outflow component of the Proposed Project by limiting flows deployed from the Voluntary Agreement program (implemented through tributary inflow from the fallowing program) to the month of May (rather than March, April, or May under the Proposed Project). All other components of the Proposed Project are included in Alternative 1. Under Alternative 1, overall long-term average Delta outflow, exports, or other hydrologic conditions would be similar to the Proposed Project. Because differences in these long-term average hydrologic variables would be minimal between the Alternative 1 and the Proposed Project, impacts on all other resources under Alternative 1 would be expected to be the similar to those described for the Proposed Project.

11.5　Alternative 2: May Deployment of SWP-Facilitated Fallowing Inject and Expansion of the CCF Increased Winter Diversion Window

This alternative is a variation of the Proposed Project that alters the spring Delta outflow component of the Proposed Project (see Section 2.3.3, "Spring Delta Outflow"). Specifically, Alternative 2 modifies the Spring Delta Outflow component of the Proposed Project by limiting the portion of the Voluntary Agreement program that allows flow purchases acquired through SWP diversion fees (implemented through tributary inflow from the fallowing program) to May (rather than March, April, or May under the Proposed Project).

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Additionally, DWR will seek a new Section 10 Rivers and Harbors Act permit from the U.S. Army Corps of Engineers to expand to December 1 through March 31 the period when diversions into CCF may be increased by one-third of the San Joaquin River flow at Vernalis to December 1 through March 31 when those flows exceed 1,000 cfs. DWR will seek concurrence from the USACE that this expansion of the CCF diversion window is consistent with Section 10 of the Rivers and Harbors Act and will not affect navigation in the Sacramento or San Joaquin rivers, or the Delta.

All other components of the Proposed Project are included in Alternative 2.

11.5.1   Surface Water Hydrology

The relative incremental changes in surface water hydrology due to Alternative 2 as compared to the Baseline Conditions are similar to those described under the Proposed Project in Chapter 4, "Surface Water Hydrology." The CalSim 3 model was used for quantifying the changes in river flows, Delta channel flows, and exports. Key output parameters for the Baseline Conditions, Proposed Project, and Alternative 2 are presented in Figures 11-27 through 11-35. Operations results from these simulations were analyzed to determine whether the incremental changes between the Baseline Conditions and Proposed Project remain similar with Alternative 2.

CalSim 3 simulation results for the Proposed Project (red lines) and Alternative 2 (yellow lines) display limited changes to flow at some locations between March and May from the Baseline Conditions (black lines). For monthly long-term average flow for the Sacramento River at Freeport, Georgiana Slough, and Delta Outflow, the shift in deployment of the 50-thousand-acre-foot fallowing inject results in slightly higher flows in May and slightly lower flows in March and April, similar to Alternative 1. There are no observable differences in the monthly long-term average Yolo Bypass, Delta Cross Channel, Qwest, and combined OMR flows, nor monthly long-term average Delta export volumes for Alternative 2. Annually, simulated exports show similar patterns in incremental changes between the Baseline Conditions and Proposed Project compared to incremental changes under Alternative 2.

In sum, surface water flows under the Proposed Project and Alternative 2 are similar. As identified for the Proposed Project, Alternative 2 would not substantially affect surface water resources.
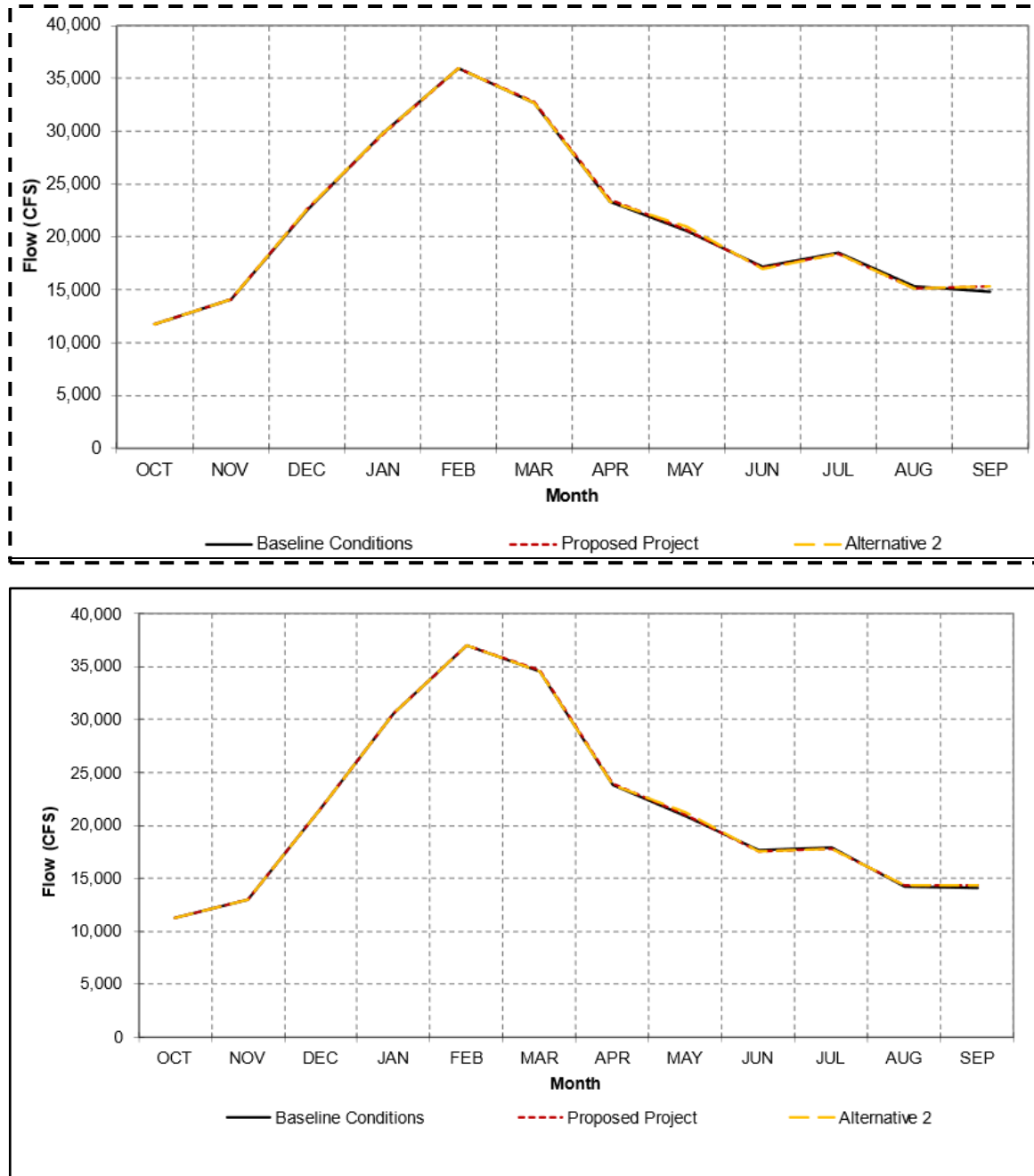
Figure 11-27. Sacramento River at Freeport Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 2
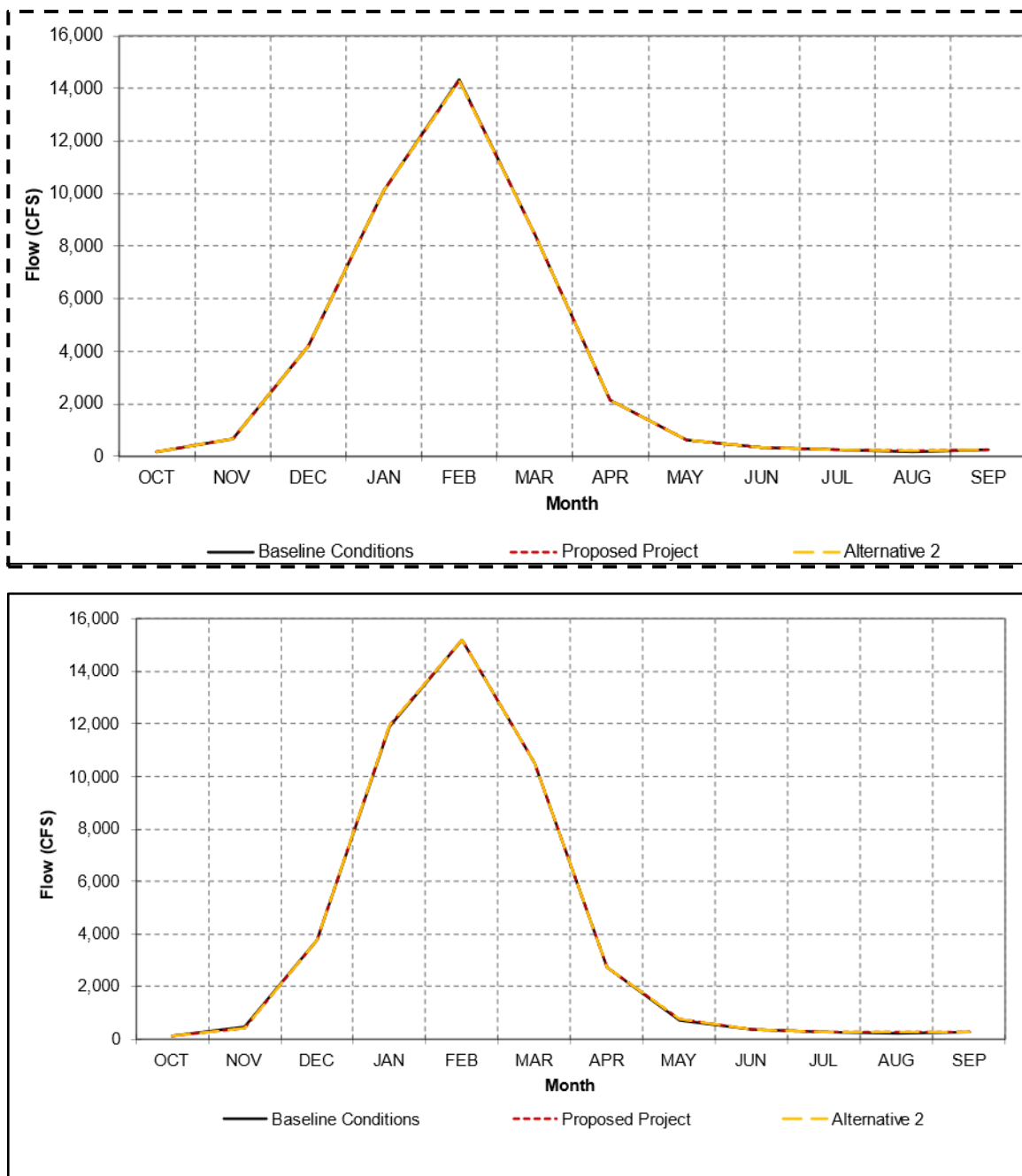
Figure 11-28. Monthly Long-term Average Yolo Bypass Flow for the Baseline Conditions, Proposed Project, and Alternative 2
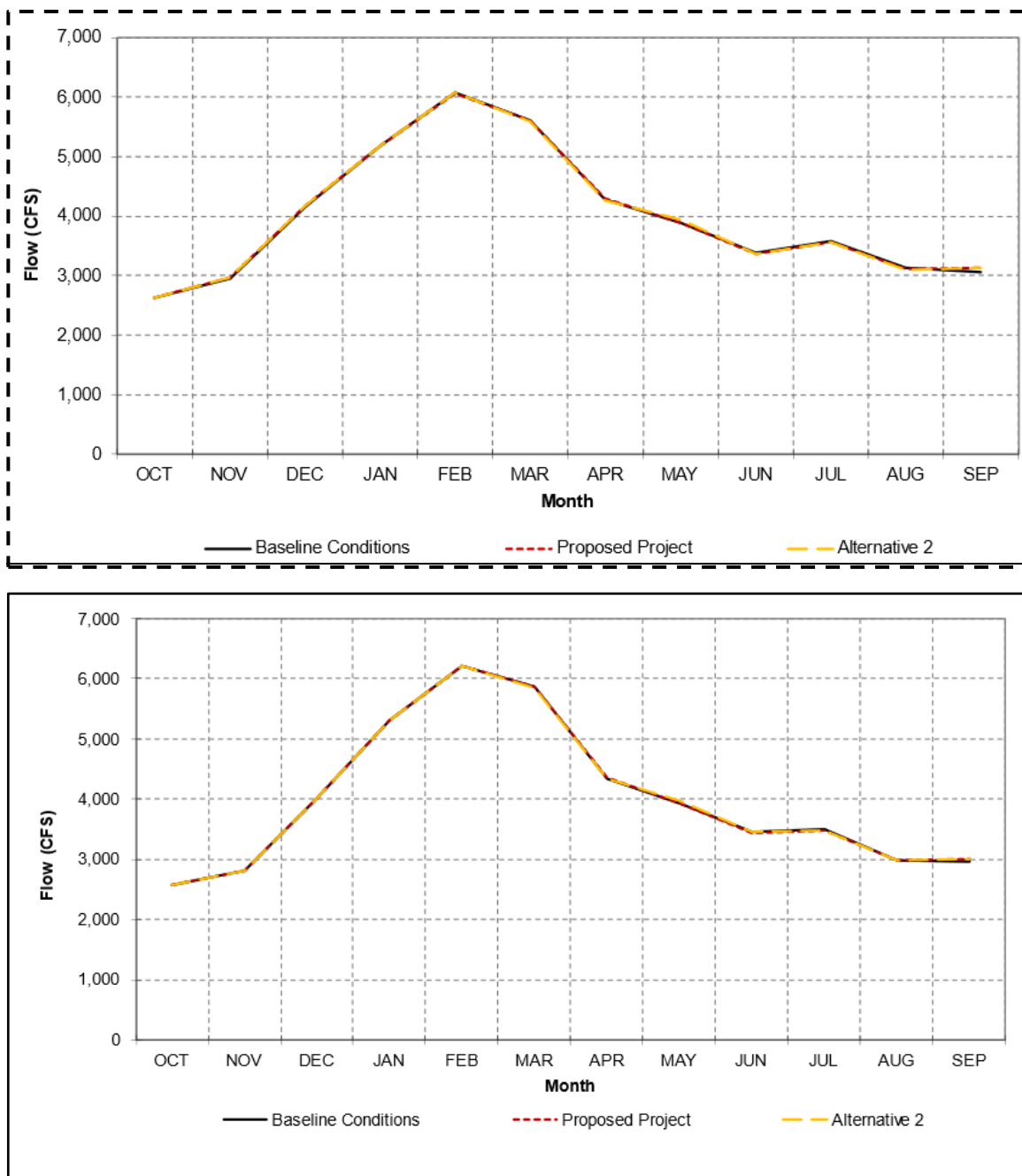
Figure 11-29. Monthly Long-term Average Georgiana Slough Flow for the Baseline Conditions, Proposed Project, and Alternative 2
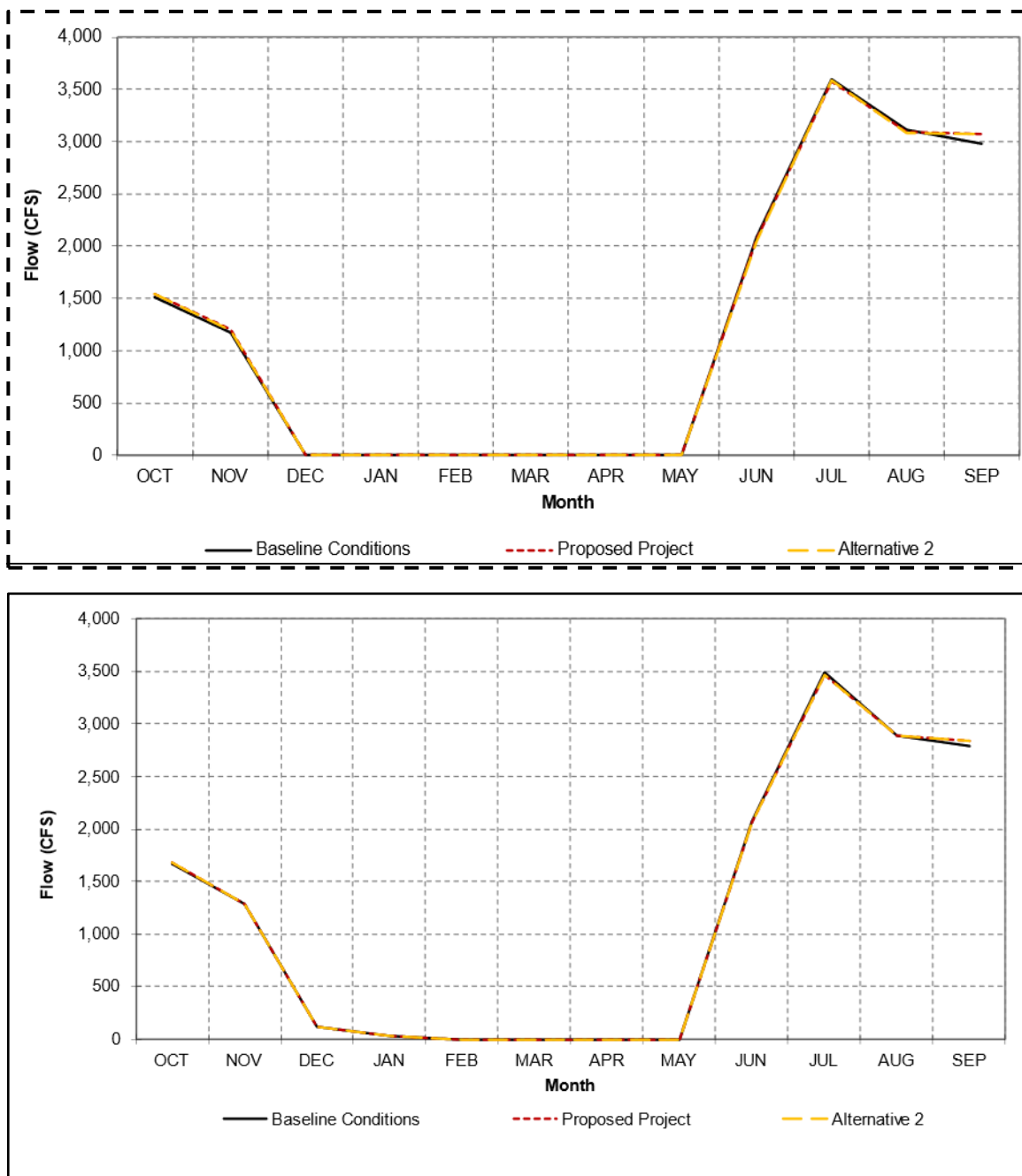
Figure 11-30. Monthly Long-term Average Delta Cross Channel Flow for the Baseline Conditions, Proposed Project, and Alternative 2
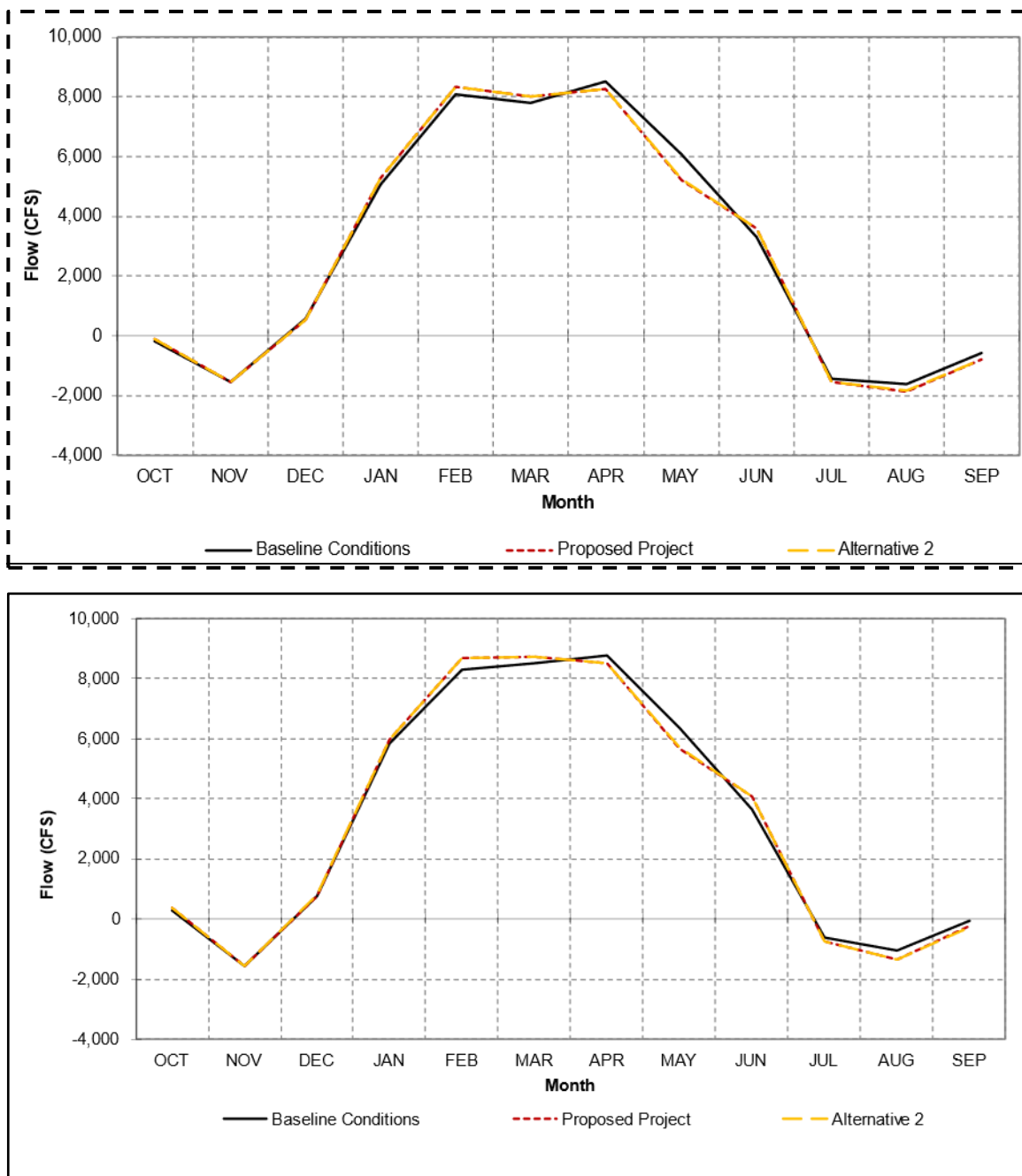
Figure 11-31. Monthly Long-term Average Qwest Flow for the Baseline Conditions, Proposed Project, and Alternative 2
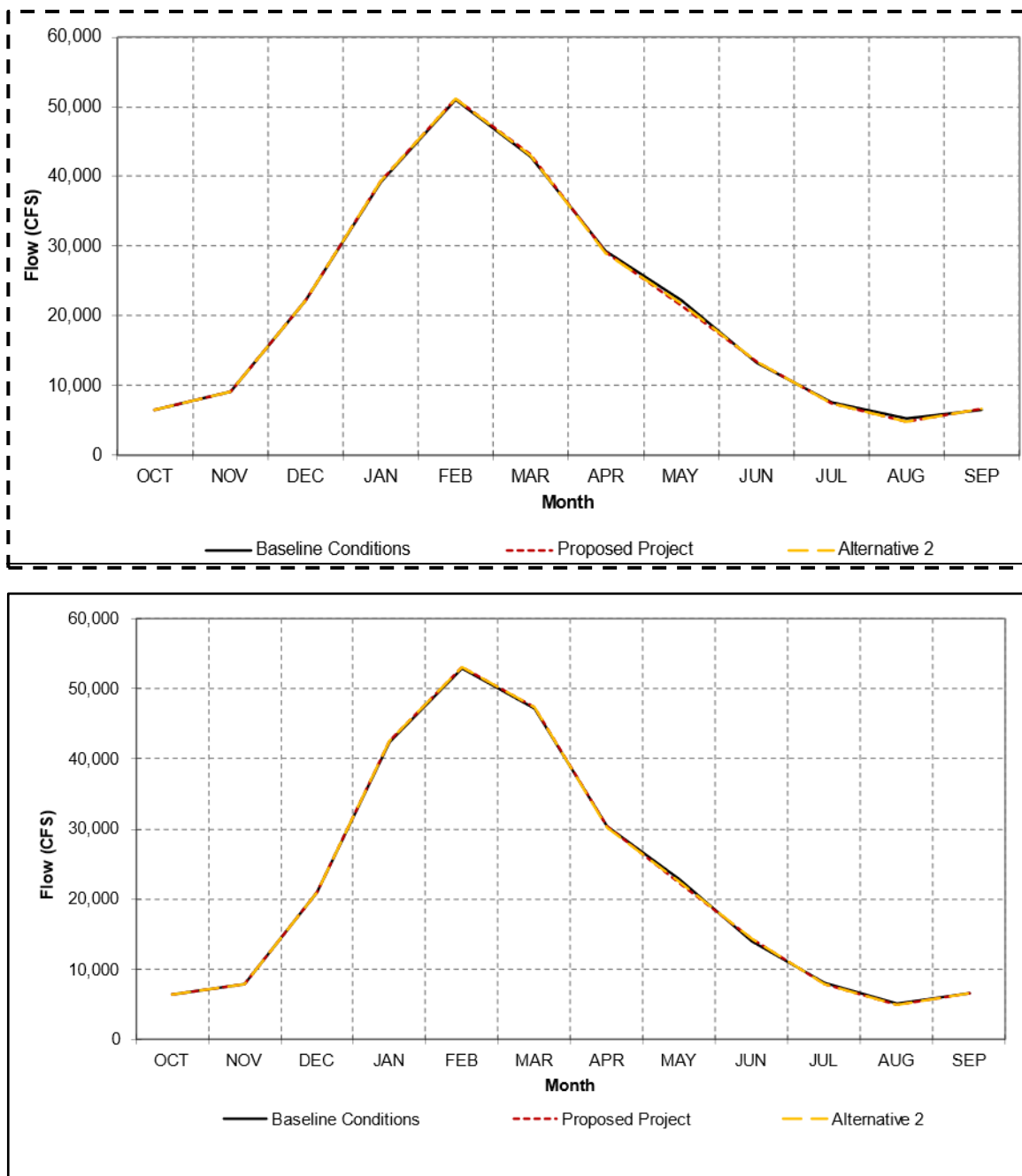
Figure 11-32. Monthly Long-term Average Delta Outflow for the Baseline Conditions, Proposed Project, and Alternative 2
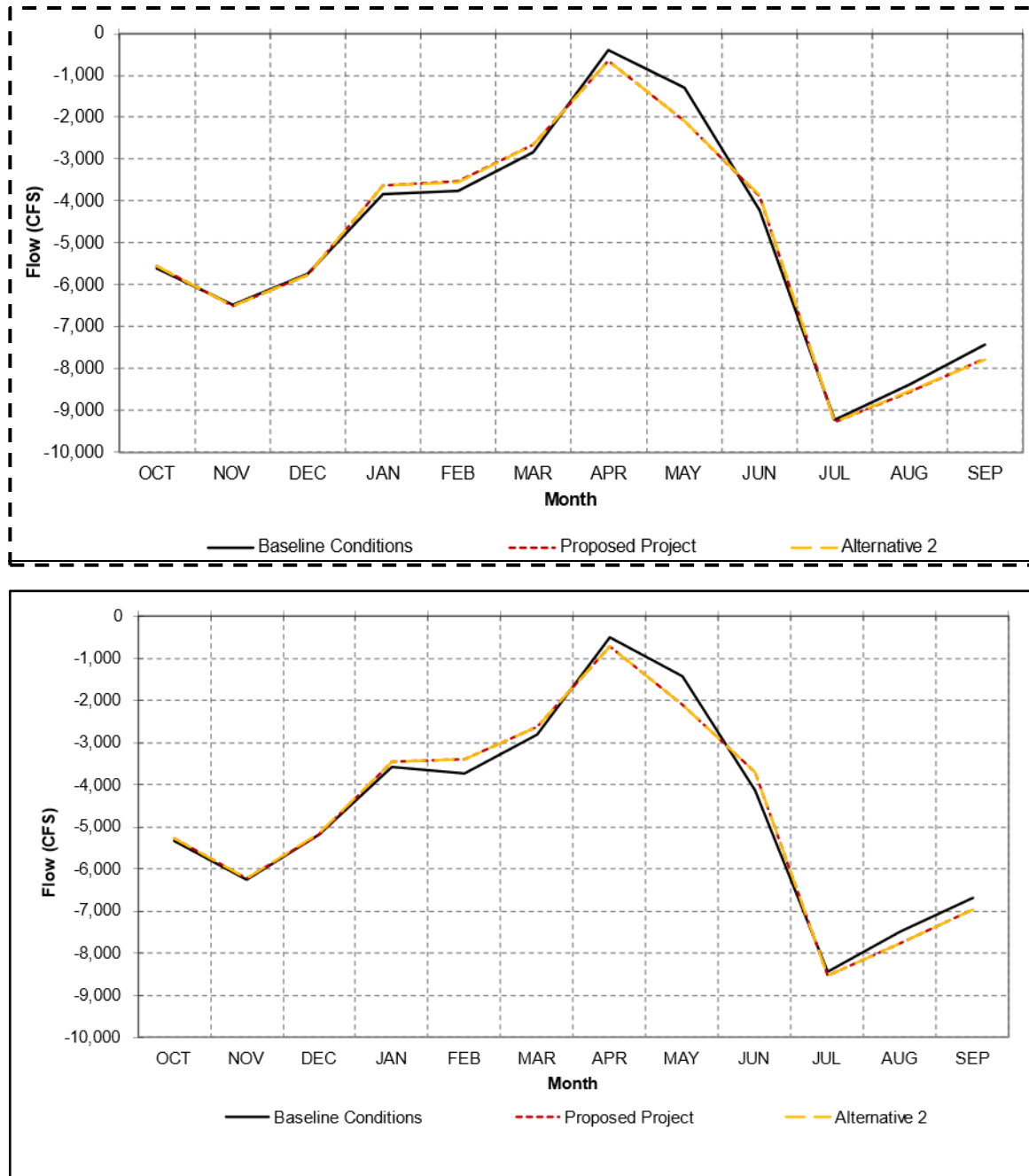
Figure 11-33. Combined Old and Middle River Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 2
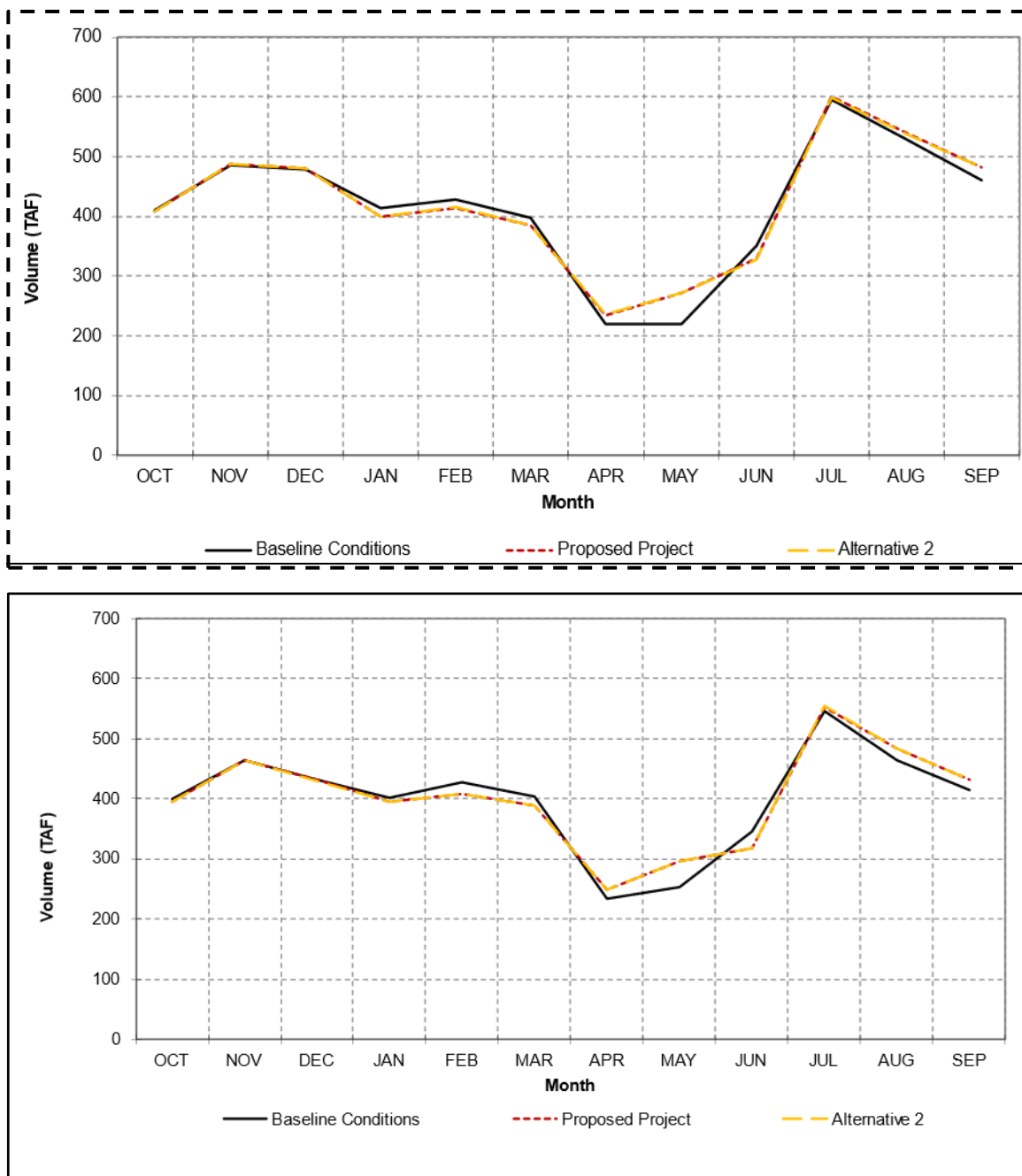
Figure 11-34. Monthly Long-term Average Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 2
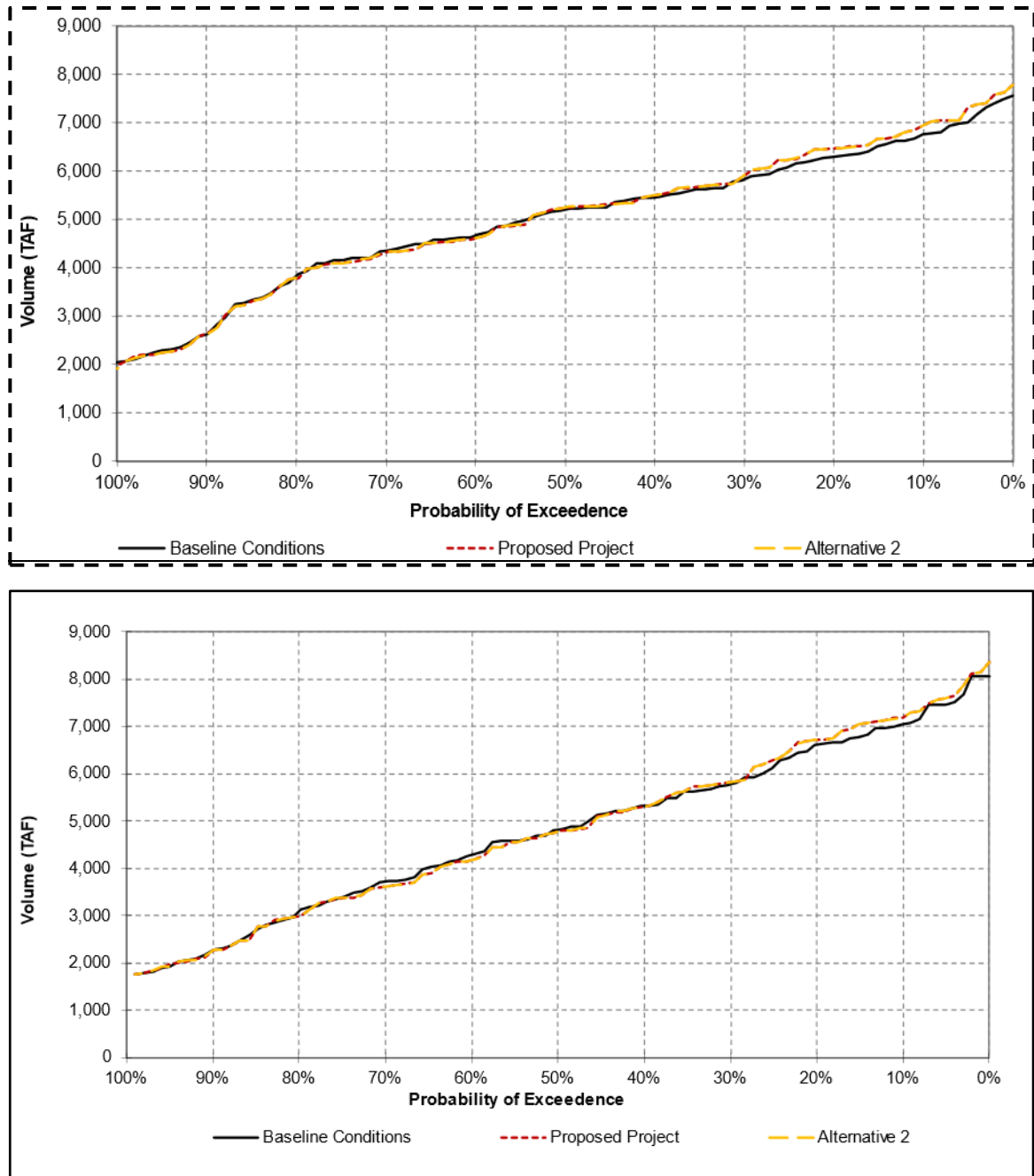
Figure 11-35. Annual Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 2

11.5.2   Surface Water Quality

The potential effects of Alternative 2 on surface water quality of study area waterbodies would be similar to those described for the Proposed Project in Chapter 5, "Surface Water Quality." CalSim 3-modeleld EC for the Sacramento River at Emmaton, San Joaquin River at Jersey Point, and Old River at Rock Slough under Alternative 2, presented in Tables ~~11-35 through 11-37~~ 11-37 through 11-39 and Figures 11-36 through 11-38, differs little if at all from the Proposed Project. Chloride concentrations, which are correlated with EC, thus also would differ little from the Proposed Project at these locations and throughout the Delta.

As described in Section 11.5.1, "Surface Water Hydrology," Delta inflows ~~and~~ , outflows , and exports under Alternative 2 would be similar to the Proposed Project ~~, and Delta exports would be slightly higher in December through March~~ . The minor differences in exports, and similar inflows and outflows in all months would indicate that residence times of water in the various Delta channels under Alternative 2 would not differ substantially from the Proposed Project. Thus, Alternative 2 also would have negligible effects on both the frequency and magnitude of Delta cyanobacterial harmful algal blooms.

Table ~~11-35~~ 11-37 . CalSim-Modeled Average Electrical Conductivity (in micromhos/cm) for the Sacramento River at Emmaton by Water Year Type, Alternative 2

Water Year Type	Baseline Conditions	Proposed Project	Difference from Baseline Conditions: Proposed Project	Alternative 2	Difference from Baseline Conditions: Alternative 2
Wet	~~488~~ 524	~~500~~ 534	~~12 (2%)~~ 10 (2%)	~~500~~ 534	~~12 (2%)~~ 10 (2%)
Above Normal	~~601~~ 610	617	~~16 (3%)~~ 7 (1%)	~~607~~ 617	~~6~~ 7 (1%)
Below Normal	~~699~~ 759	~~699~~ 764	~~0 (0%)~~ 5 (1%)	~~699~~ 762	~~0~~ 3 (0%)
Dry	~~896~~ 948	~~908~~ 958	~~12~~ 10 (1%)	~~906~~ 954	~~10~~ 6 (1%)
Critically Dry	~~1,510~~ 1,558	~~1,503~~ 1,572	~~-7 (0%)~~ 14 (1%)	~~1,494~~ 1,571	~~-16 (-1%)~~ 13 (1%)

Source: ~~LTO_9-series_trendrpt_20231201_noMacros.xlsx~~
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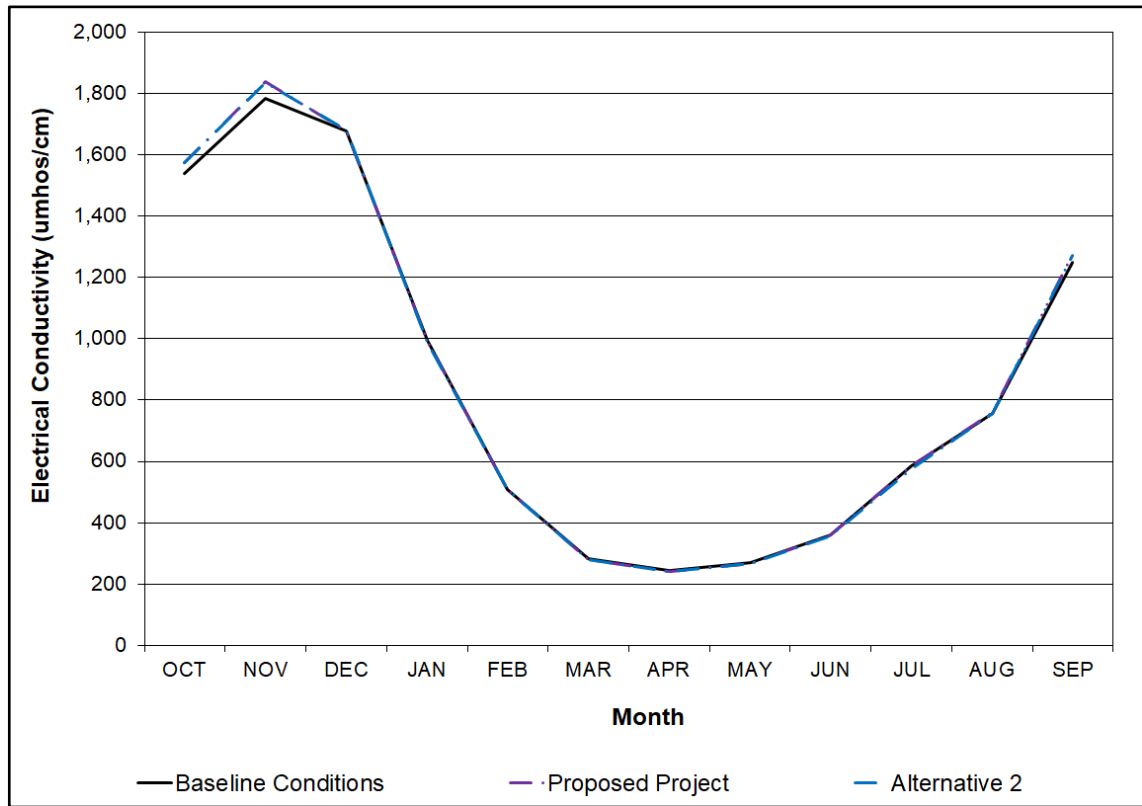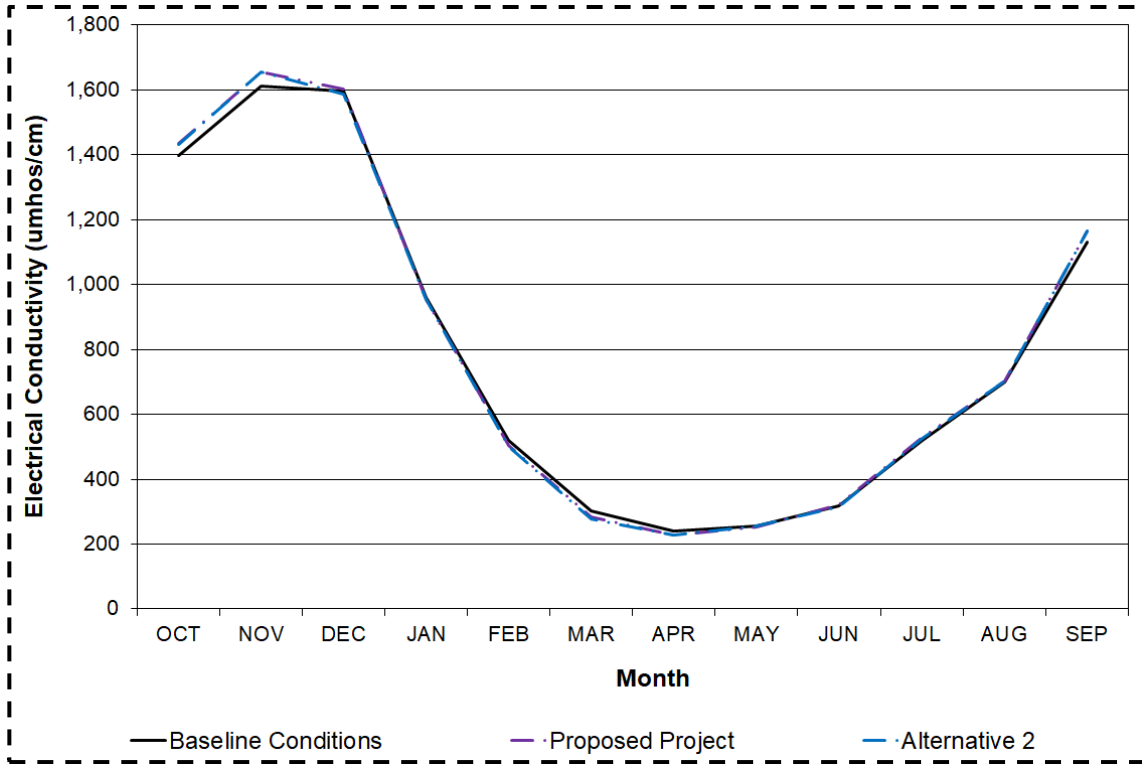
Figure 11-36. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the Sacramento River at Emmaton, Water Years 1922–2021, Alternative 2

Table ~~11-36~~ <u>11-38</u> . CalSim-Modeled Average Electrical Conductivity (in micromhos/cm) for the San Joaquin River at Jersey Point by Water Year Type, Water Years 1922–2021, Alternative 2

Water Year Type	Baseline Conditions	Proposed Project	Difference from Baseline Conditions: Proposed Project	Alternative 2	Difference from Baseline Conditions: Alternative 2
Wet	~~521~~ <u>516</u>	~~531~~ <u>524</u>	~~10~~ <u>8</u> (2%)	~~531~~ <u>524</u>	~~10~~ <u>8</u> (2%)
Above Normal	~~591~~ <u>570</u>	~~602~~ <u>580</u>	~~11~~ <u>10</u> (2%)	~~596~~ <u>580</u>	~~5 (1%)~~ <u>10 (2%)</u>
Below Normal	~~722~~ <u>714</u>	~~722~~ <u>719</u>	~~0 (0%)~~ <u>5 (1%)</u>	~~721~~ <u>719</u>	~~-1 (0%)~~ <u>5 (1%)</u>
Dry	~~862~~ <u>802</u>	~~868~~ <u>812</u>	~~6~~ <u>10</u> (1%)	~~867~~ <u>810</u>	~~5~~ <u>8</u> (1%)
Critically Dry	~~1,048~~ <u>1,025</u>	~~1,039~~ <u>1,034</u>	~~-9 (-1%)~~ <u>9 (1%)</u>	~~1,036~~ <u>1,033</u>	~~-12 (-1%)~~ <u>8 (1%)</u>

Source: ~~LTO_9-series_trendrpt_20231201_noMacros.xlsx~~
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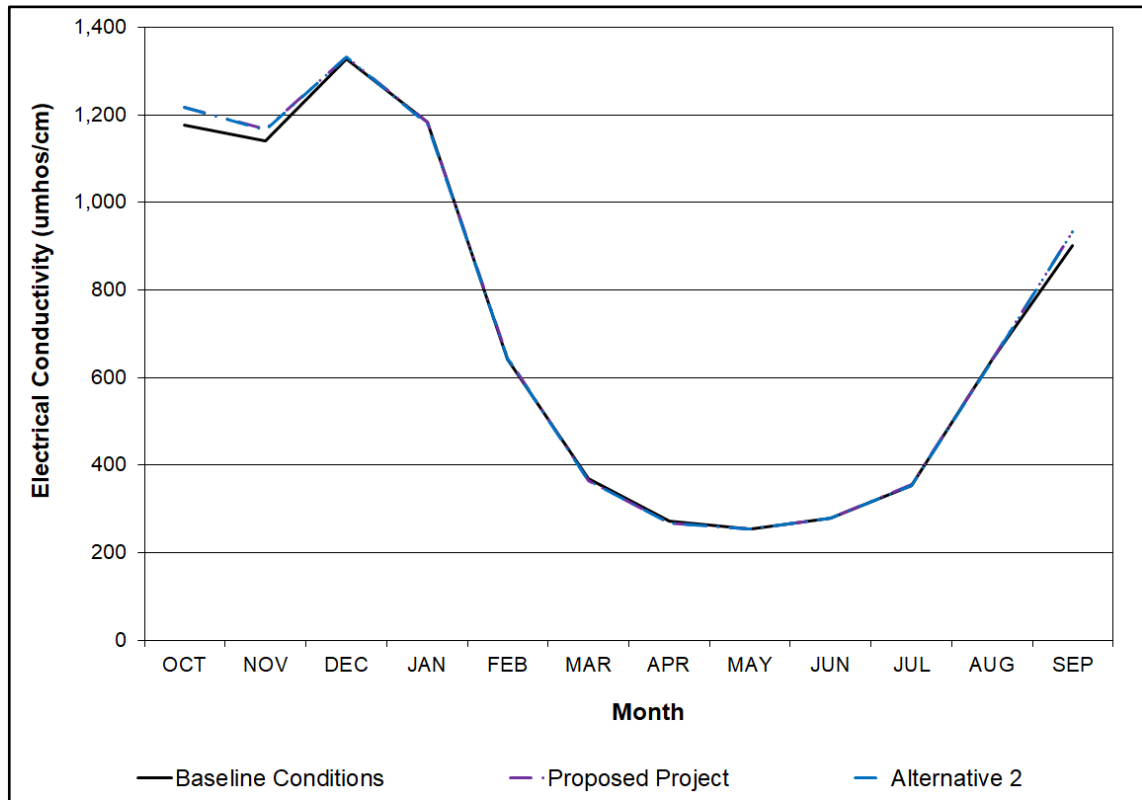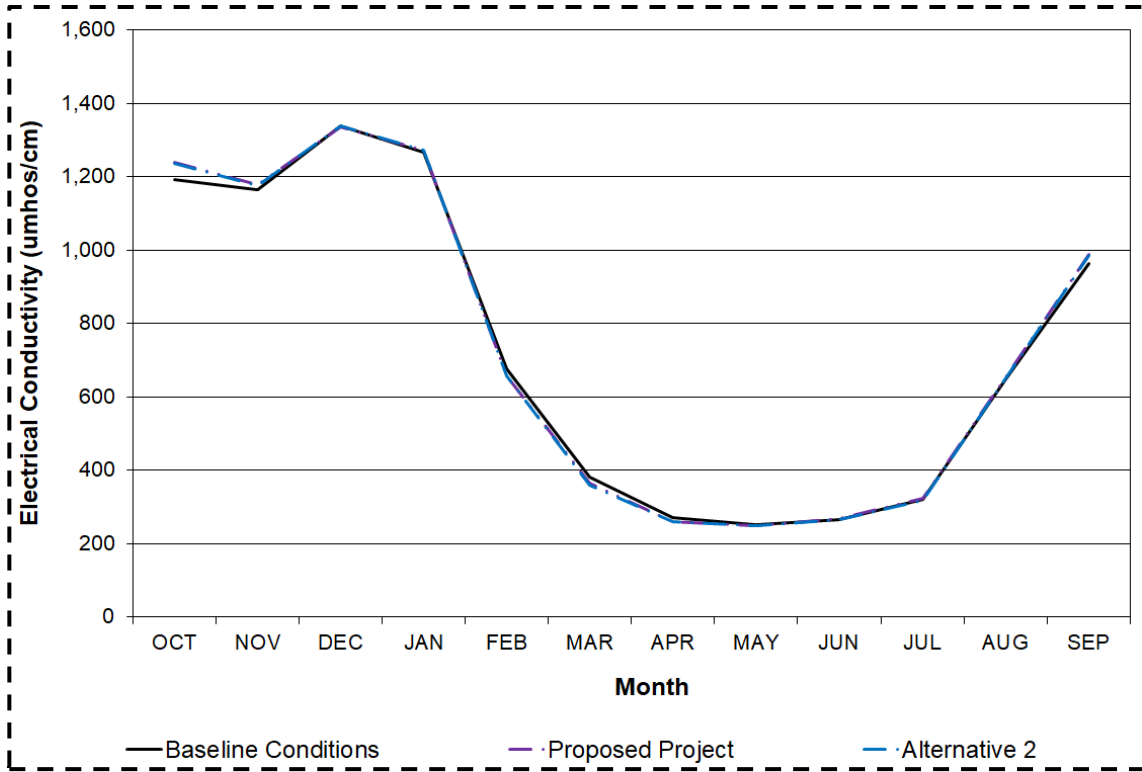
Figure 11-37. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the San Joaquin River at Jersey Point, Water Years 1922–2021, Alternative 2

Table 11-37 11-39. CalSim-Modeled Average Electrical Conductivity (in micromhos/cm) for the Old River at Rock Slough by Water Year Type, Water Years 1922–2021, Alternative 2

Water Year Type	Baseline Conditions	Proposed Project	Difference from Baseline Conditions: Proposed Project	Alternative 2	Difference from Baseline Conditions: Alternative 2
Wet	~~347~~ 339	~~348~~ 340	1 (0%)	~~347~~ 340	~~0~~ 1 (0%)
Above Normal	~~386~~ 369	~~385~~ 372	~~-1 (0%)~~ 3 (1%)	~~384~~ 372	~~-2 (-1%)~~ 3 (1%)
Below Normal	~~443~~ 432	~~438~~ 431	~~-5 (-1%)~~ -1 (0%)	~~438~~ 431	~~-5 (-1%)~~ -1 (0%)
Dry	~~496~~ 456	~~495~~ 459	~~-1 (0%)~~ 3 (1%)	~~495~~ 458	~~-1~~ 2 (0%)
Critically Dry	~~572~~ 548	~~566~~ 552	~~-6 (-1%)~~ 4 (1%)	~~566~~ 552	~~-6 (-1%)~~ 4 (1%)

Source: ~~LTO_9-series_trendrpt_20231201_noMacros.xlsx~~
DRAFT_TrendReport_MultiCalSim_rev12_FEIR_1_7_7v2_9b_9bv2_7.23.0.xlsx .
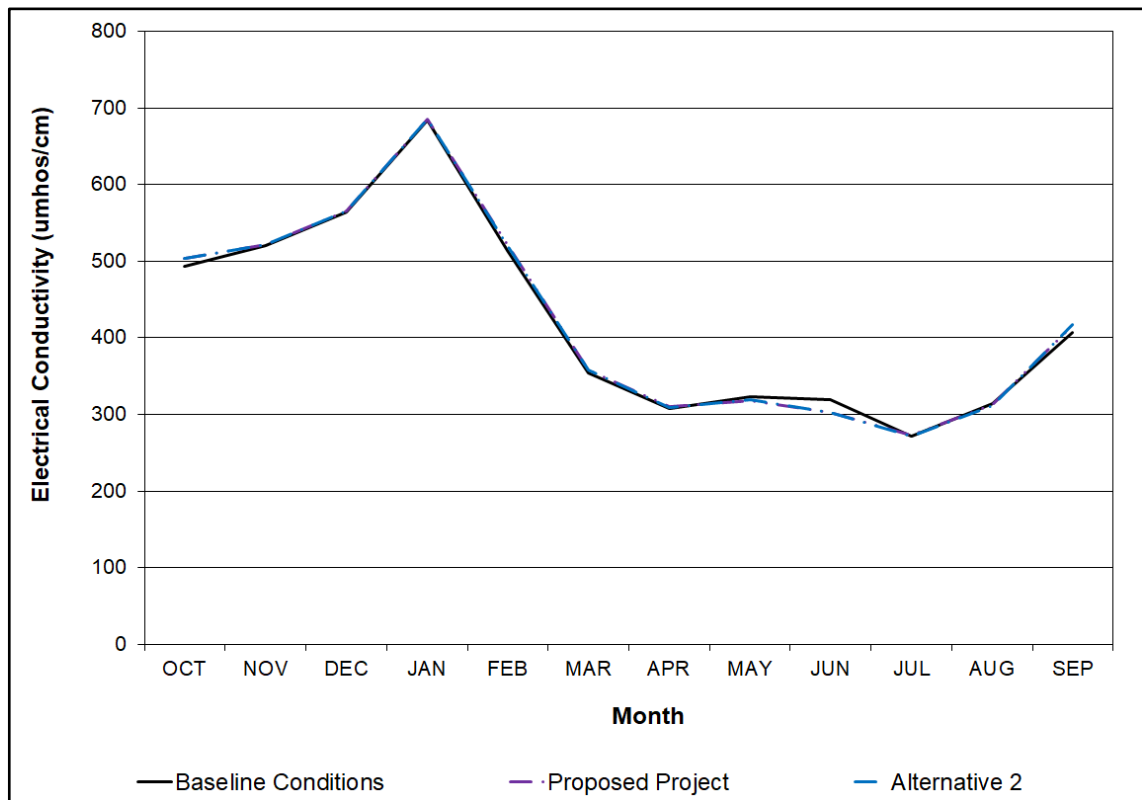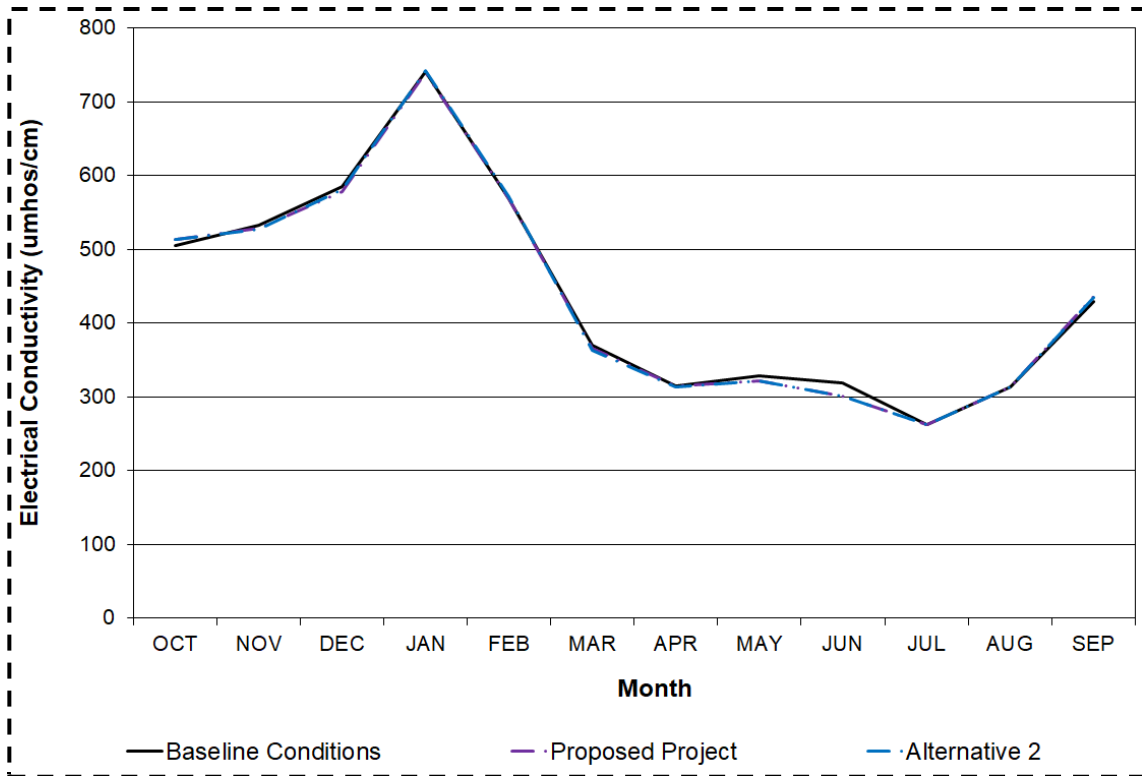
Figure 11-38. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for Old River at Rock Slough, Water Years 1922–2021, Alternative 2

11.5.3   Aquatic Biological Resources

Under Alternative 2, the approximately two-week increase in CCF diversion capacity during December and March is the same as that included in the Proposed Project, so that SWP south Delta exports under Alternative 2 would be essentially the same as under the Proposed Project in these months (Figures 11-39 and 11-40). The results of the salvage-density method illustrate SWP south Delta exports would be very similar under Alternative 2 as under the Proposed Project (Tables 11-5 through ~~11-23~~ 11-25). Operational criteria for species protection (e.g., OMR management as described in Chapter 2, "Project Description") would be in place under all alternatives, minimizing potential negative effects. Alternative 2 includes the May deployment of the SWP-facilitated fallowing inject that is also included in Alternative 1, so associated differences relative to the Proposed Project for factors such as winter/spring Delta outflow (Tables ~~11-24 through 11-27~~ 11-26 through 11-29) and its potential associated effects on aquatic biological resources also would be similar to those described for Alternative 1 and not greatly different from the Proposed Project (Tables ~~11-28, 11-29, and 11-30~~ 11-30, 11-31, and 11-32 ; Figures 11-41, 11-42, and 11-43 ~~, 6-50, 6-50a, and 6-50b~~ ; Figures 6-53, 6-54, and 6-55; Tables 6-26, 6-27, and 6-28). Effects as a result of operations at other times of the year would be very similar to the Proposed Project, as illustrated by the Delta Smelt LCME modeling results (Table ~~11-31~~ 11-33 ; Figures 11-44 and 6-43).
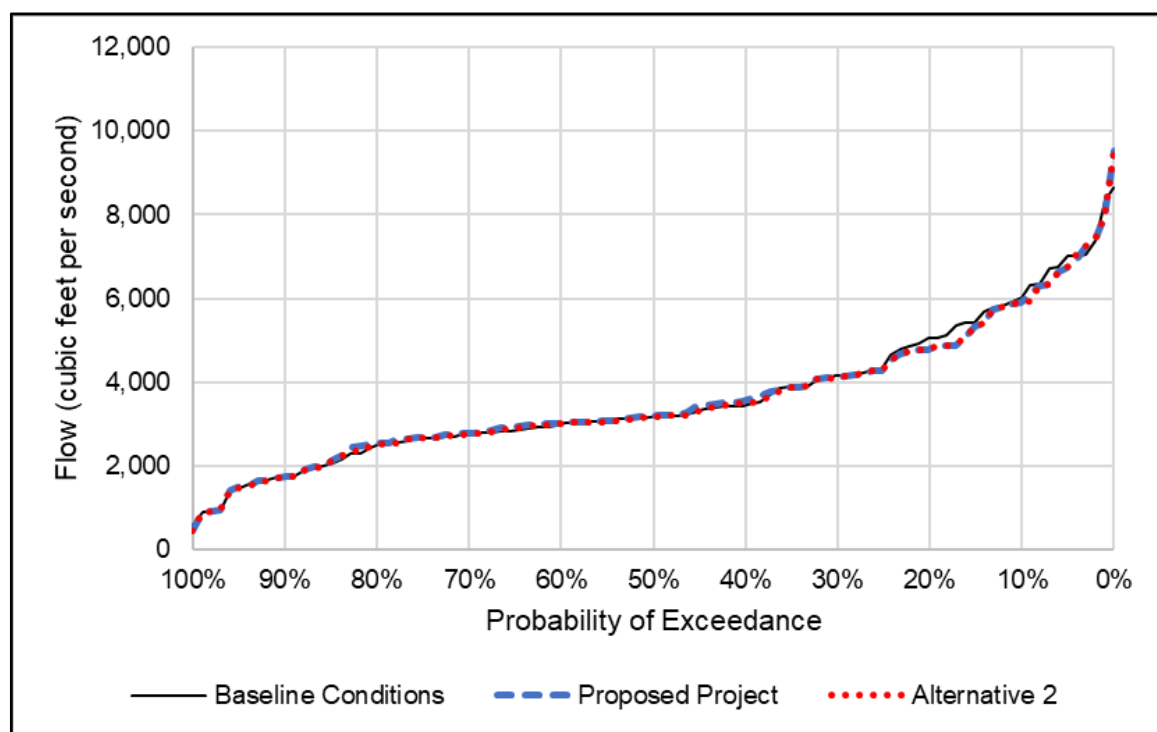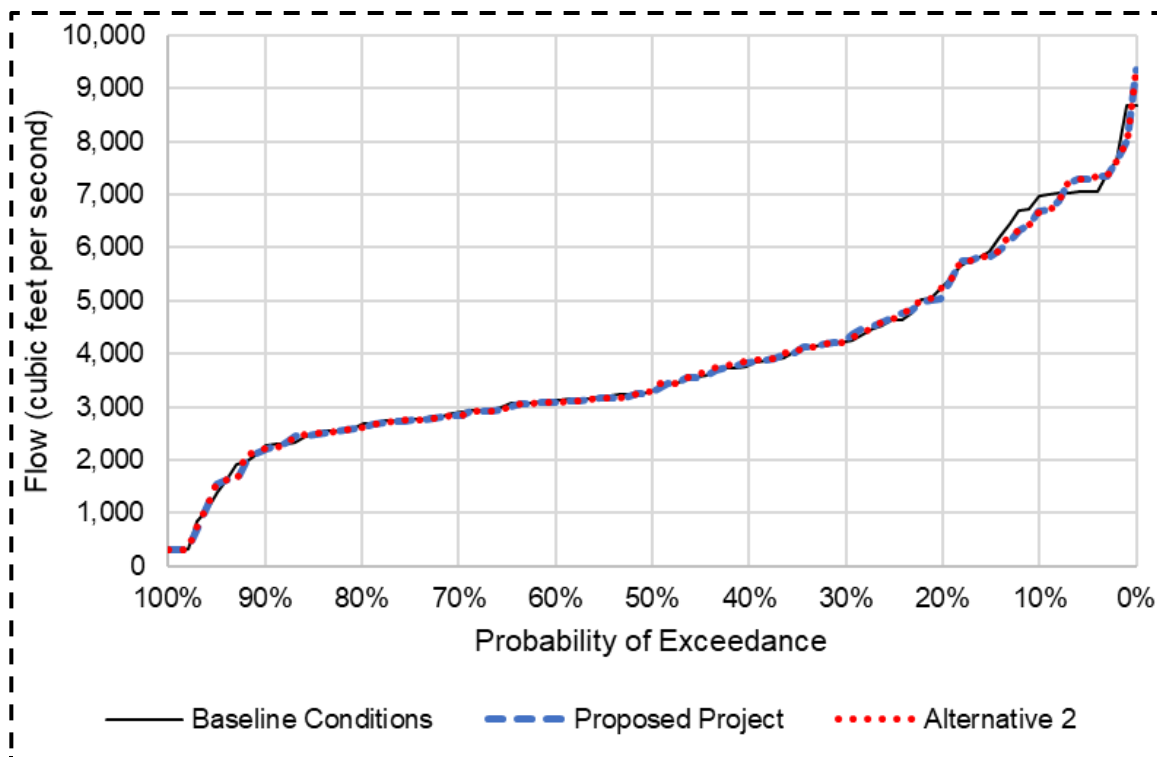
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Figure 11-39. Mean Modeled SWP South Delta Exports (Baseline Conditions, Proposed Project, and Alternative 2), December
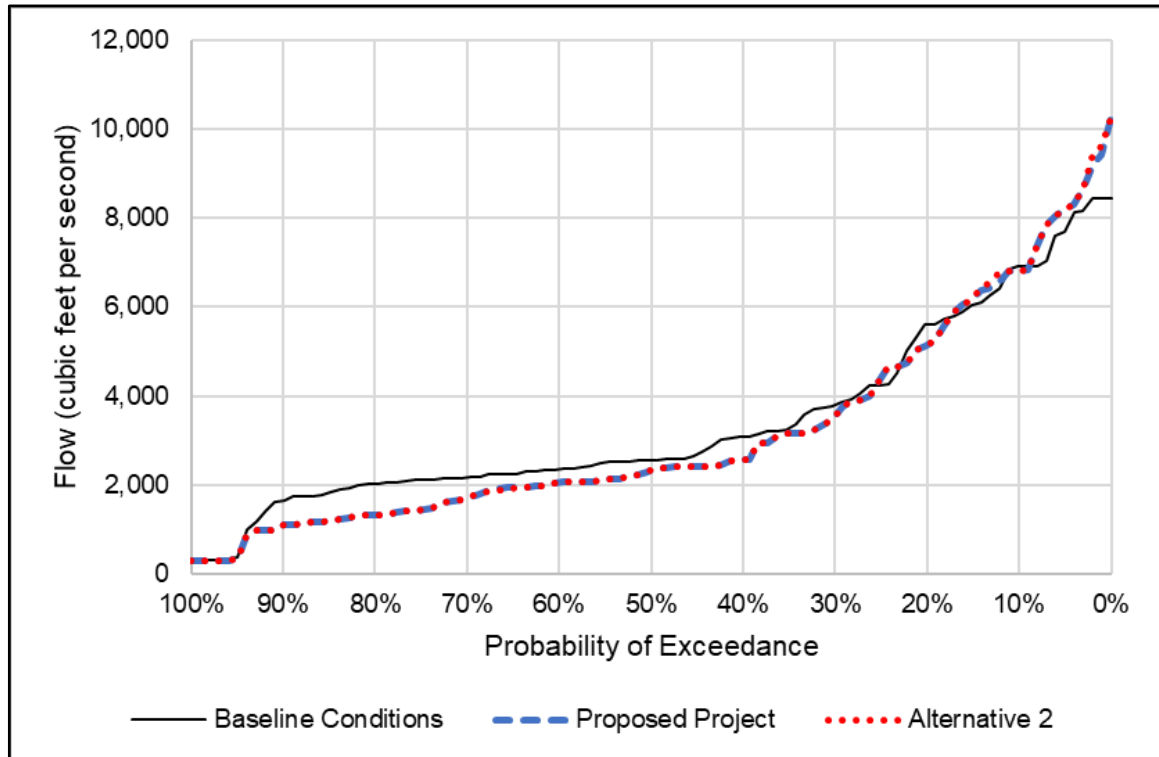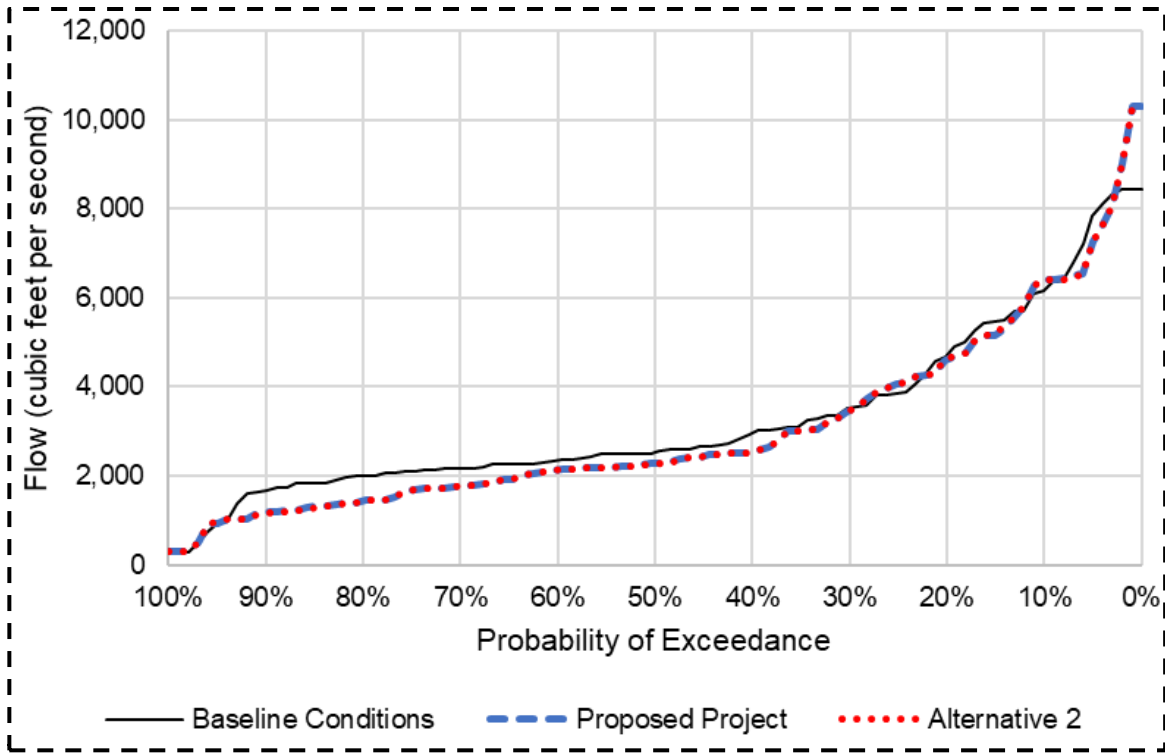
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DRAFT_TrendReport_MultiCalSim_rev12_DEIR_FEIR_7_7v2_9b_comp_7.23.xlsx .

Figure 11-40. Mean Modeled SWP South Delta Exports (Baseline Conditions, Proposed Project, and Alternative 2), March
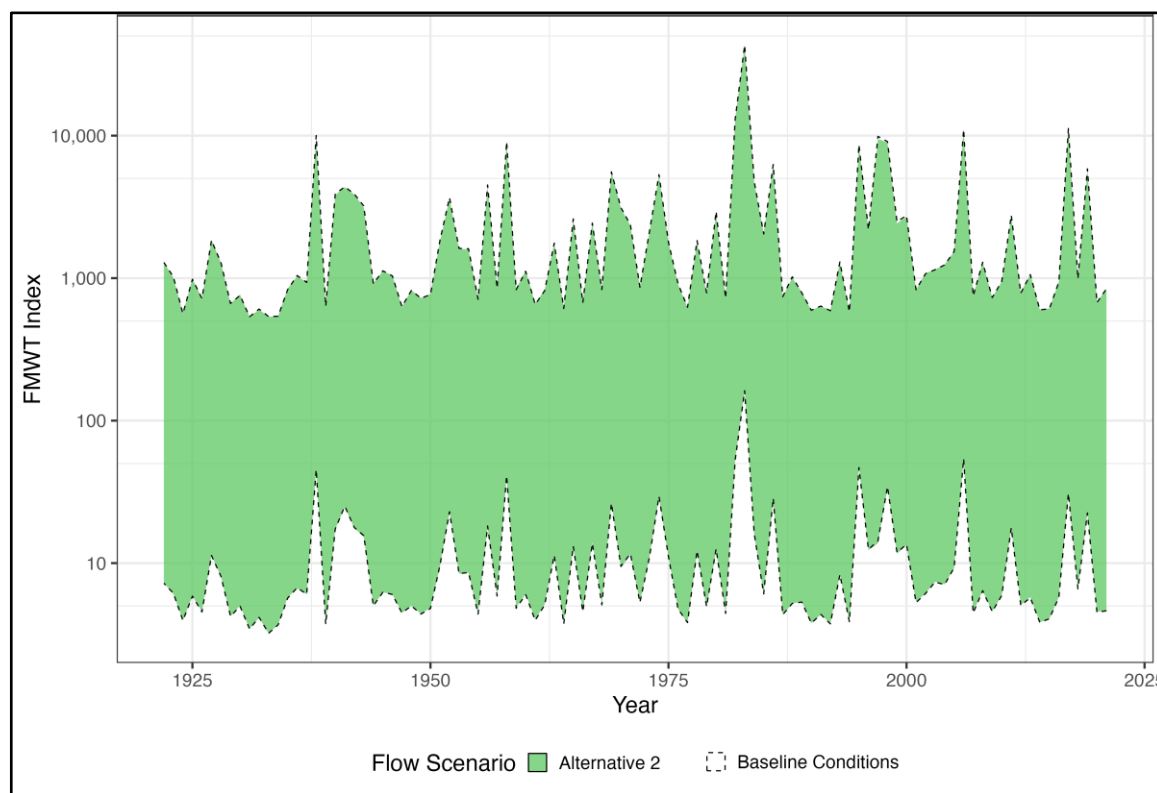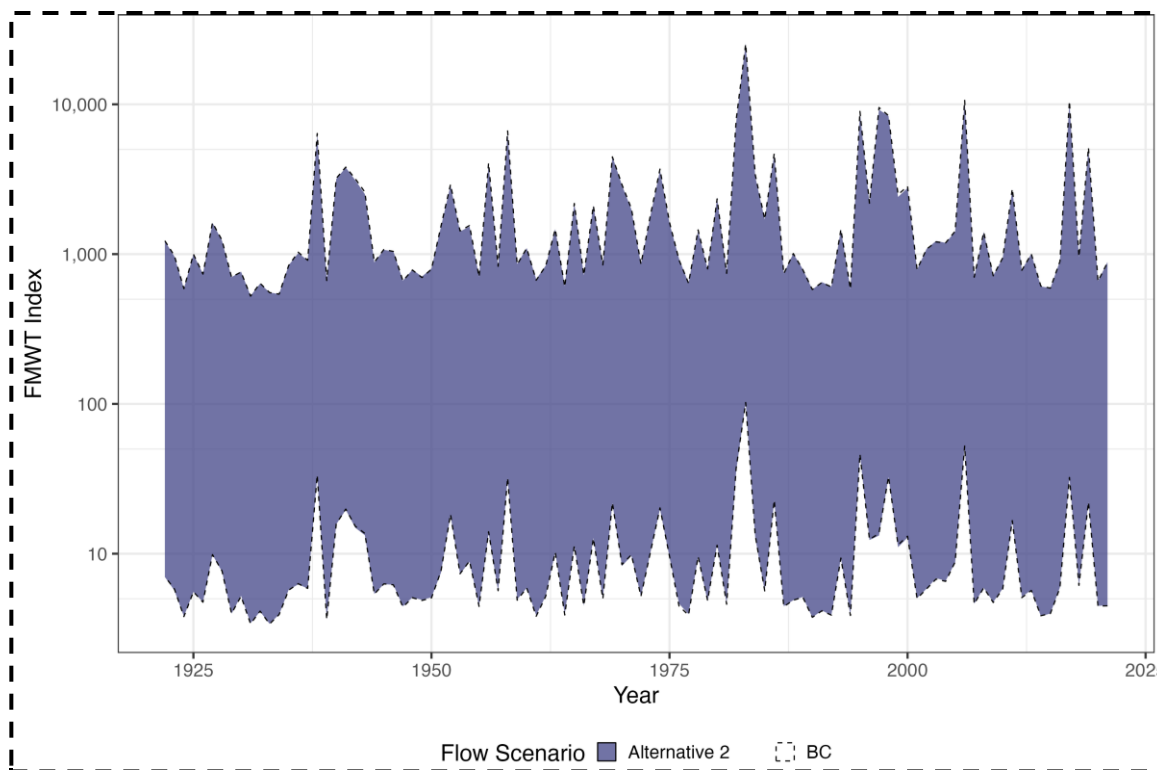
Figure 11-41. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Fall Midwater Trawl Index from Application of the Delta Outflow-Abundance Index Method for Alternative 2 and Baseline Conditions (BC) Scenarios
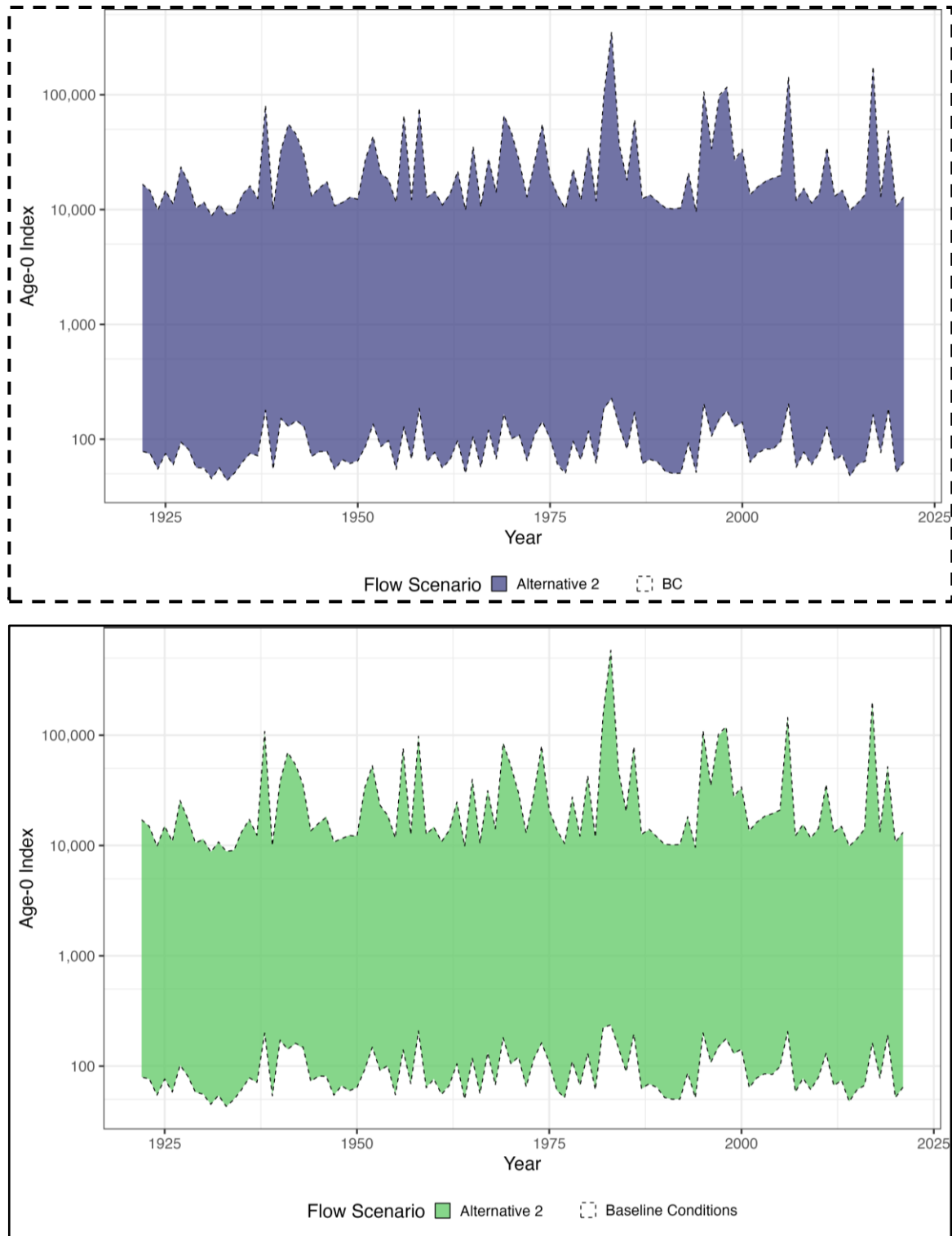
Figure 11-42. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Midwater Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 2 and Baseline Conditions (BC) Scenarios
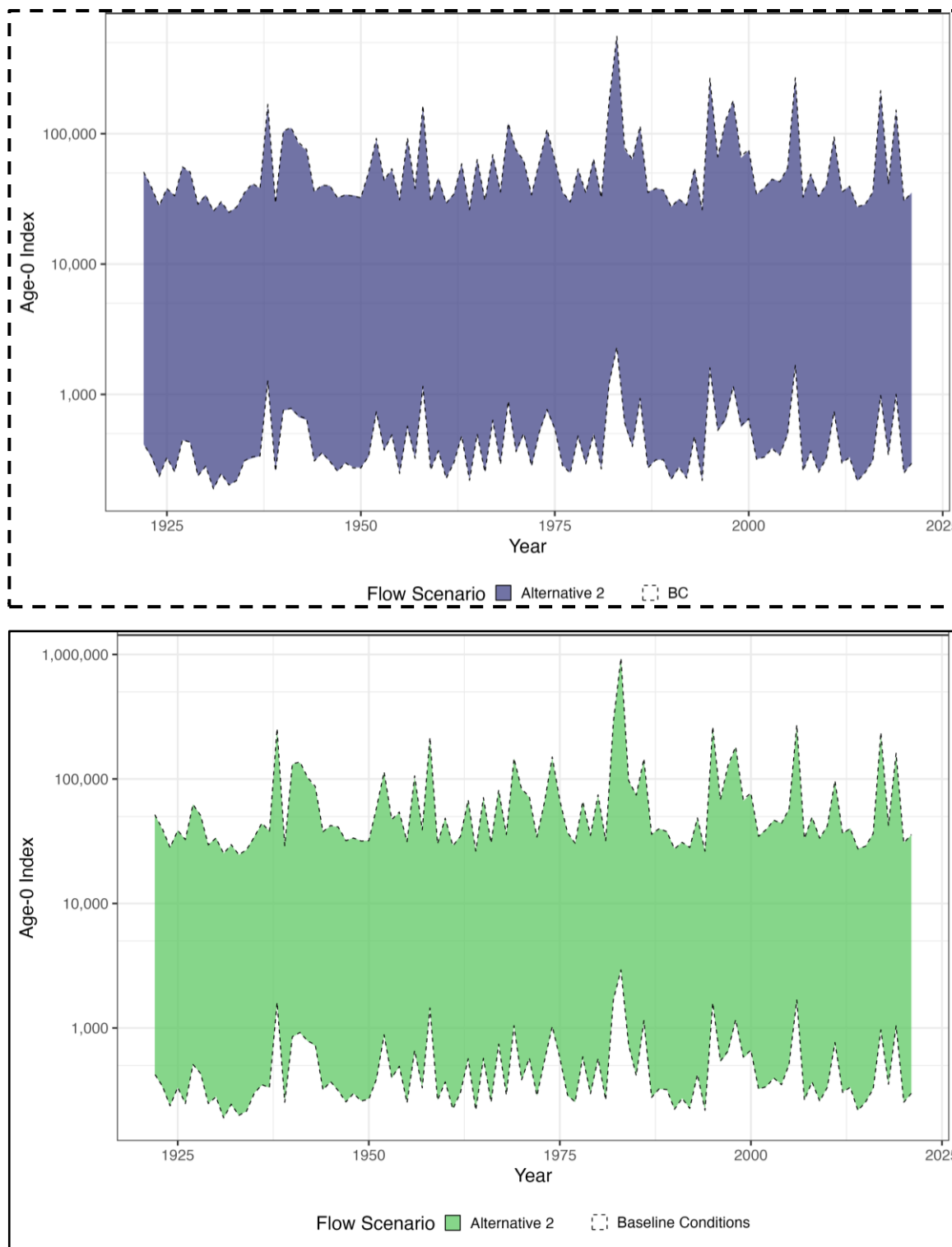
Figure 11-43. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Otter Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 2 and Baseline Conditions (BC) Scenarios
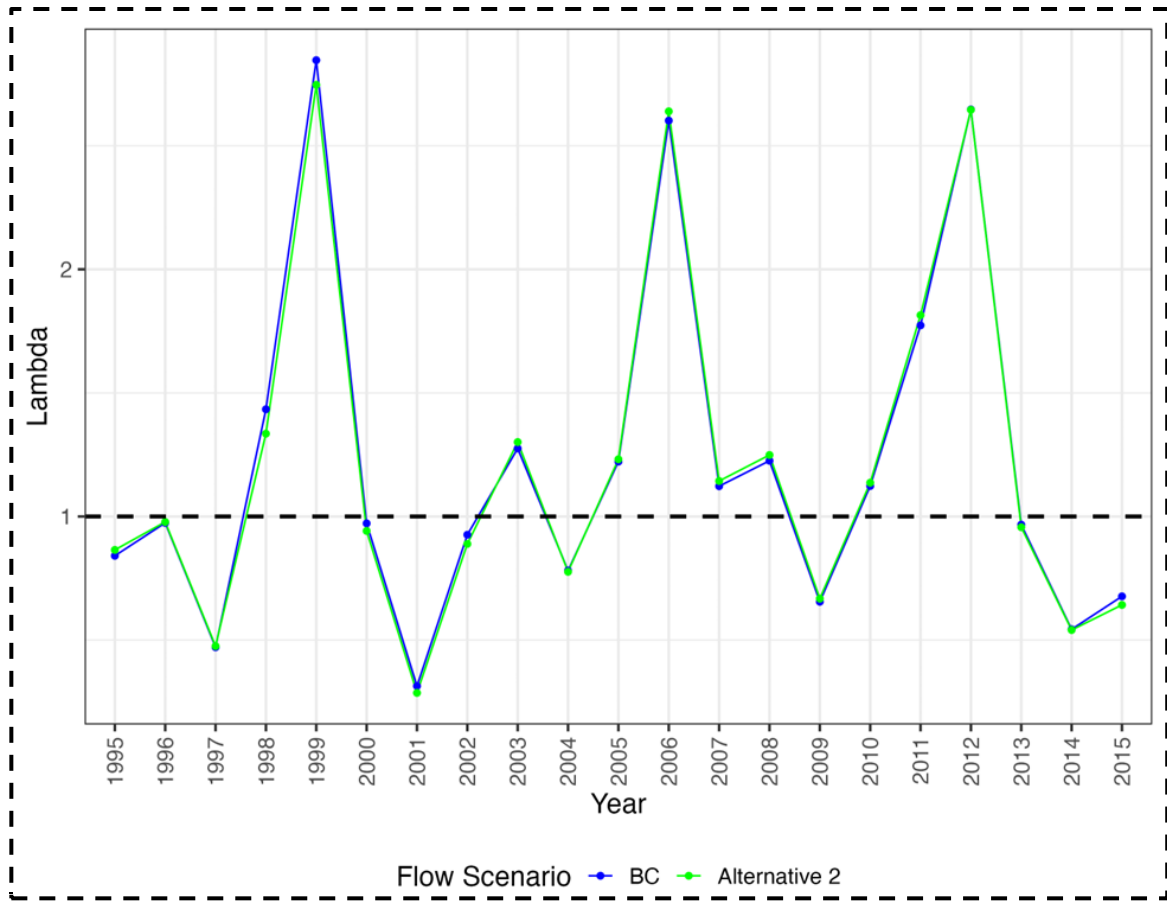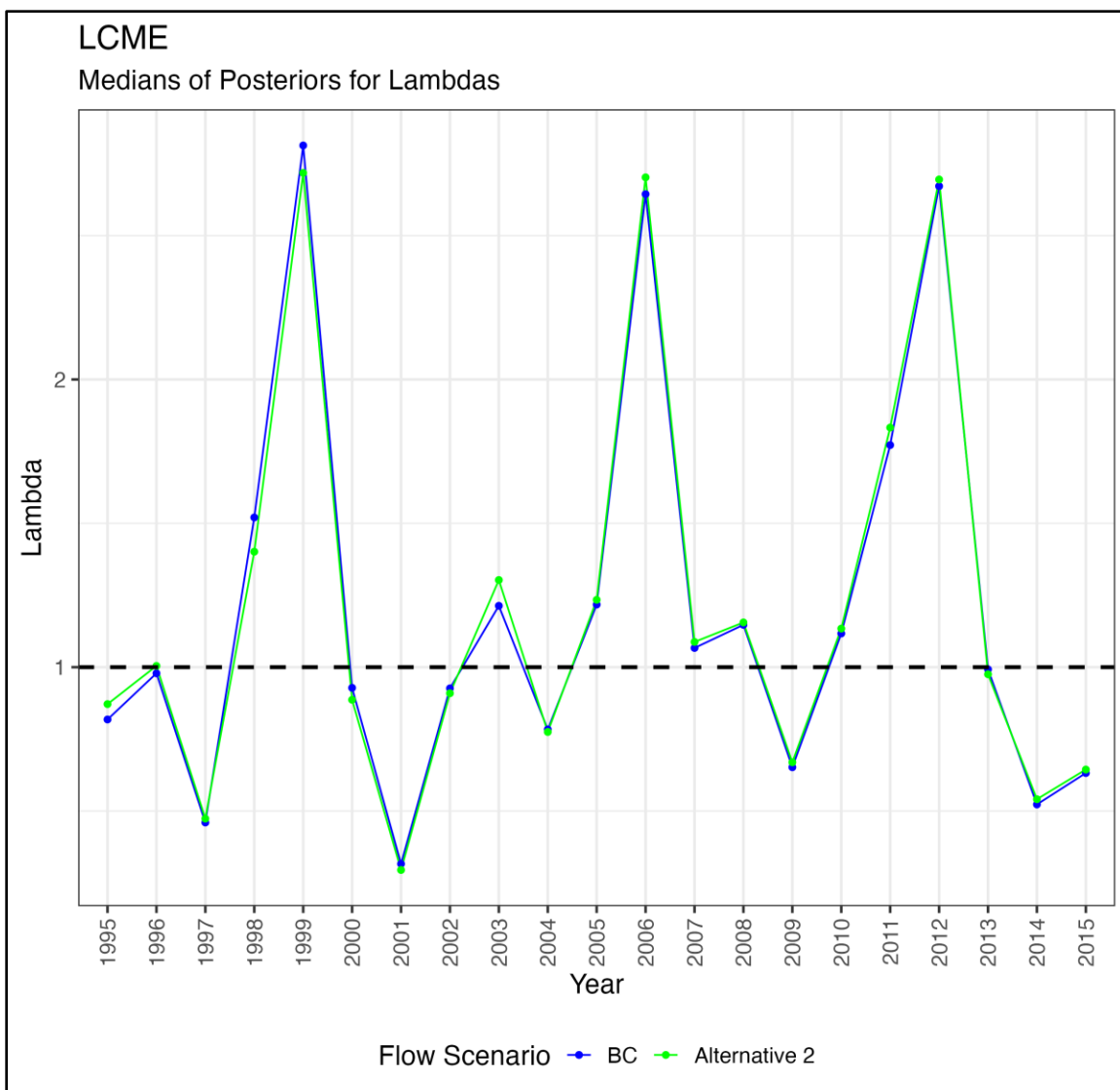
Note: BC = Baseline Conditions; median is 50th percentile of posterior distribution by year. Broken line indicates lambda = 1, i.e., the population replacement rate.

Figure 11-44. Median Population Growth Rate (Lambda) from Delta Smelt LCME Modeling for Baseline Conditions and Alternative 2

Effects related to other Project activities (Delta Smelt Summer and Fall Habitat Actions; John E. Skinner Delta Fish Protective Facility; Habitat Restoration; Delta Smelt Supplementation; Water Transfers; Agricultural Barriers; Barker Slough Pumping Plant; CCF Weed Management; Suisun Marsh Operations; Monitoring and Special Studies; and Drought-related Actions) would be as described for the Proposed Project in Chapter 6, "Aquatic Biological Resources."

Like the Proposed Project, the impact on aquatic biological resources from Alternative 2 would be less than significant.

11.5.4   Other Resources

Because the only difference between Alternative 2 and the Proposed Project is that Alternative 2 modifies the Spring Delta Outflow component of the Proposed Project by limiting the portion of the Voluntary Agreement program that allows flow purchases acquired through SWP diversion fees (implemented through tributary inflow from the fallowing program) to May (rather than March, April, or May under the Proposed Project), overall long-term average Delta outflow, exports, or other hydrologic conditions would be similar under Alternative 2 and the Proposed Project. Because differences in these long-term average hydrologic variables would be minimal, impacts on all other resources under Alternative 2 would be expected to be the same as described for the Proposed Project.

11.6   Alternative 3: Flexible Deployment of SWP-Facilitated Fallowing Inject and No Expansion of the CCF Increased Winter Diversion Window

Alternative 3 is a variation of the Proposed Project that modifies seasonal operations (see Section 2.3.1, "Seasonal Operations") and keeps the period during which increased diversions from the CCF can occur the same as Baseline Conditions. This keeps operations to a U.S. Army Corps of Engineers notice that allows for CCF diversions to increase above 6,680 cfs from mid-December to mid-March (assumed December 15 to March 15). During this window CCF diversions can increase by one-third of the San Joaquin River flow at Vernalis.

All other components of the Proposed Project are included in Alternative 3, including flexible deployment of the Spring Delta Outflow component of the Proposed Project, which allows the portion of the Voluntary Agreement program flow purchases acquired through SWP diversion fees to occur from March through May.

11.6.1   Surface Water Hydrology

The relative incremental changes in surface water hydrology due to Alternative 3 as compared to the Baseline Conditions are similar to those described under the Proposed Project in Chapter 4, "Surface Water Hydrology." The CalSim 3 model was used for quantifying the changes in river flows, Delta channel flows, and exports. Key output parameters for the Baseline Conditions, Proposed Project, and Alternative 3 are presented in Figures 11-45 through 11-57. Operations results from these simulations were analyzed to determine whether the incremental changes between the Baseline Conditions and Proposed Project remain similar with Alternative 3.

CalSim 3 simulation results for the Proposed Project (red lines) and Alternative 3 (purple lines) display noteworthy changes to diversions from the Baseline Conditions (black lines) in some high flow years. However, consistent with Alternatives 1 and 2, the relative incremental changes between the Baseline Conditions and Alternative 3 are similar, on average, when compared to the Proposed Project. Monthly long-term average flow for the Sacramento River at Freeport, Yolo Bypass, Georgiana Slough, Delta Cross Channel, Qwest, Delta Outflow, and combined OMR, as well as monthly export patterns, show little to no differences between the Proposed Project and Alternative 3. Consistent with Alternative 1, simulated export exceedances for Alternative 3 for December and March show incremental decreases, relative to the Proposed Project, roughly ~~15~~ 10 percent of the time in December and ~~5~~ 10 percent of the time in March (Figures 11-53 and 11-56, respectively). ~~As expected, these~~ These changes are not observable in January and February. Annually, simulated exports show similar patterns in incremental changes between the Baseline Conditions and Proposed Project as compared to incremental changes under Alternative 3.

In sum, surface water flows under the Proposed Project and Alternative 3 are similar. As identified for the Proposed Project, Alternative 3 would not substantially affect surface water resources.
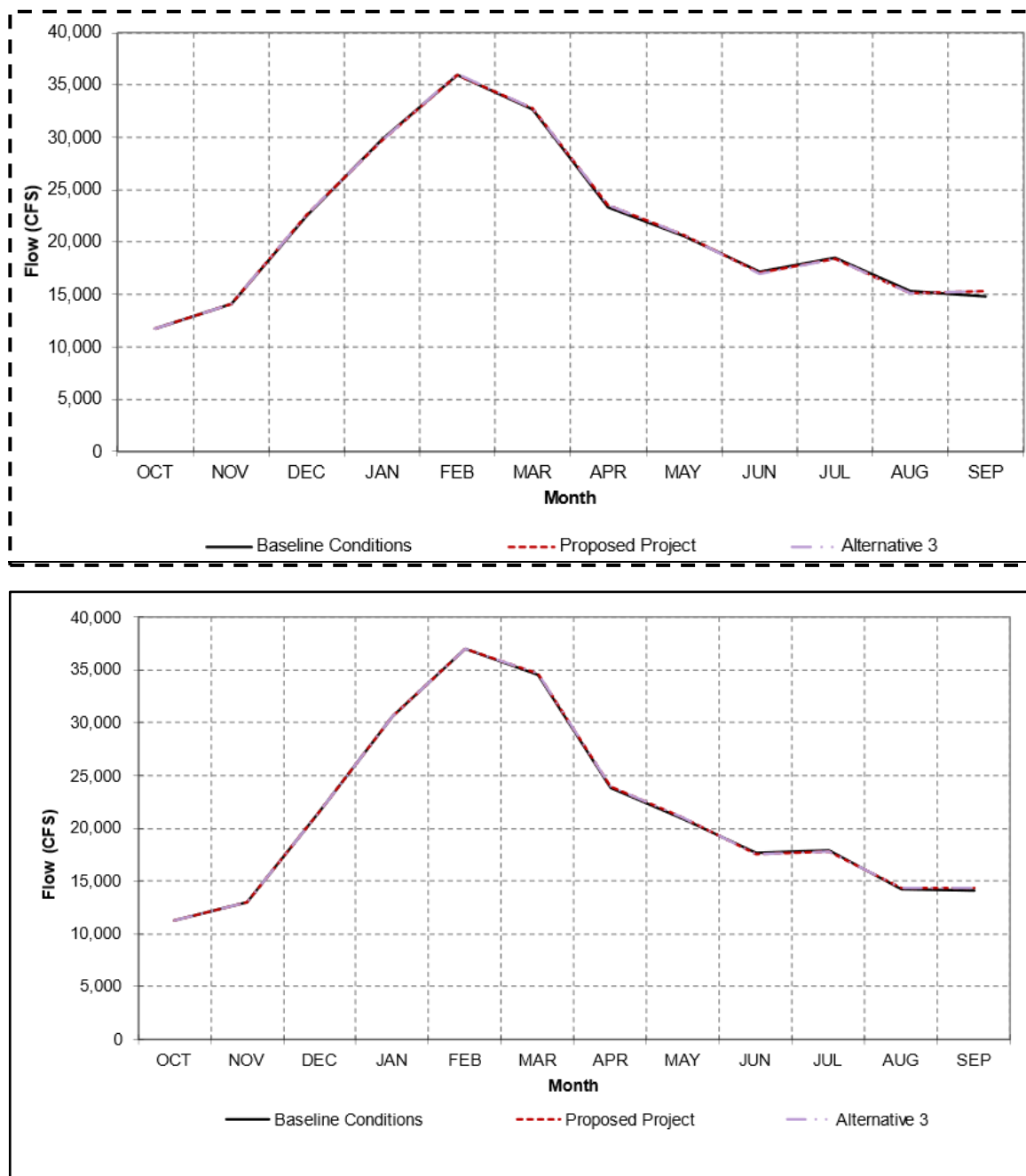
Figure 11-45. Sacramento River at Freeport Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 3
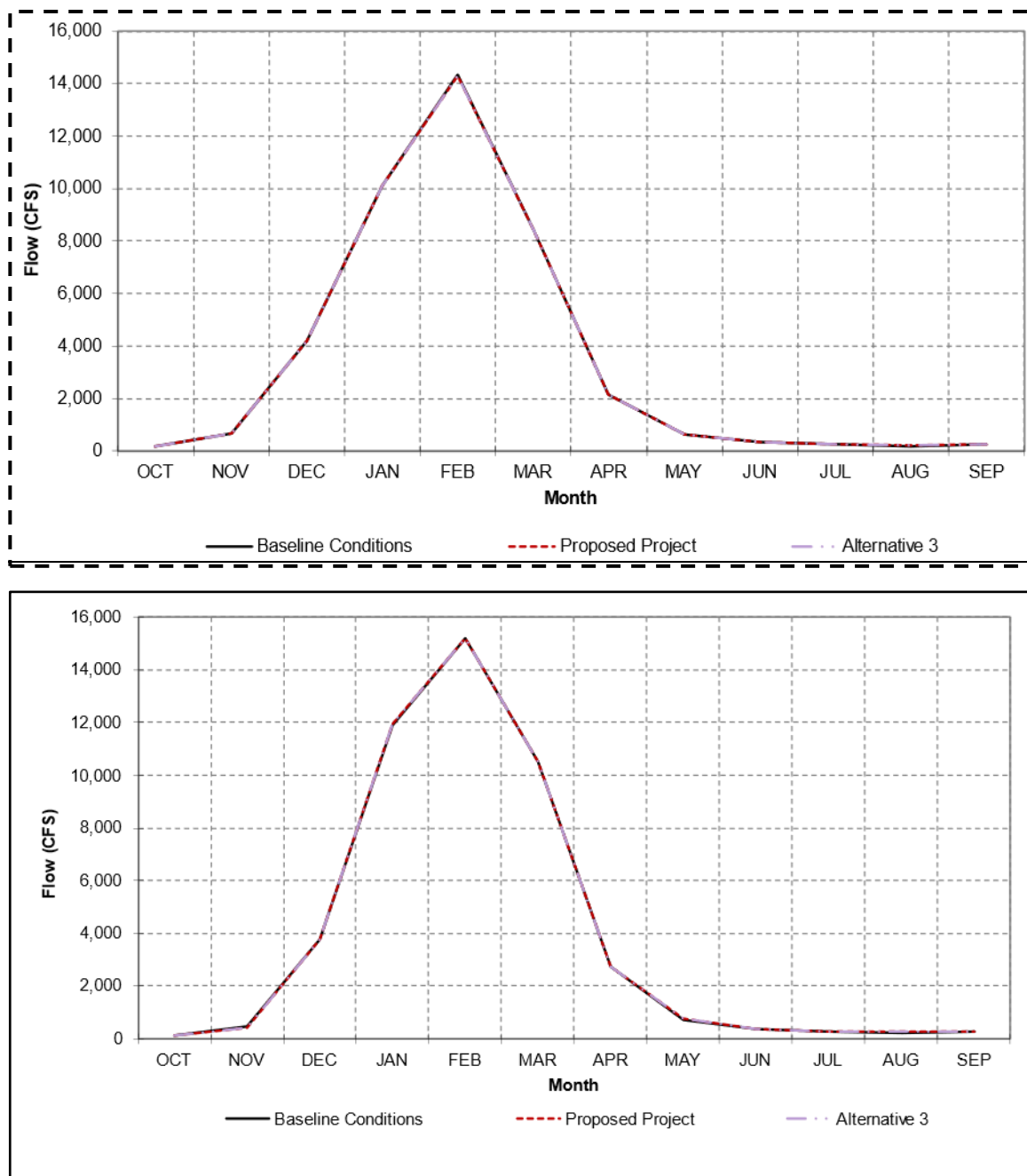
Figure 11-46. Monthly Long-term Average Yolo Bypass Flow for the Baseline Conditions, Proposed Project, and Alternative 3
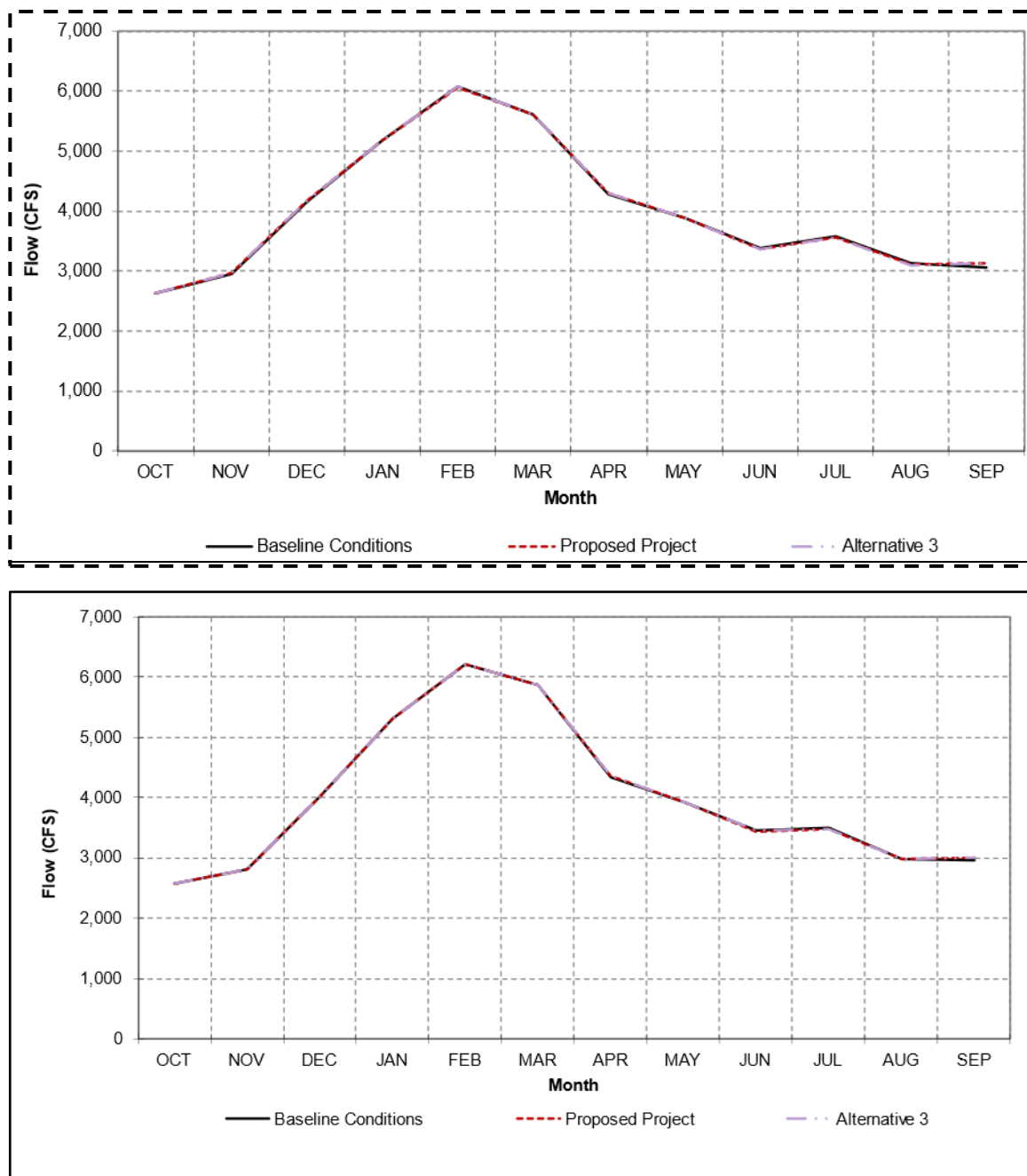
Figure 11-47. Monthly Long-term Average Georgiana Slough Flow for the Baseline Conditions, Proposed Project, and Alternative 3
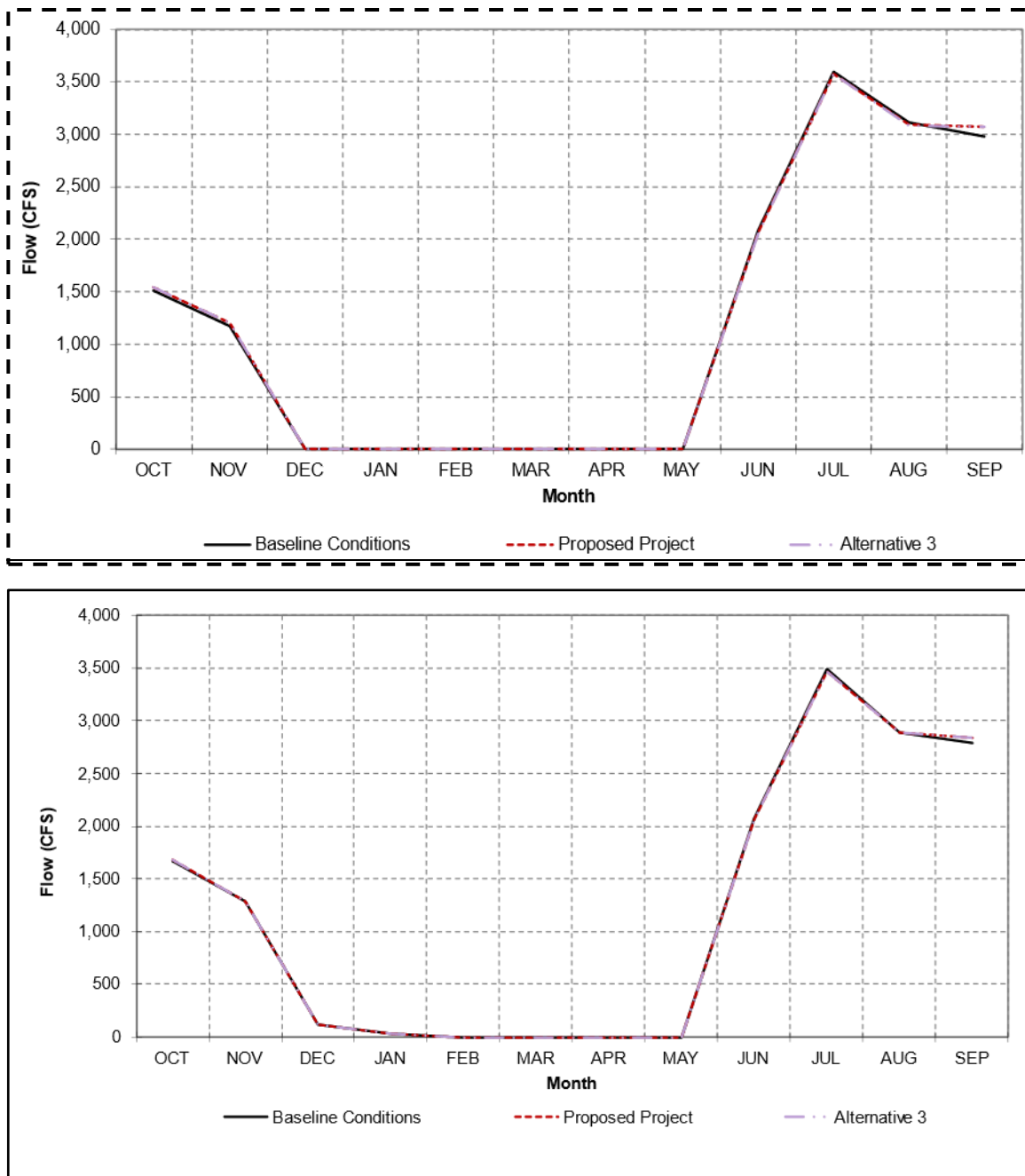
Figure 11-48. Monthly Long-term Average Delta Cross Channel Flow for the Baseline Conditions, Proposed Project, and Alternative 3

California Department of Water Resources   Alternatives to the Proposed Project
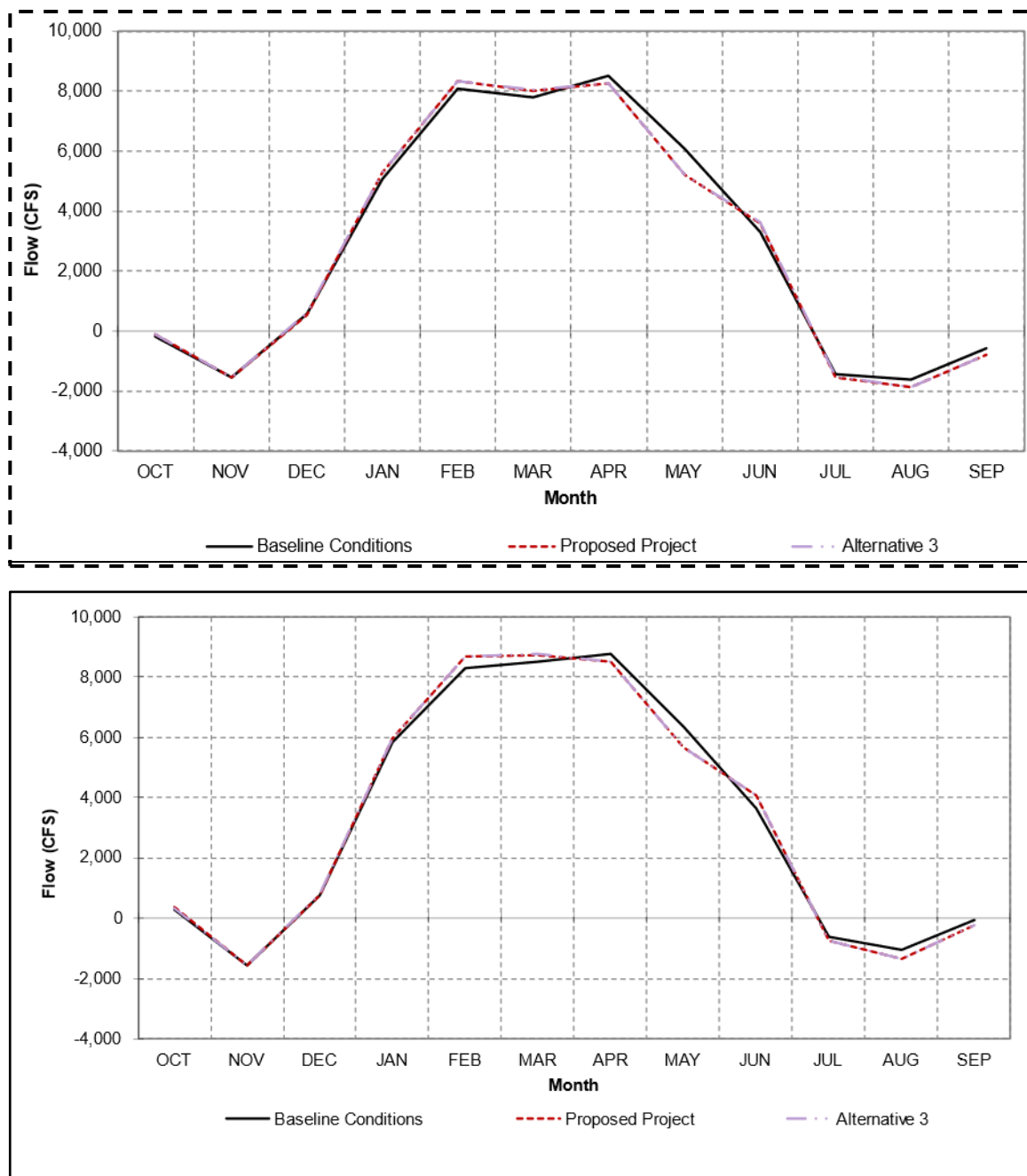
Figure 11-49. Monthly Long-term Average Qwest Flow for the Baseline Conditions, Proposed Project, and Alternative 3

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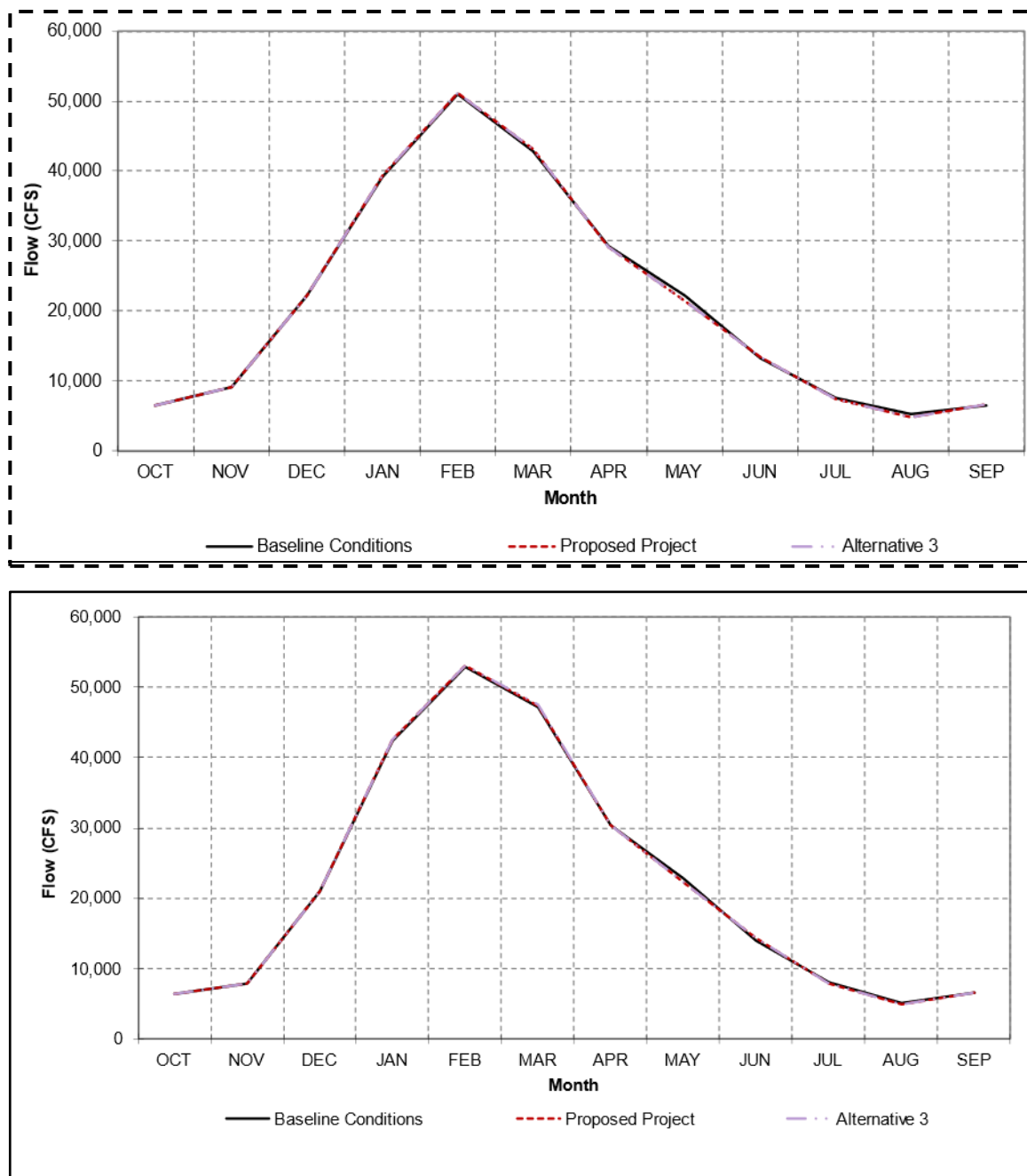
Figure 11-50. Monthly Long-term Average Delta Outflow for the Baseline Conditions, Proposed Project, and Alternative 3
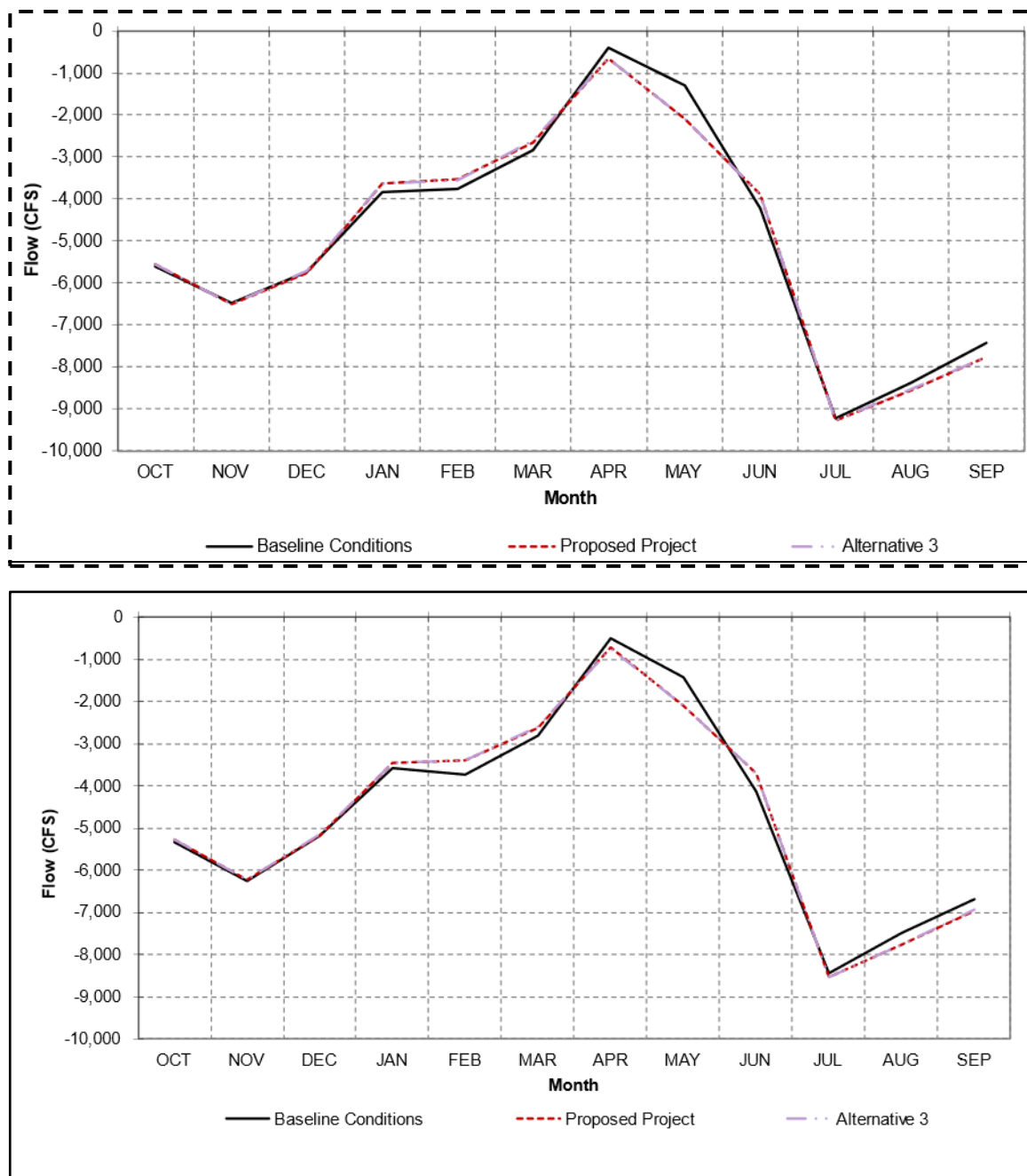
Figure 11-51. Combined Old and Middle River Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 3
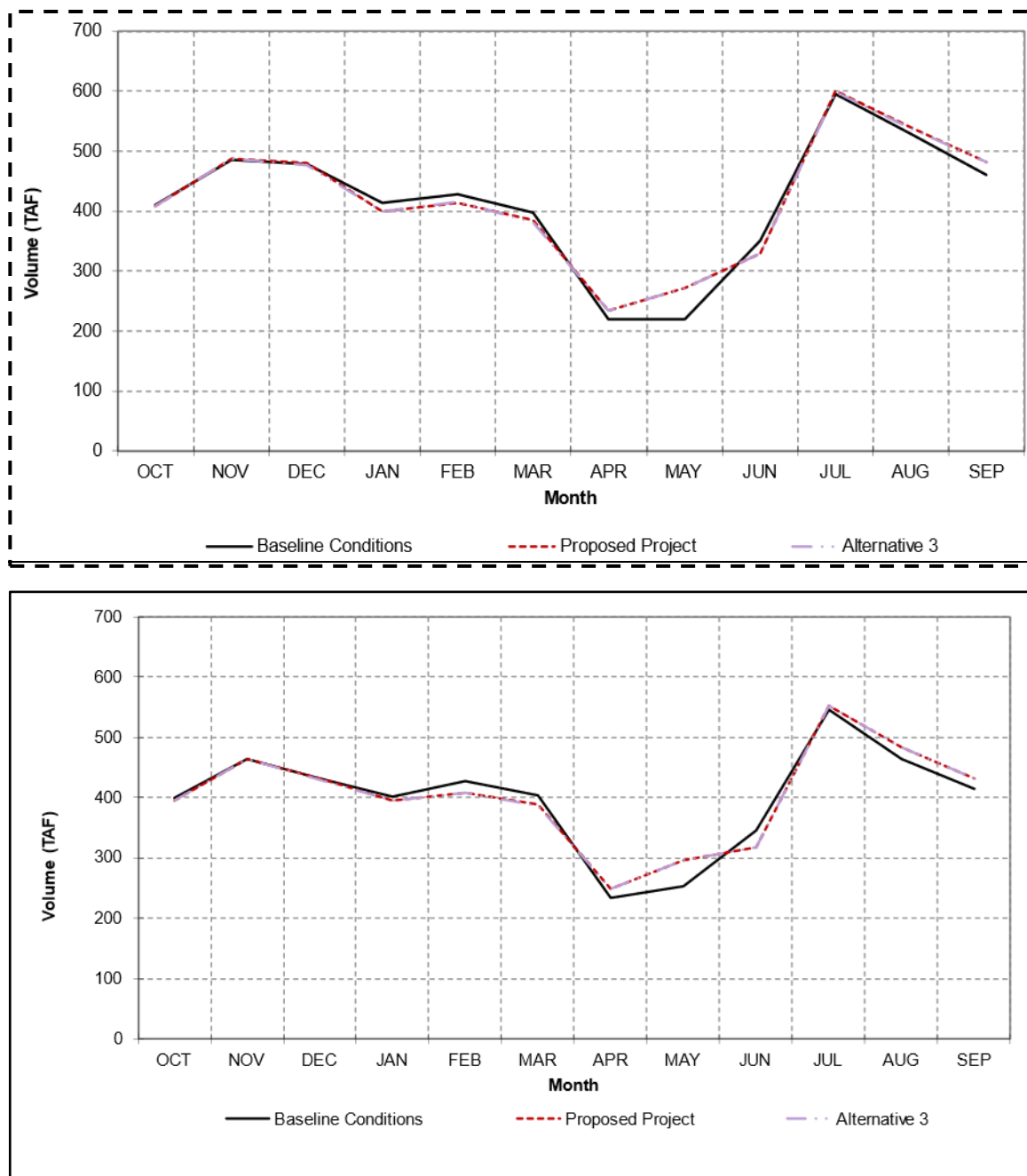
Figure 11-52. Monthly Long-term Average Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3
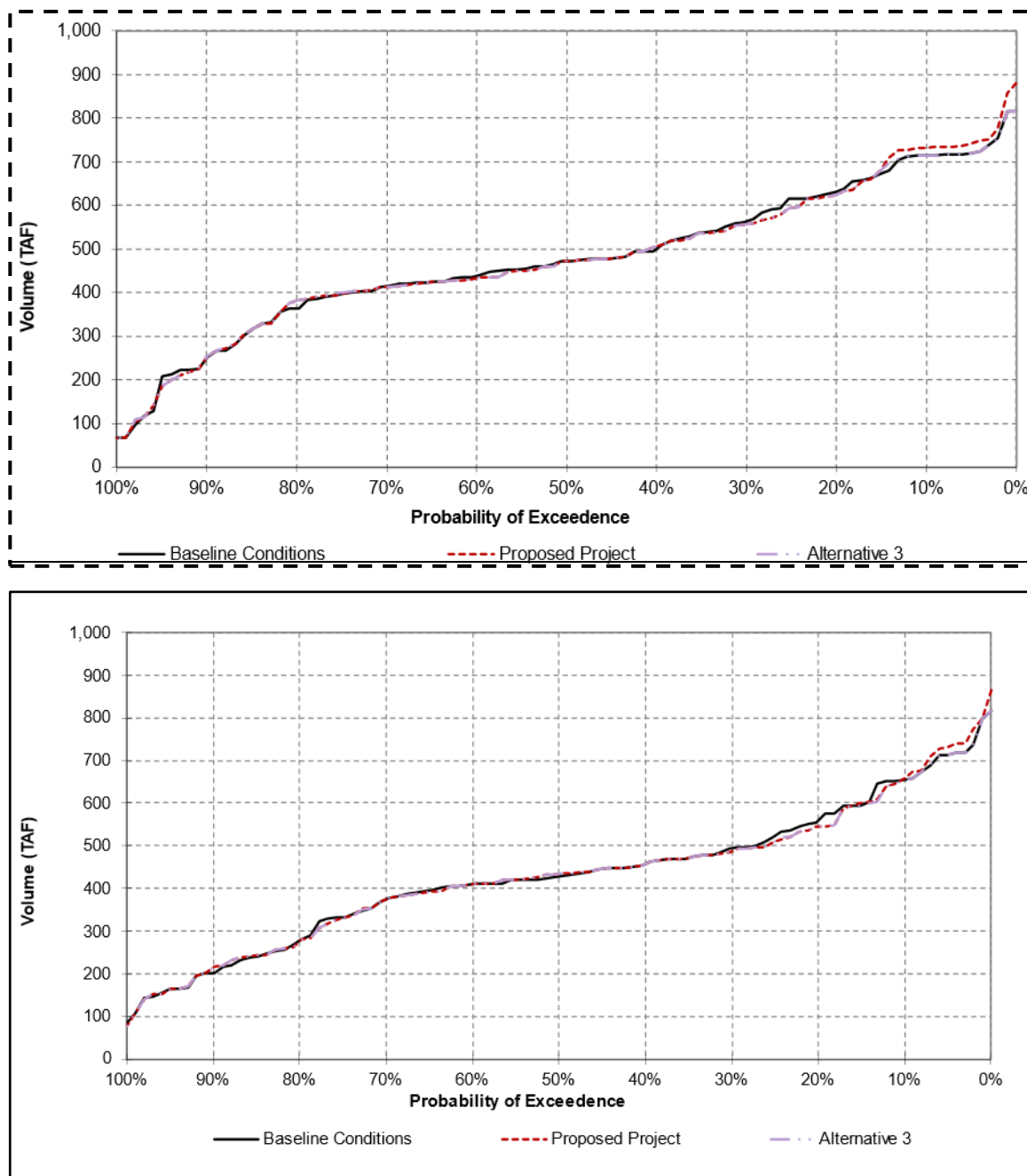
Figure 11-53. December Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3
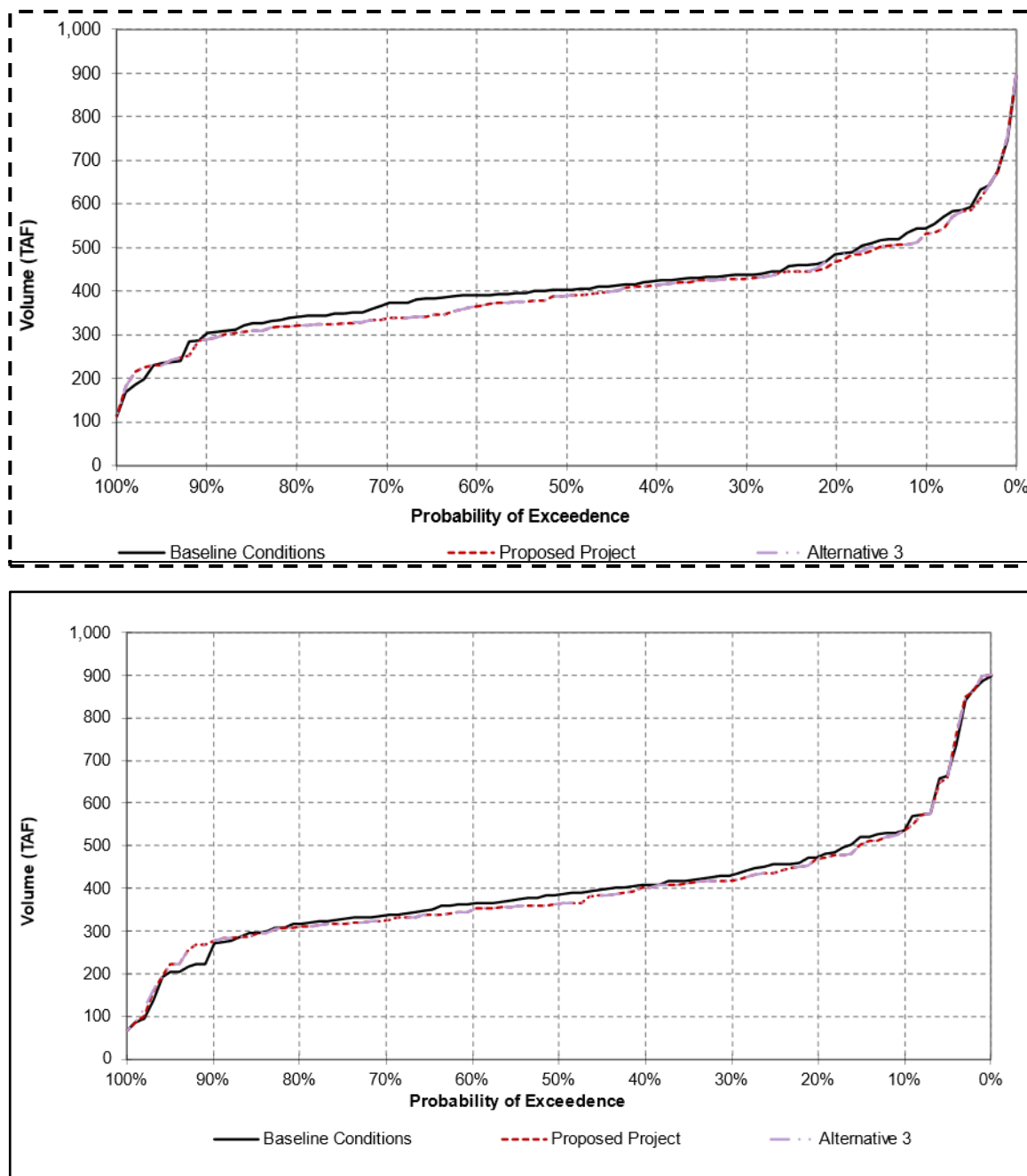
Figure 11-54. January Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3
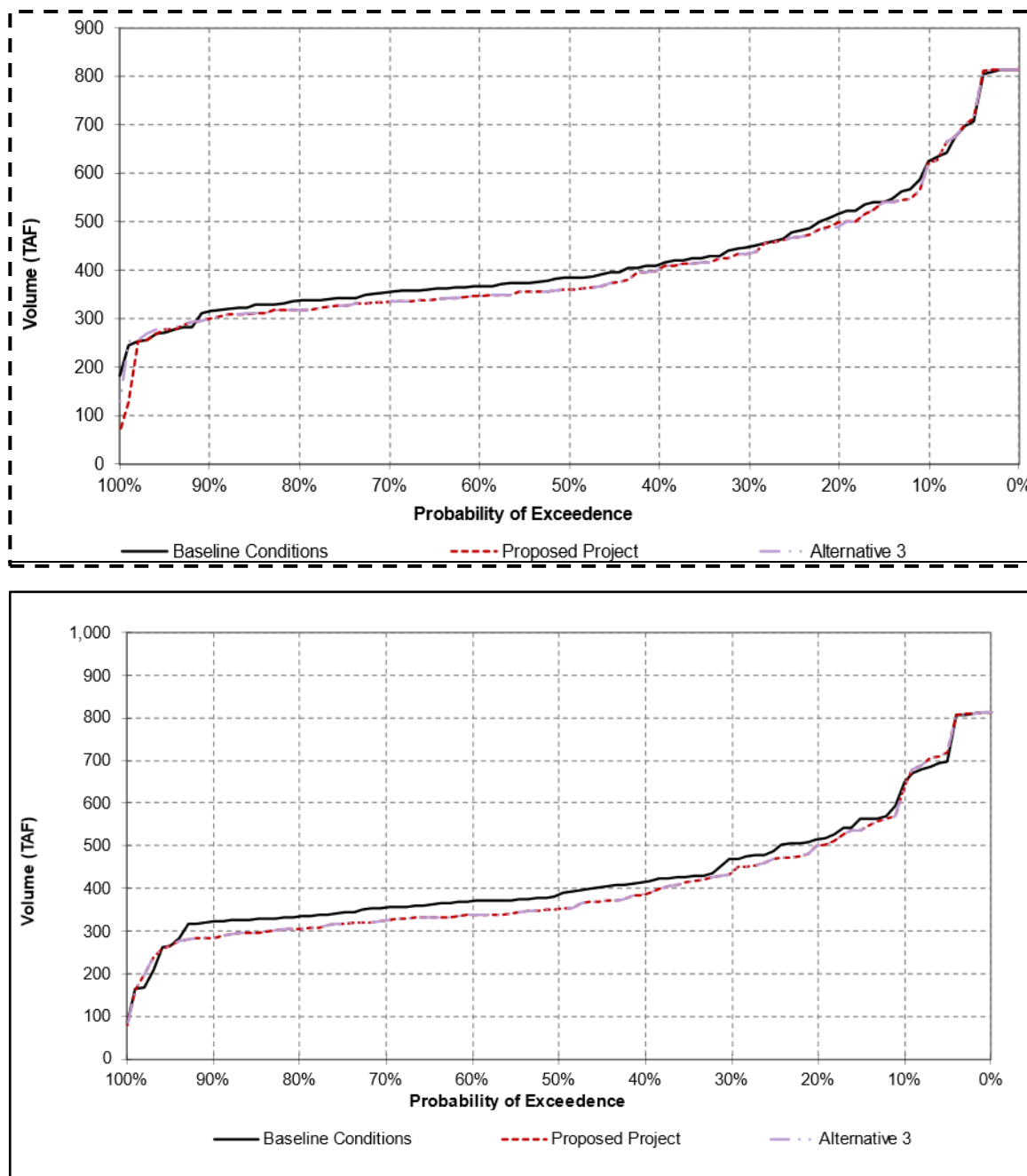
Figure 11-55. February Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3
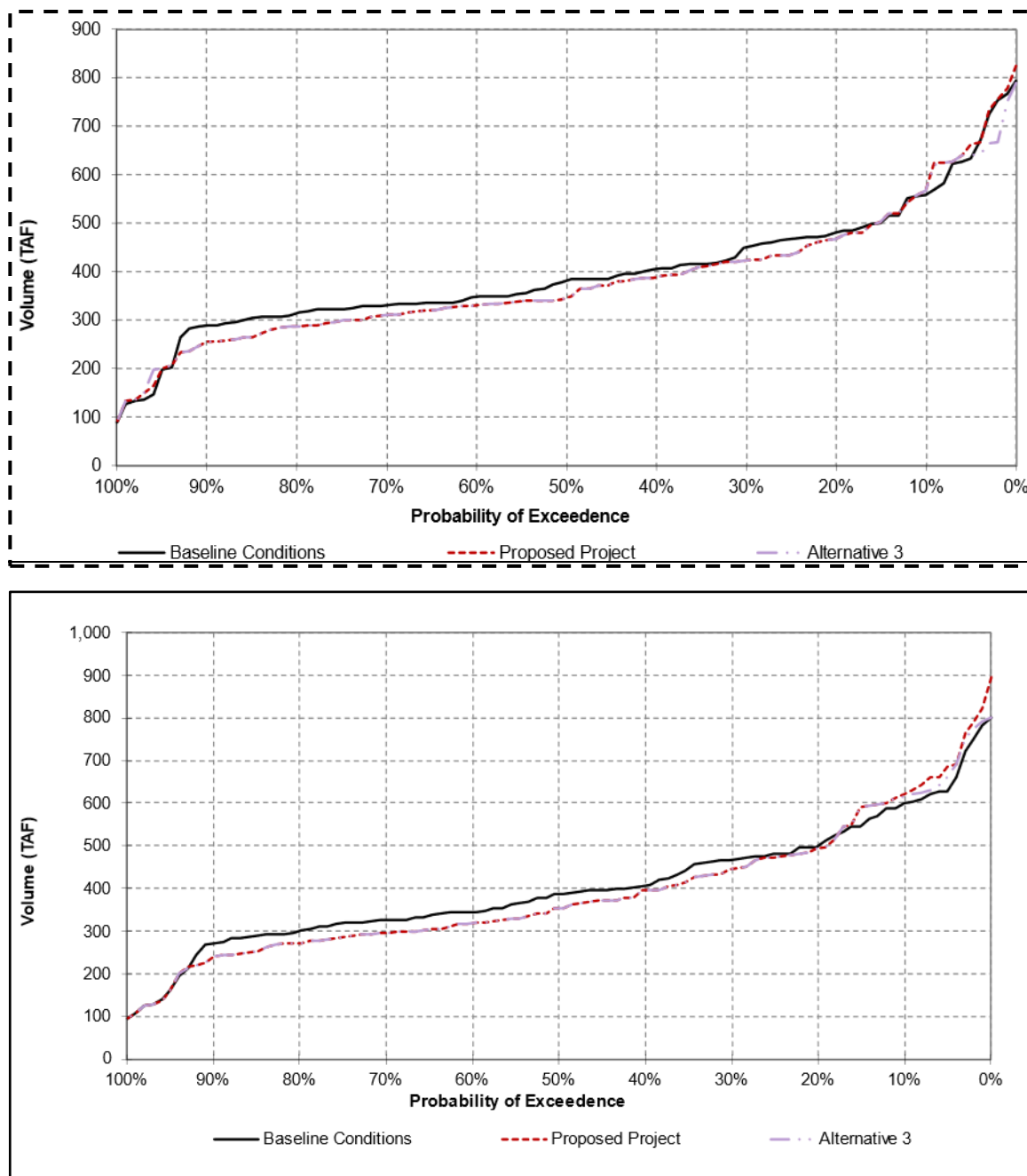
Figure 11-56. March Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3
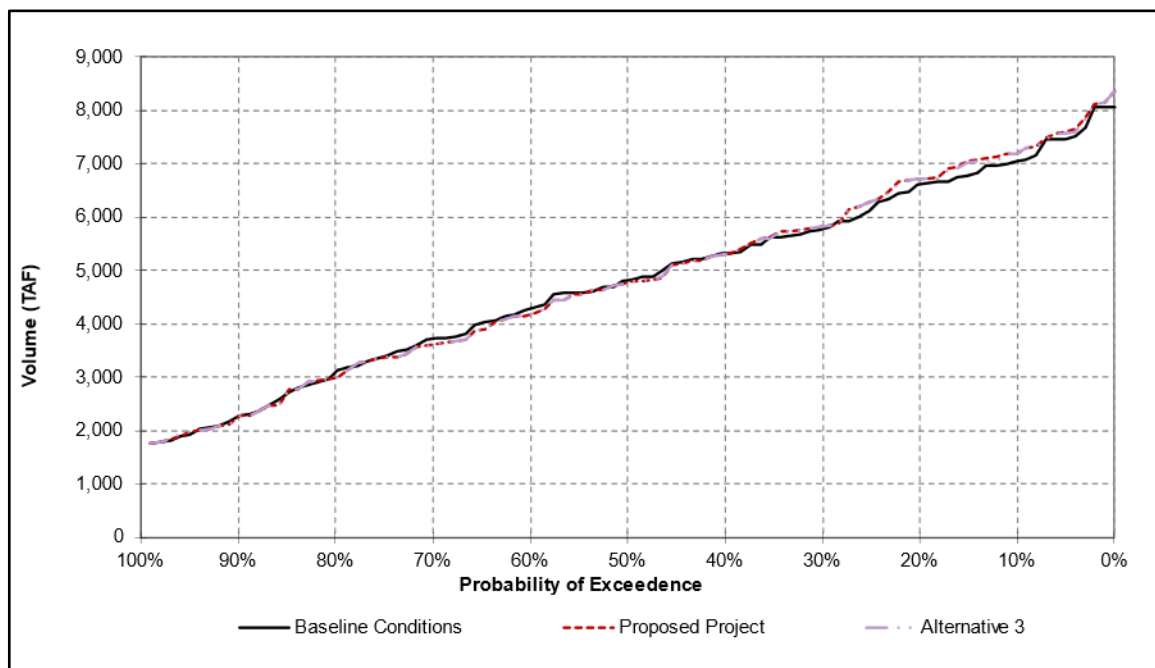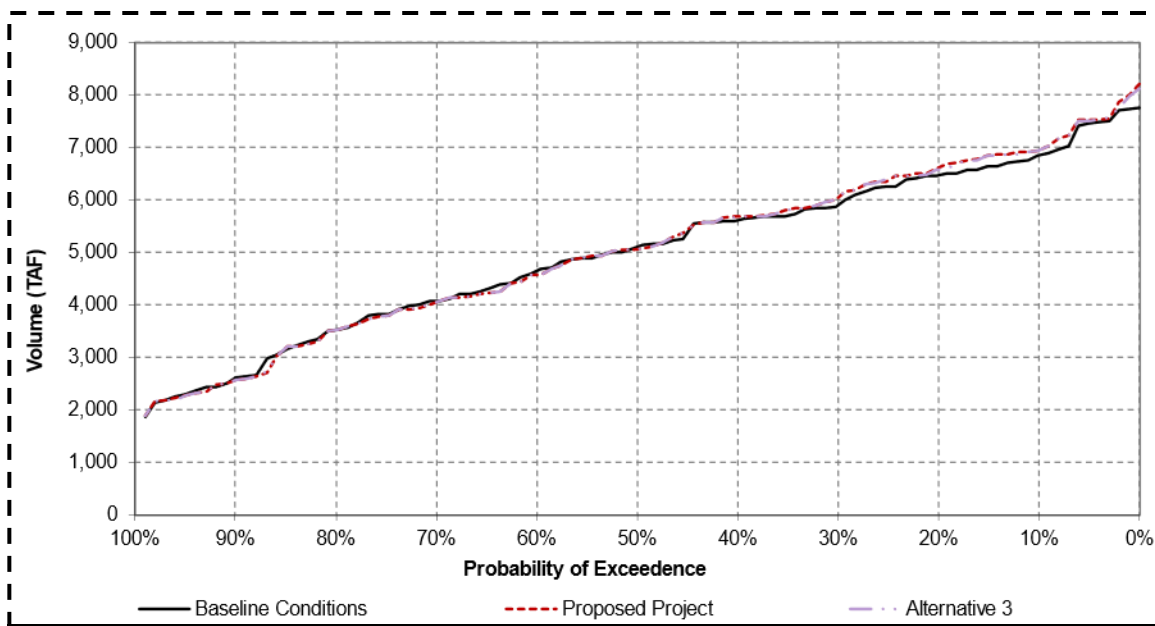
Figure 11-57. Annual Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3

11.6.2   Surface Water Quality

The potential effects of Alternative 3 on surface water quality of study area waterbodies would be similar to those described for the Proposed Project in Chapter 5, "Surface Water Quality." CalSim 3-modeleld EC for the Sacramento River at Emmaton, San Joaquin River at Jersey Point, and Old River at Rock Slough under Alternative 2, presented in Tables ~~11-38 through 11-40~~ 11-40 through 11-42 and Figures 11-58 through 11-60, differs little if at all from the Proposed Project. Chloride concentrations, which are correlated with EC, thus also would differ little from the Proposed Project at these locations and throughout the Delta.

As described in Section 11.6.1, "Surface Water Hydrology," Yolo Bypass, Delta Cross Channel, Qwest, and combined OMR flows under Alternative 3 would be similar to the Proposed Project. The minor differences in exports, inflows, and outflows in all months would indicate that residence times of water in the various Delta channels under Alternative 3 would not differ substantially from the Proposed Project. Thus, Alternative 3 also would have negligible effects on both the frequency and magnitude of Delta cyanobacterial harmful algal blooms.

Table ~~11-38~~ 11-40 . CalSim-Modeled Average Electrical Conductivity (in micromhos/cm) for the Sacramento River at Emmaton by Water Year Type, Alternative 3

Water Year Type	Baseline Conditions	Proposed Project	Difference from Baseline Conditions: Proposed Project	Alternative 3	Difference from Baseline Conditions: Alternative 3
Wet	~~488~~ 524	~~500~~ 534	~~12~~ 10 (2%)	~~500~~ 534	~~12~~ 10 (2%)
Above Normal	~~601~~ 610	617	~~16 (3%)~~ 7 (1%)	~~617~~ 616	~~16 (3%)~~ 6 (1%)
Below Normal	~~699~~ 759	~~699~~ 764	~~0 (0%)~~ 5 (1%)	~~699~~ 765	~~0 (0%)~~ 6 (1%)
Dry	~~896~~ 948	~~908~~ 958	~~12~~ 10 (1%)	~~908~~ 957	~~12~~ 9 (1%)
Critically Dry	~~1,510~~ 1,558	~~1,503~~ 1,572	~~-7 (0%)~~ 14 (1%)	~~1,501~~ 1,573	~~-9 (-1%)~~ 15 (1%)

Source: ~~LTO_9-series_trendrpt_20231201_noMacros.xlsx~~
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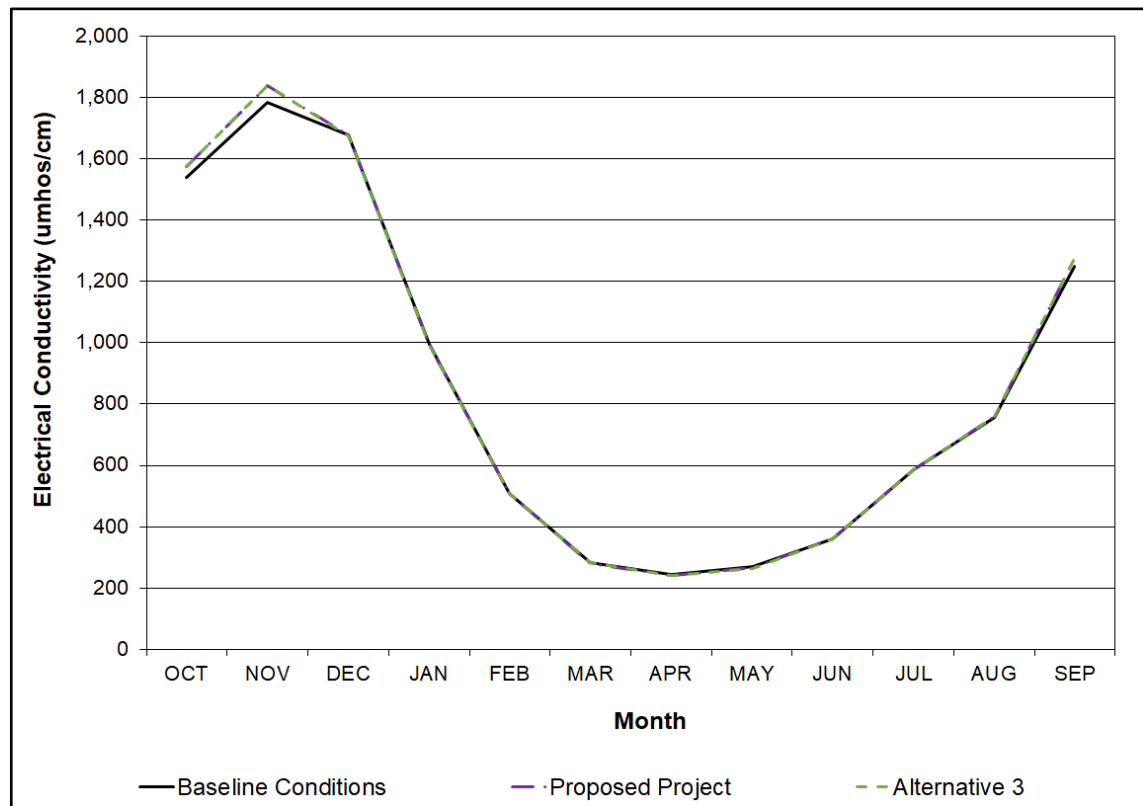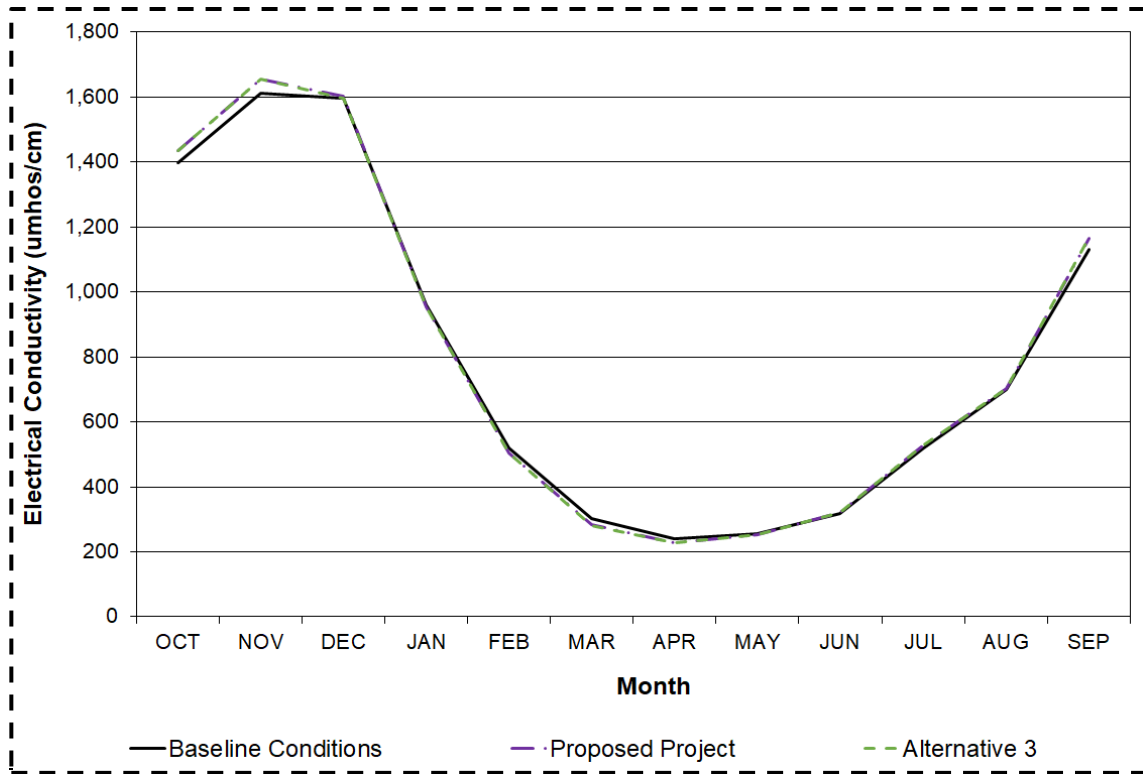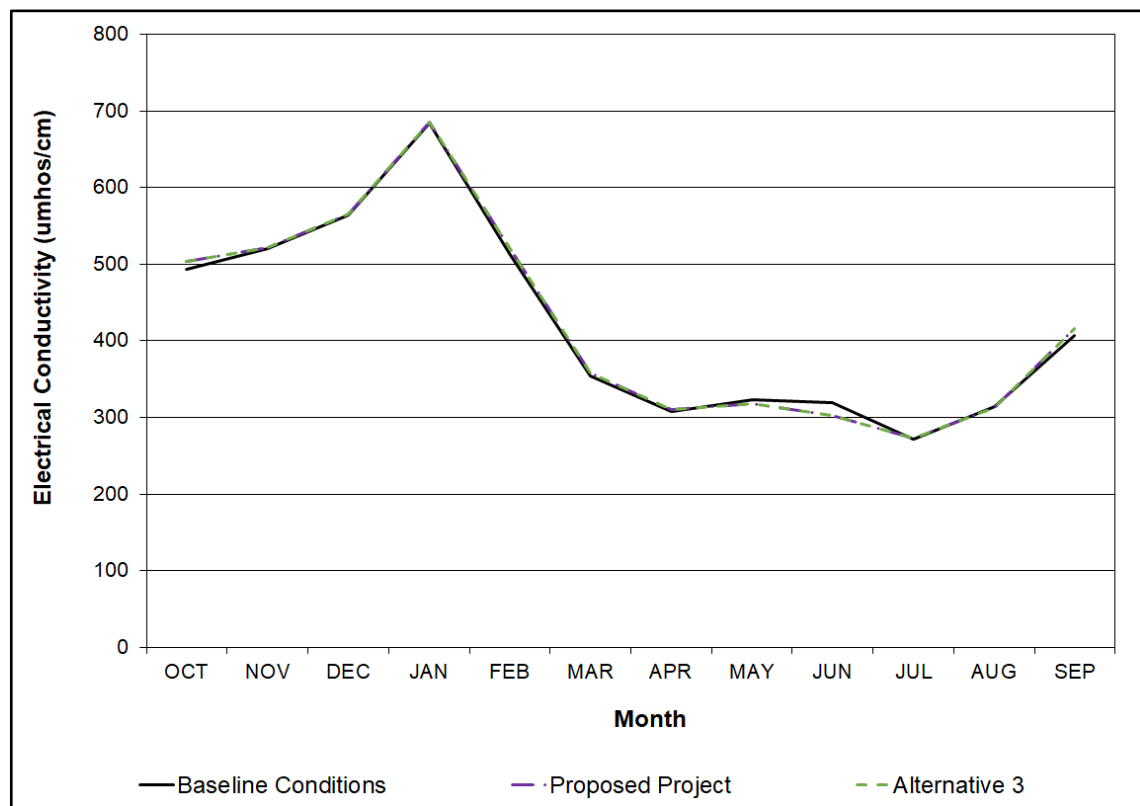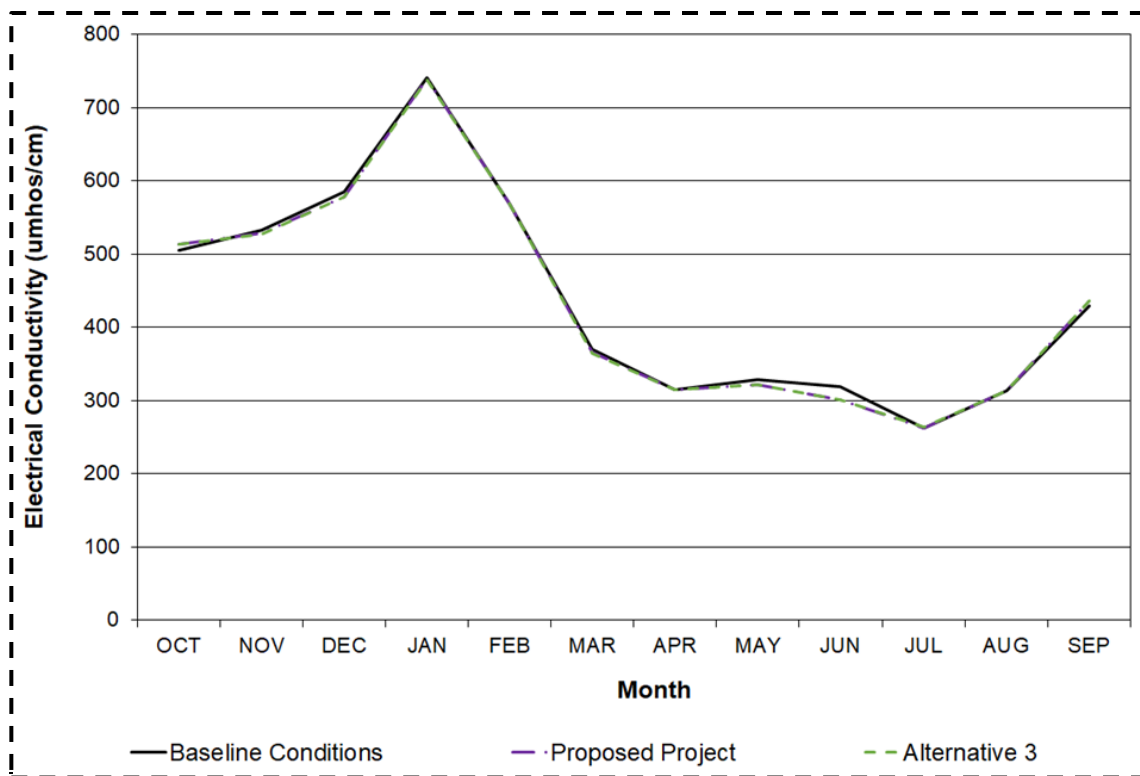
Figure 11-58. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the Sacramento River at Emmaton, Water Years 1922–2021, Alternative 3

Table ~~11-39~~ 11-41 . CalSim-Modeled Average Electrical Conductivity (in micromhos/cm) for the San Joaquin River at Jersey Point by Water Year Type, Water Years 1922–2021, Alternative 3

Water Year Type	Baseline Conditions	Proposed Project	Difference from Baseline Conditions: Proposed Project	Alternative 3	Difference from Baseline Conditions: Alternative 3
Wet	~~521~~ 516	~~531~~ 524	~~10~~ 8 (2%)	~~531~~ 524	~~10~~ 8 (2%)
Above Normal	~~591~~ 570	~~602~~ 580	~~11~~ 10 (2%)	~~600~~ 578	~~9 (2%)~~ 8 (1%)
Below Normal	~~722~~ 714	~~722~~ 719	~~0 (0%)~~ 5 (1%)	~~722~~ 719	~~0 (0%)~~ 5 (1%)
Dry	~~862~~ 802	~~868~~ 812	~~6~~ 10 (1%)	~~867~~ 812	~~5~~ 10 (1%)
Critically Dry	~~1,048~~ 1,025	~~1,039~~ 1,034	~~-9 (-1%)~~ 9 (1%)	~~1,037~~ 1,034	~~-11 (-1%)~~ 9 (1%)

Source: ~~LTO_9-series_trendrpt_20231201_noMacros.xlsx~~
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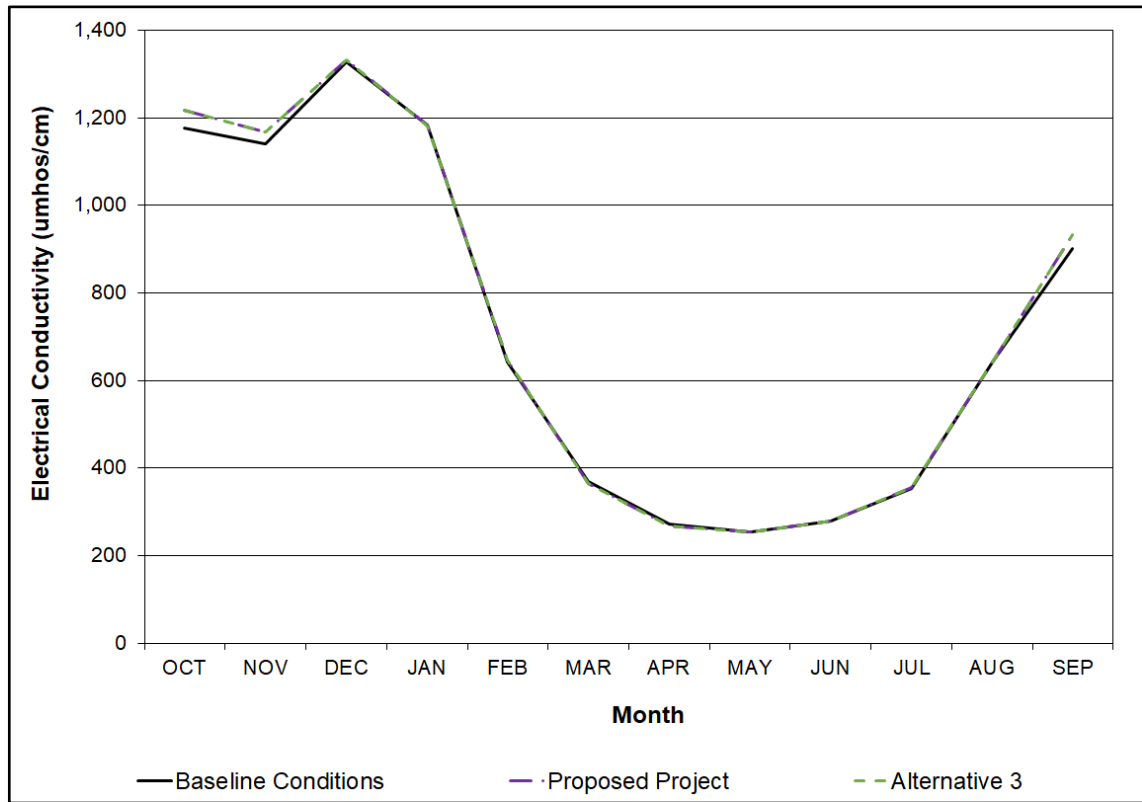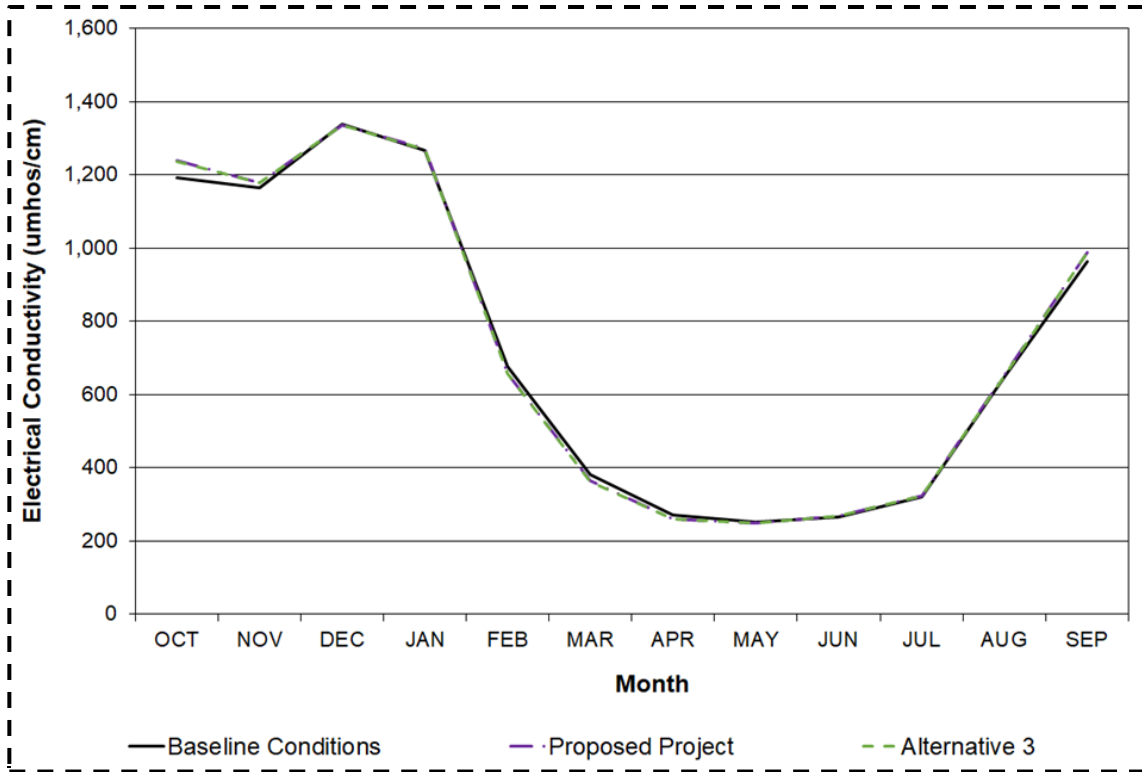
Figure 11-59. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the San Joaquin River at Jersey Point, Water Years 1922–2021, Alternative 3

Table ~~11-40~~ 11-42 . CalSim-Modeled Average Electrical Conductivity (in micromhos/cm) for the Old River at Rock Slough by Water Year Type, Water Years 1922–2021, Alternative 3

Water Year Type	Baseline Conditions	Proposed Project	Difference from Baseline Conditions: Proposed Project	Alternative 3	Difference from Baseline Conditions: Alternative 3
Wet	~~347~~ 339	~~348~~ 340	1 (0%)	~~347~~ 340	~~0~~ 1 (0%)
Above Normal	~~386~~ 369	~~385~~ 372	~~-1 (0%)~~ 3 (1%)	~~384~~ 371	~~-2 (-1%)~~ 2 (1%)
Below Normal	~~443~~ 432	~~438~~ 431	~~-5 (-1%)~~ -1 (0%)	~~438~~ 431	~~-5 (-1%)~~ -1 (0%)
Dry	~~496~~ 456	~~495~~ 459	~~-1 (0%)~~ 3 (1%)	~~494~~ 459	~~-2 (0%)~~ 3 (1%)
Critically Dry	~~572~~ 548	~~566~~ 552	~~-6 (-1%)~~ 4 (1%)	~~565~~ 552	~~-7 (-1%)~~ 4 (1%)

Source: ~~LTO_9-series_trendrpt_20231201_noMacros.xlsx~~
DRAFT_TrendReport_MultiCalSim_rev12_FEIR_1_7_7v2_9b_9bv2_7.23.0.xlsx .

Figure 11-60. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for Old River at Rock Slough, Water Years 1922–2021, Alternative 3

11.6.3   Aquatic Biological Resources

Alternative 3's inclusion of the flexible deployment of the SWP-facilitated fallowing inject would result in similar effects as the Proposed Project, whereas the lack of the approximately two-week increase in CCF diversion capacity during December and March would give similar effects as previously described for Alternative 1. Effects would generally be similar to those for the Proposed Project, with some minor differences (Tables 11-5 through ~~11-34~~ 11-36 ; Figures 11-61 through 11-70). As with the other alternatives and the Proposed Project, operational criteria for species protection (e.g., OMR management as described in Chapter 2, "Project Description") would be in place, minimizing potential negative effects.
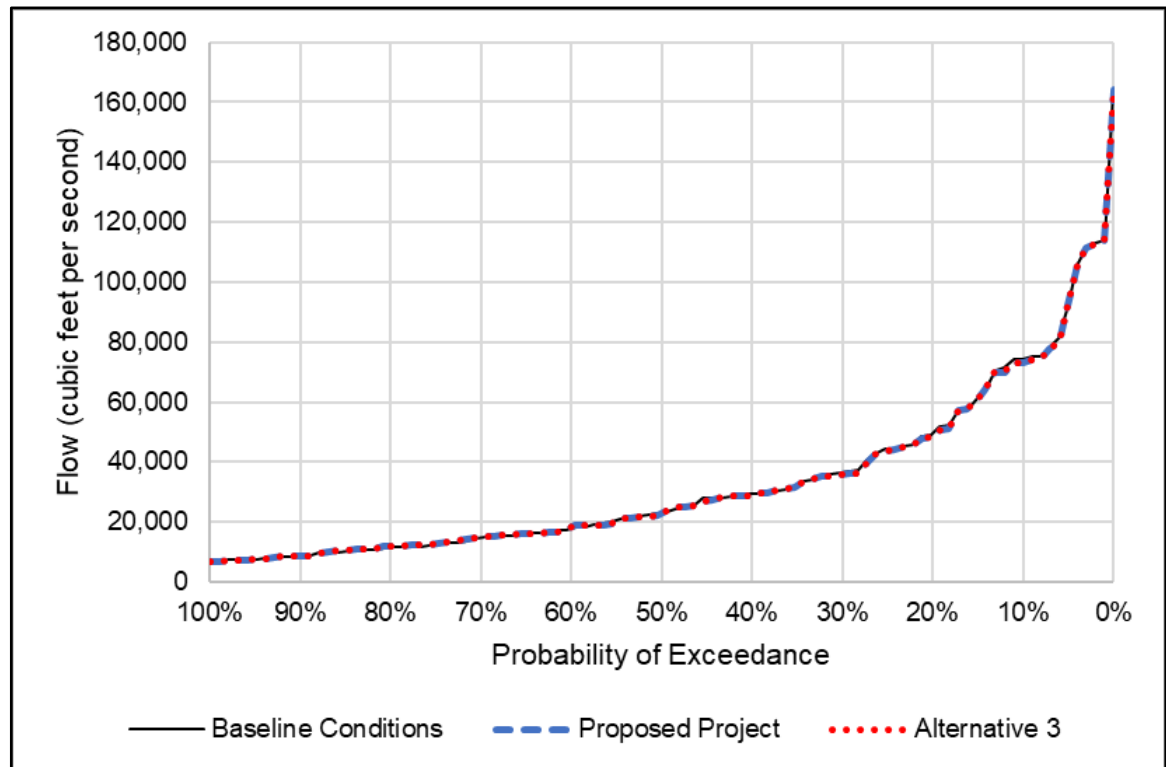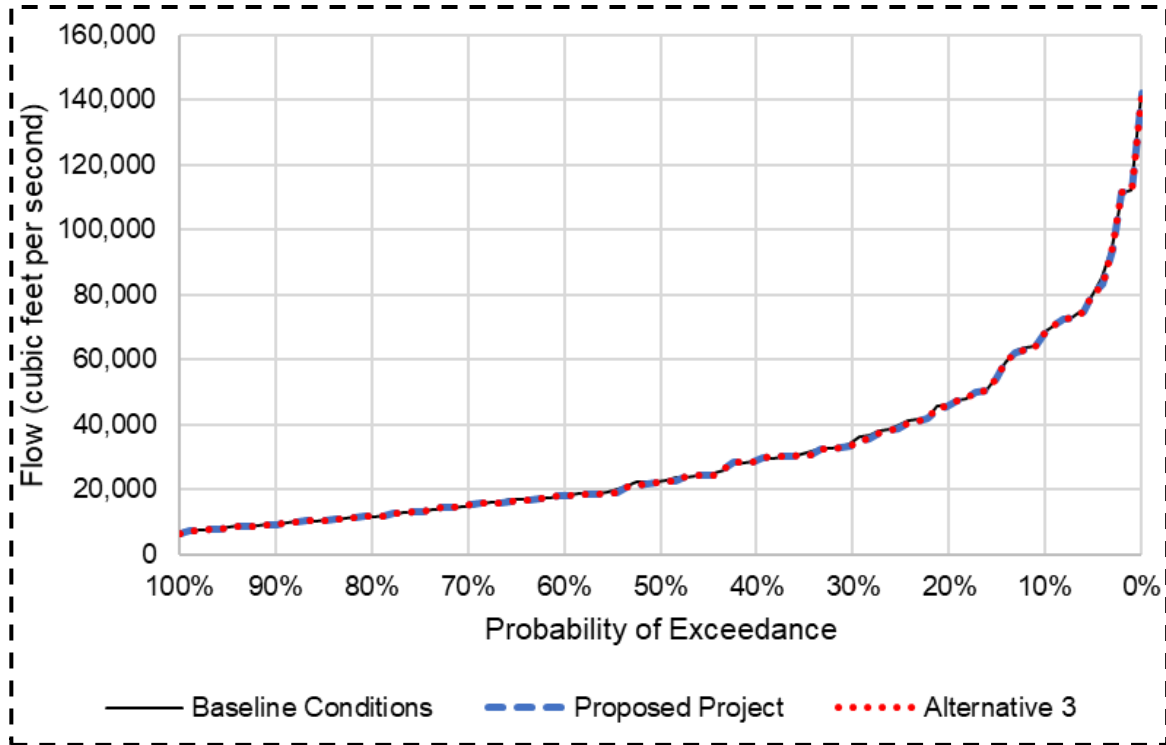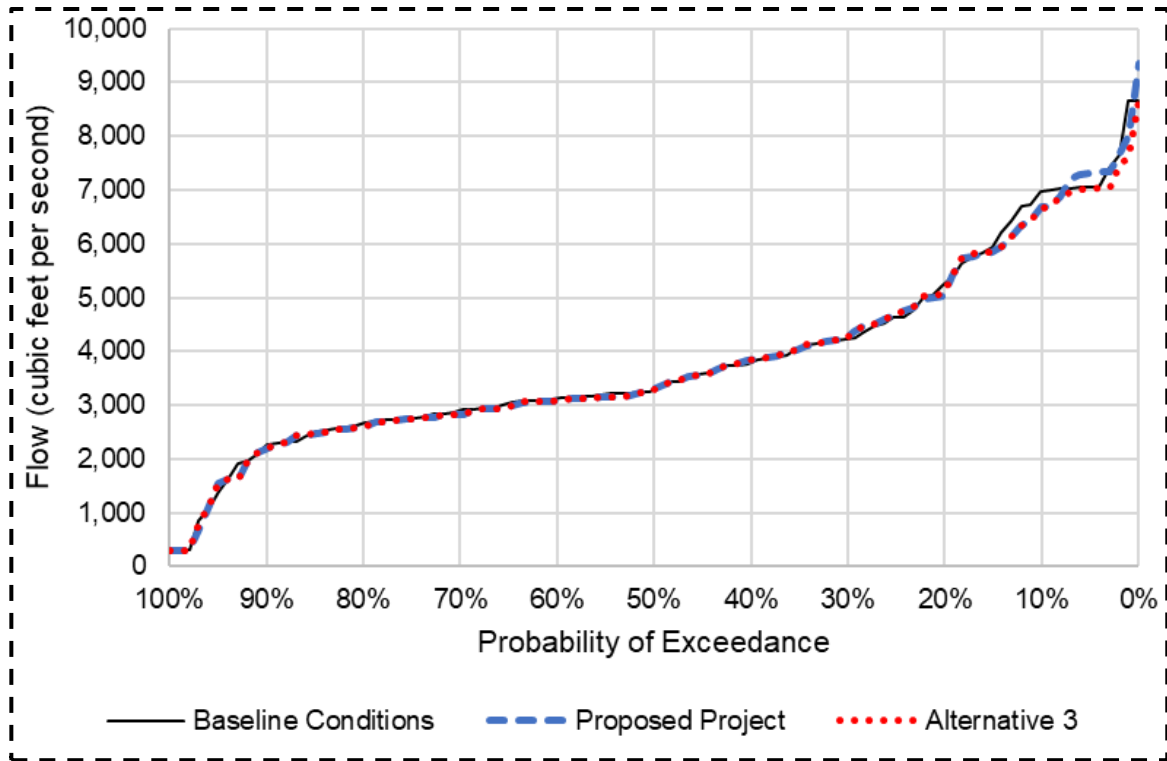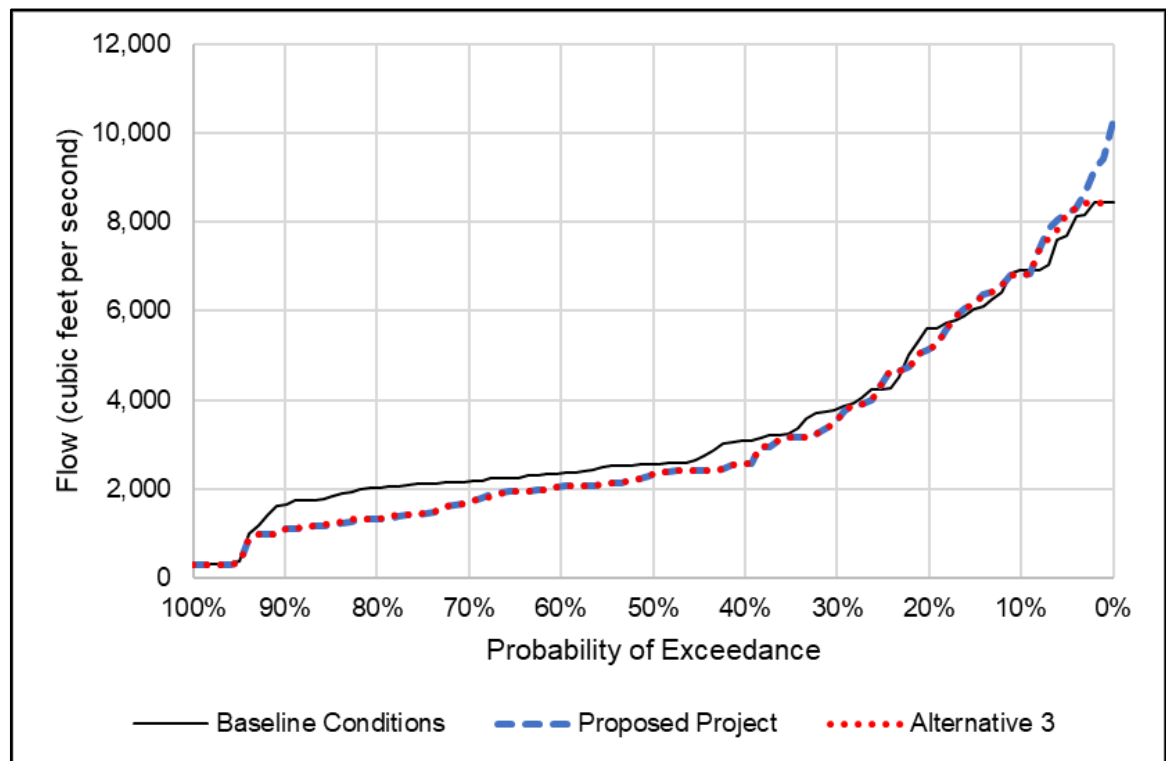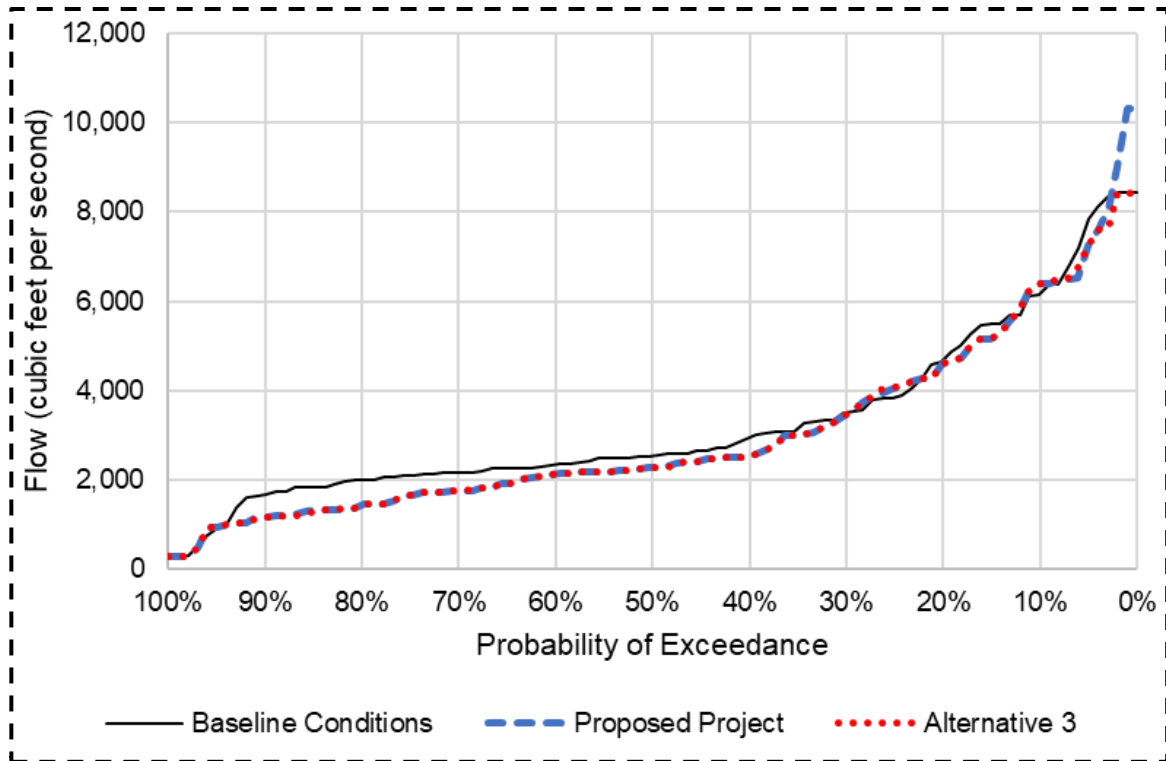
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Figure 11-61. Mean Modeled March–May Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 3
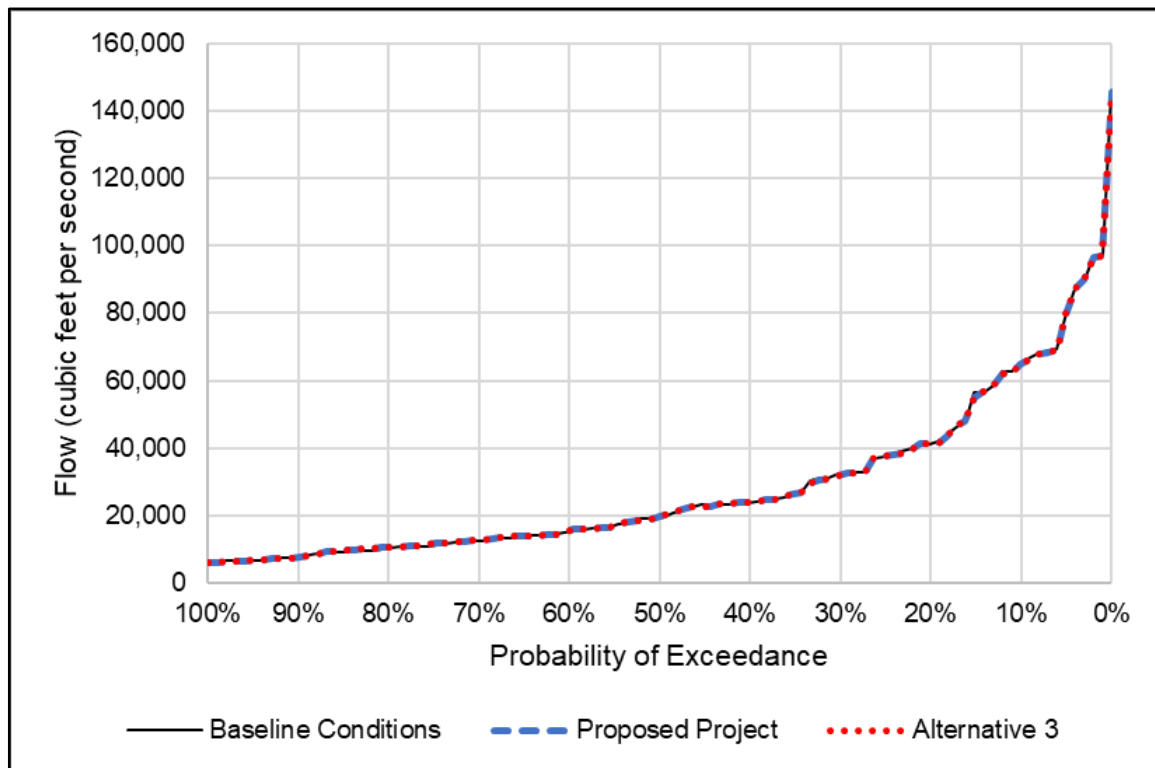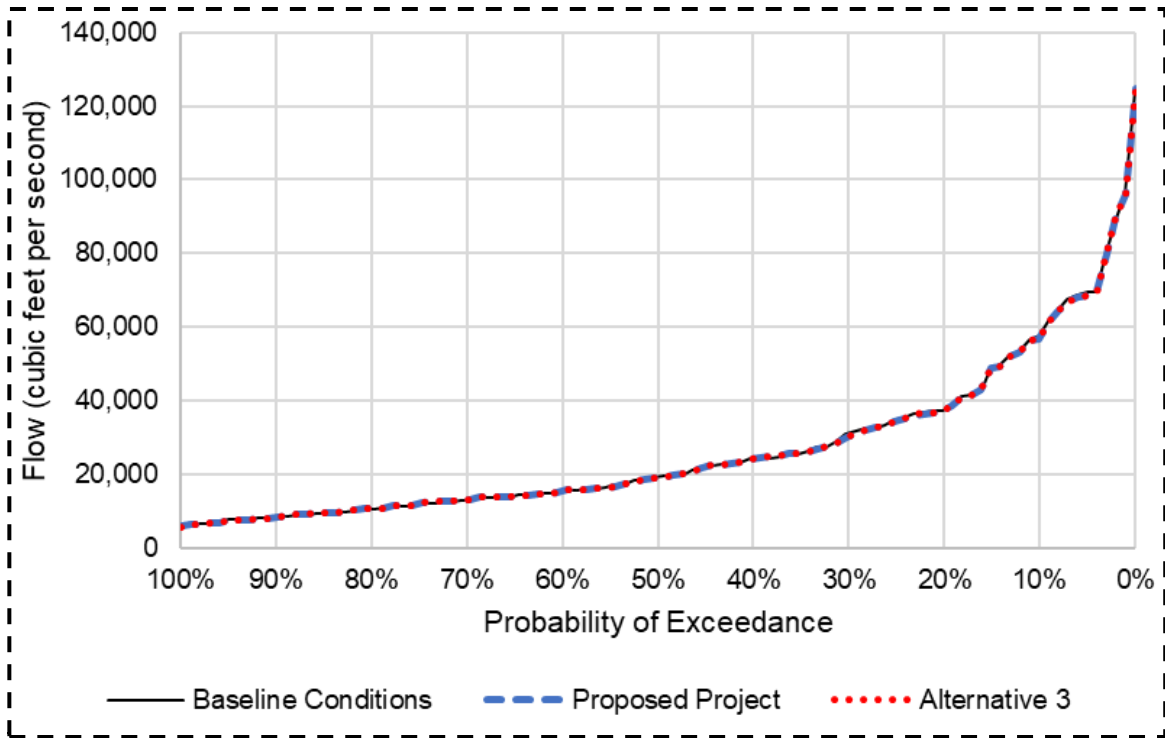
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DRAFT_TrendReport_MultiCalSim_rev12_DEIR_FEIR_7_7v2_9b_comp_7.23.xlsx .

Figure 11-62. Mean Modeled March–June Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 3
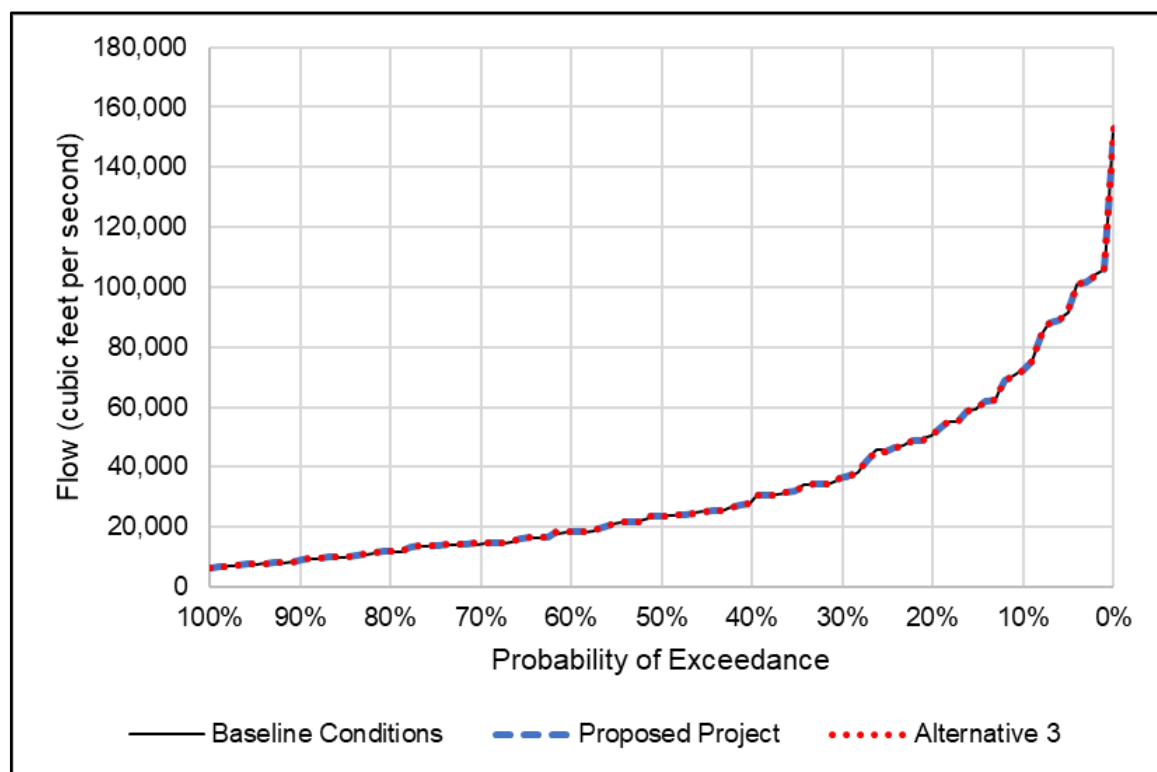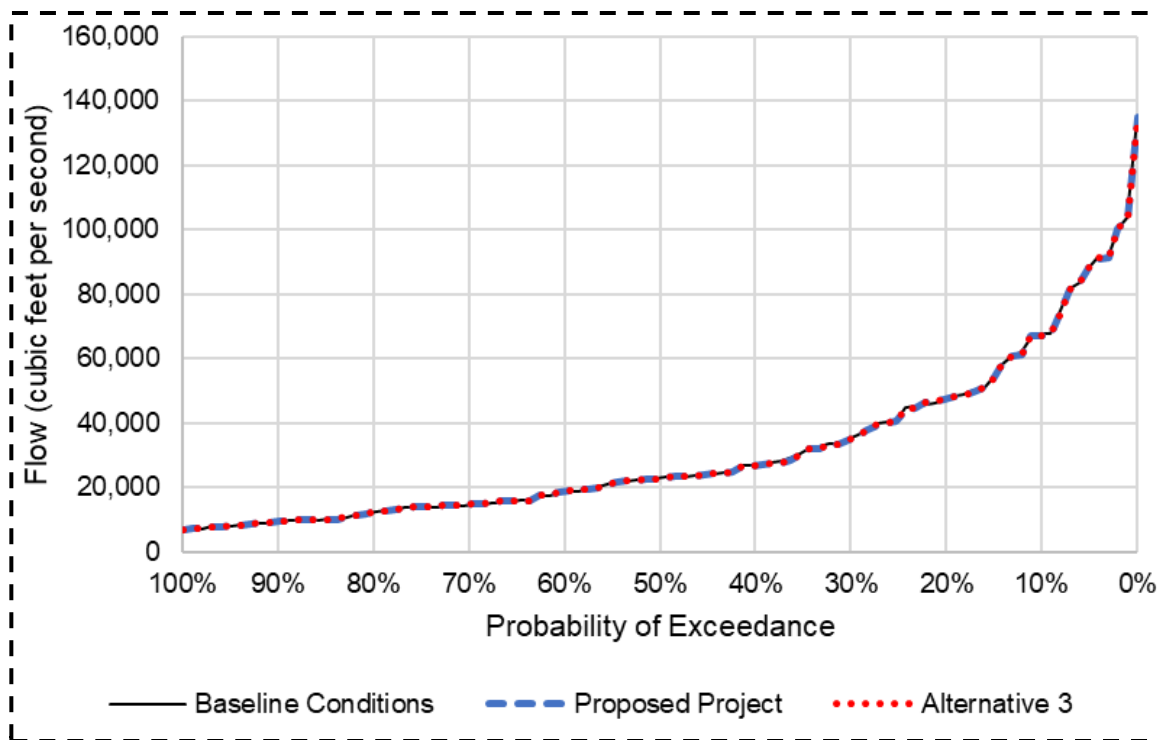
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Figure 11-63. Mean Modeled February–June Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 3
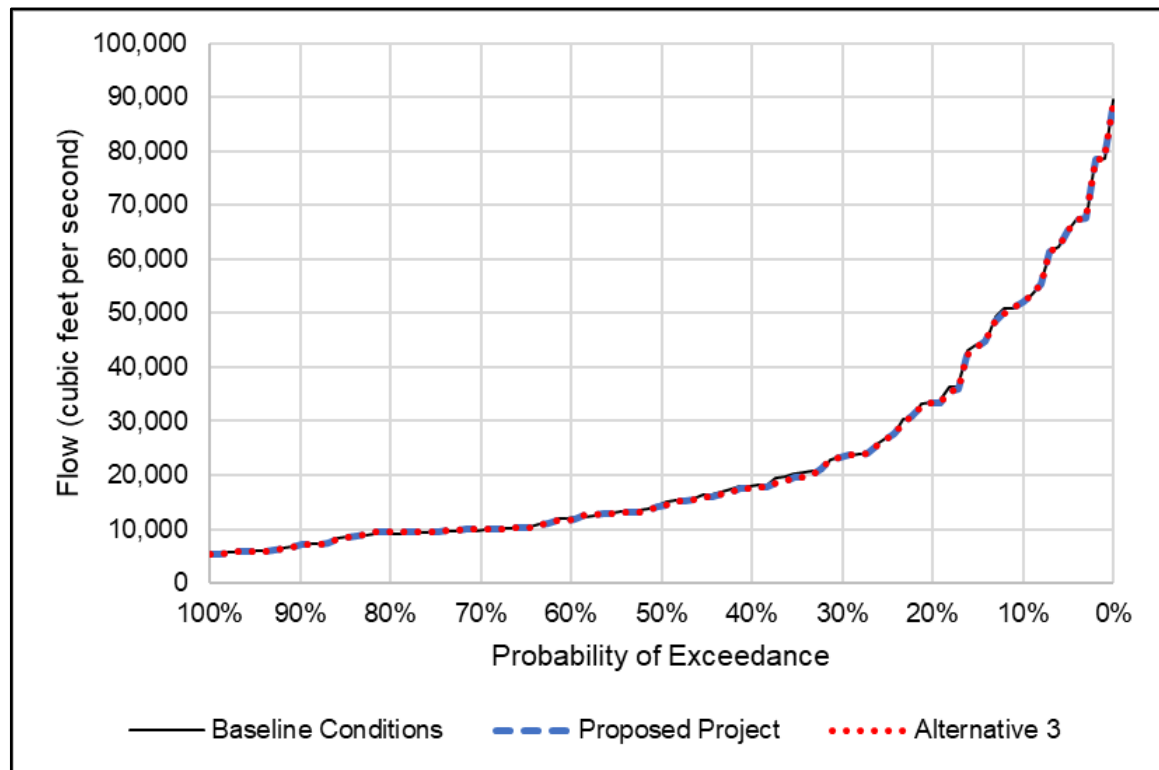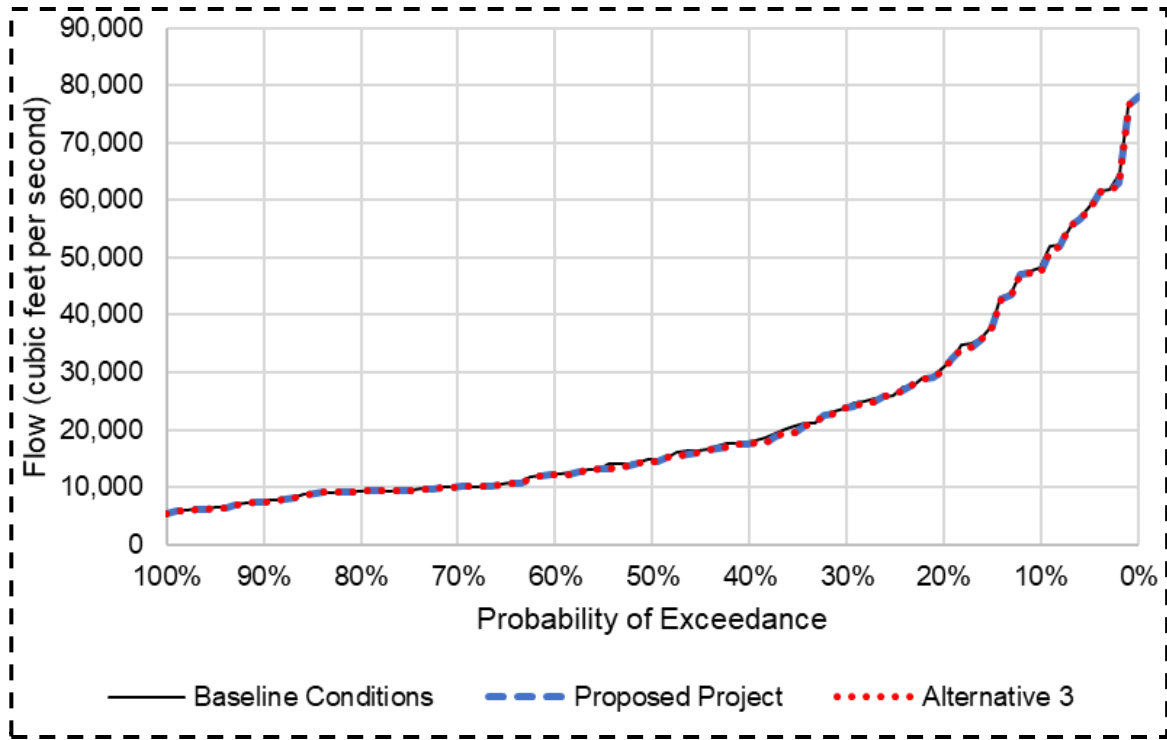
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Figure 11-64. Mean Modeled April–June Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 3
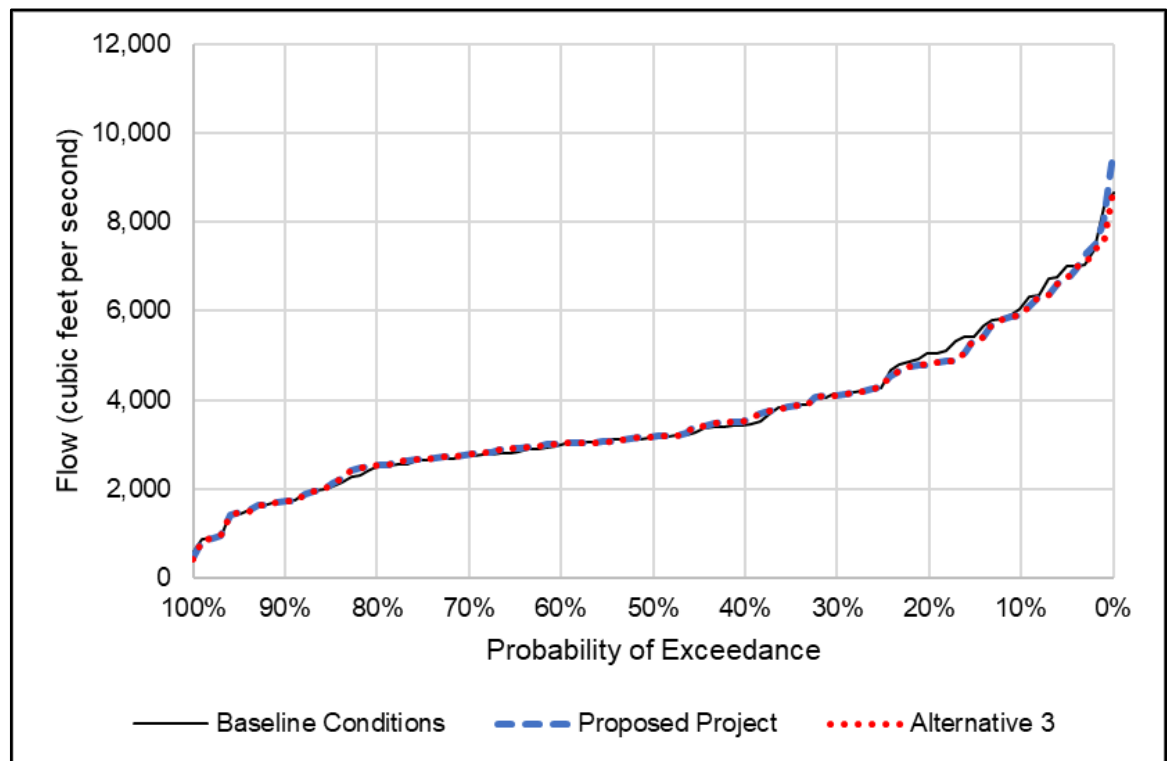
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**Figure 11-65. Mean Modeled SWP South Delta Exports (Baseline Conditions, Proposed Project, and Alternative 3), December**

Source: ~~DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm~~
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Figure 11-66. Mean Modeled SWP South Delta Exports (Baseline Conditions, Proposed Project, and Alternative 3), March
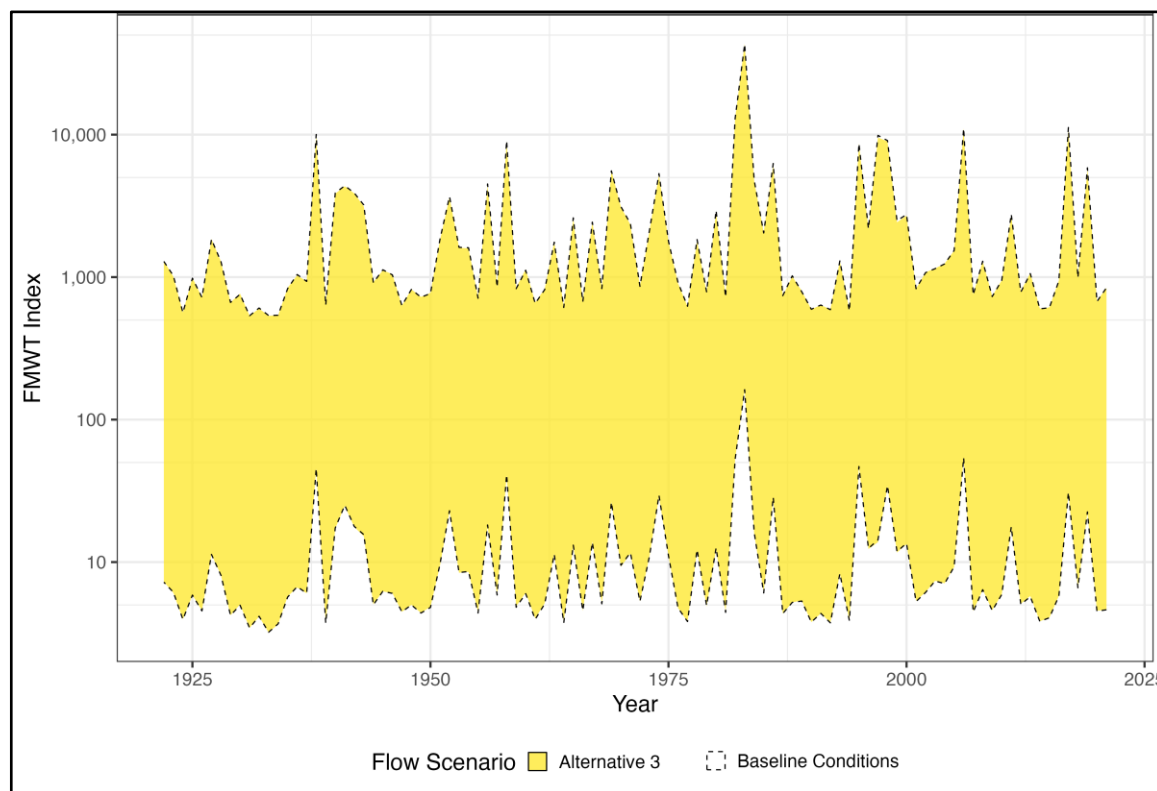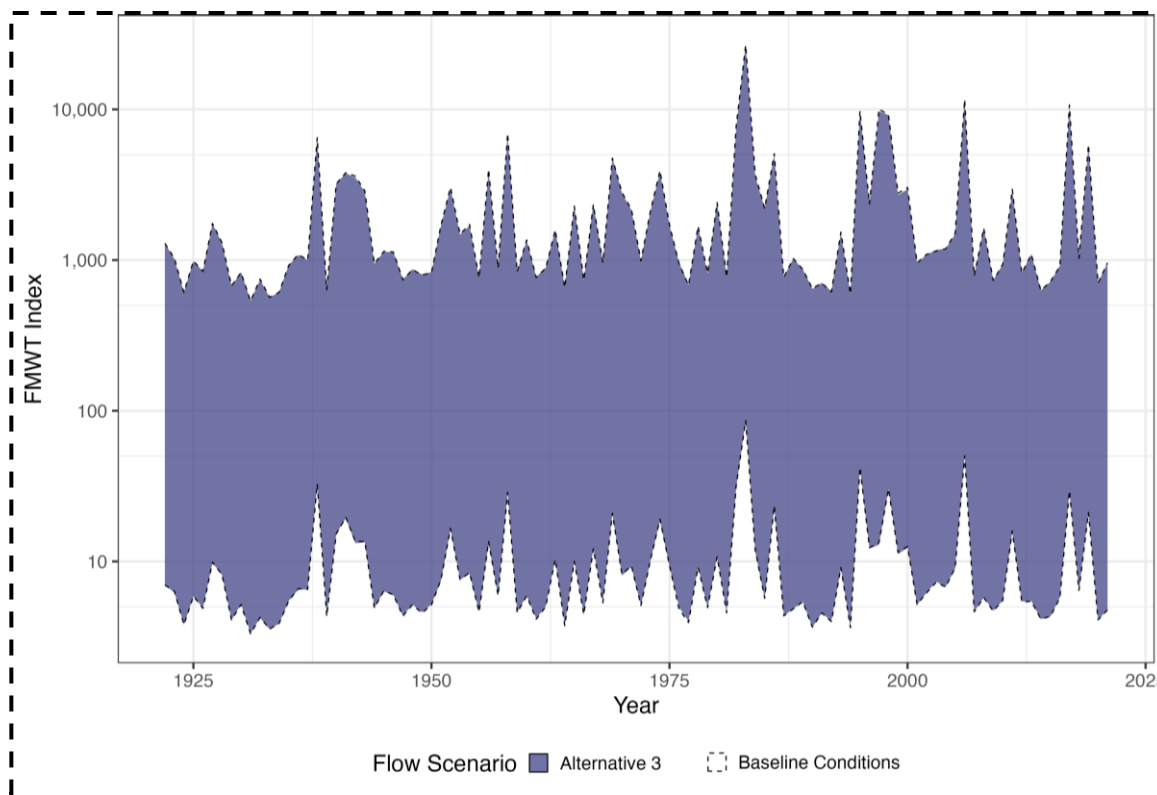
Figure 11-67. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Fall Midwater Trawl Index from Application of the Delta Outflow-Abundance Index Method for Alternative 3 and Baseline Conditions (BC) Scenarios
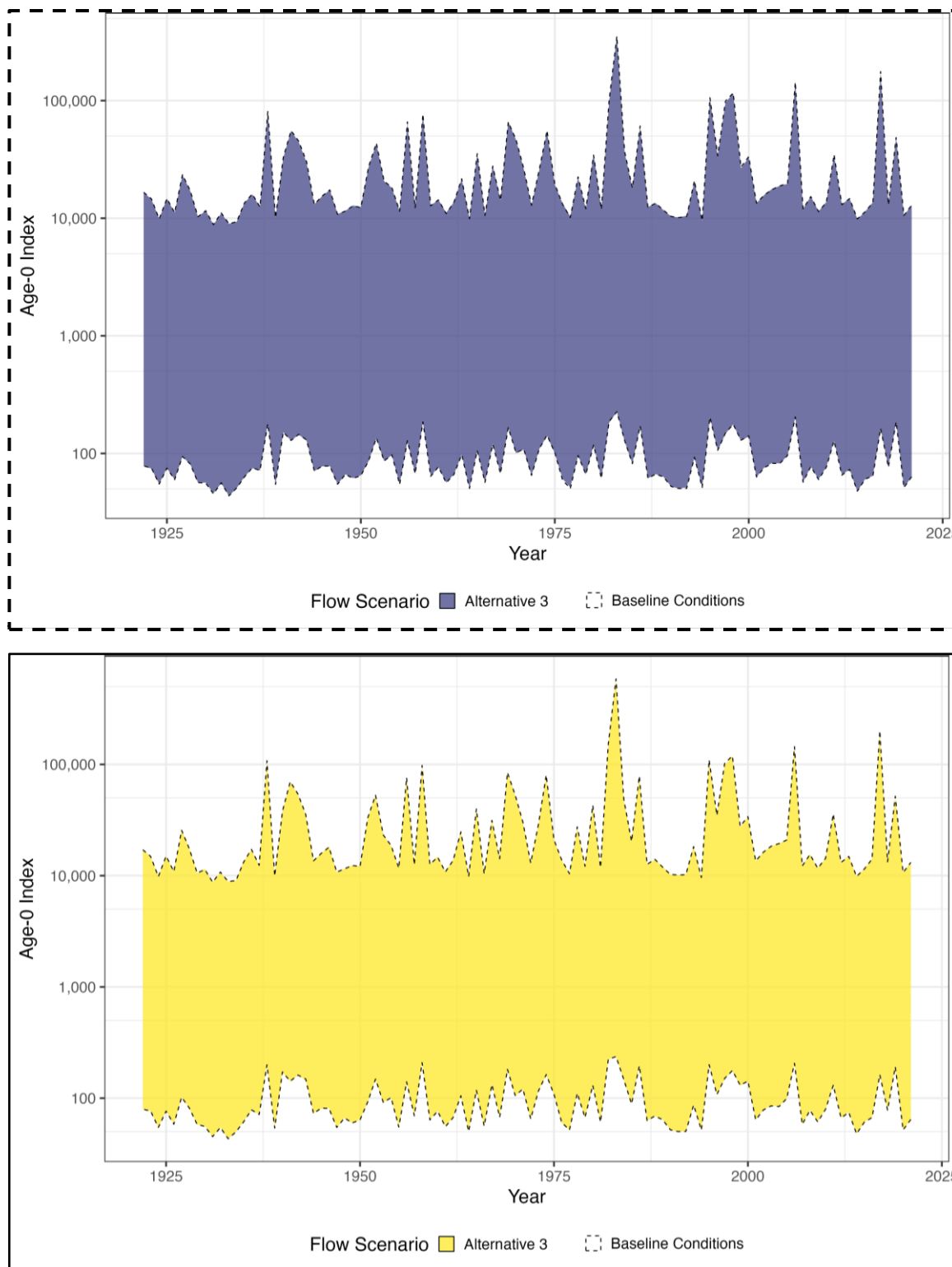
Figure 11-68. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Midwater Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 3 and Baseline Conditions (BC) Scenarios
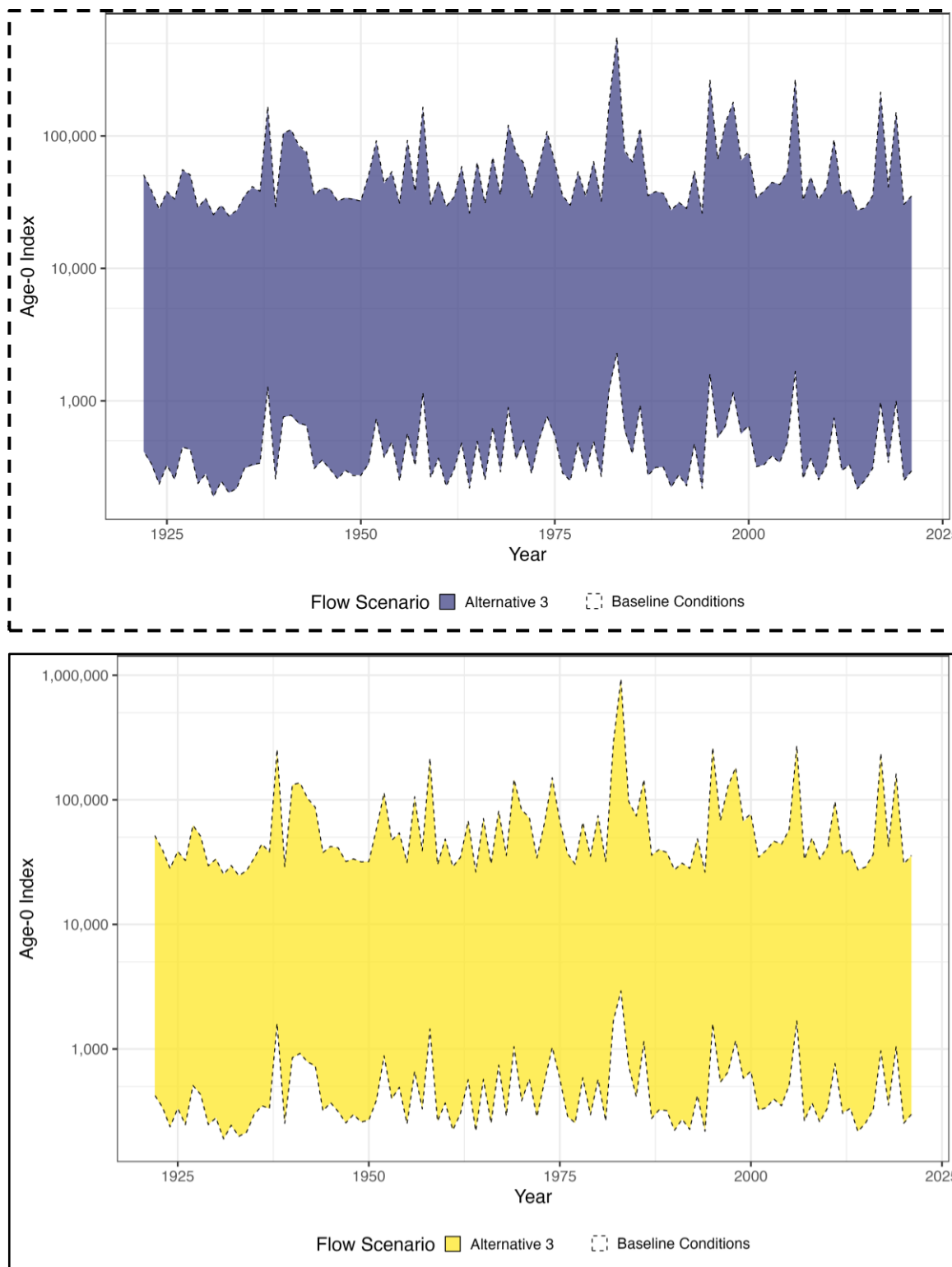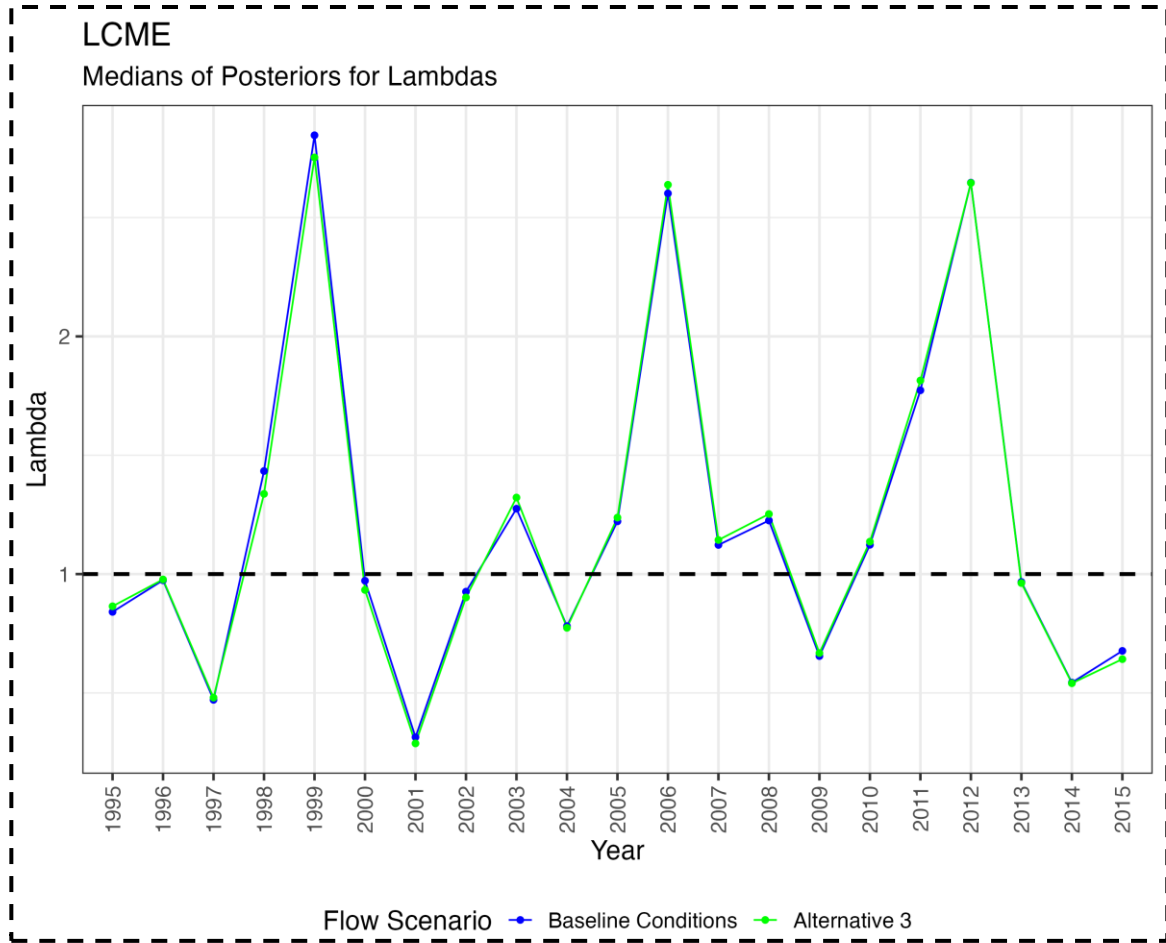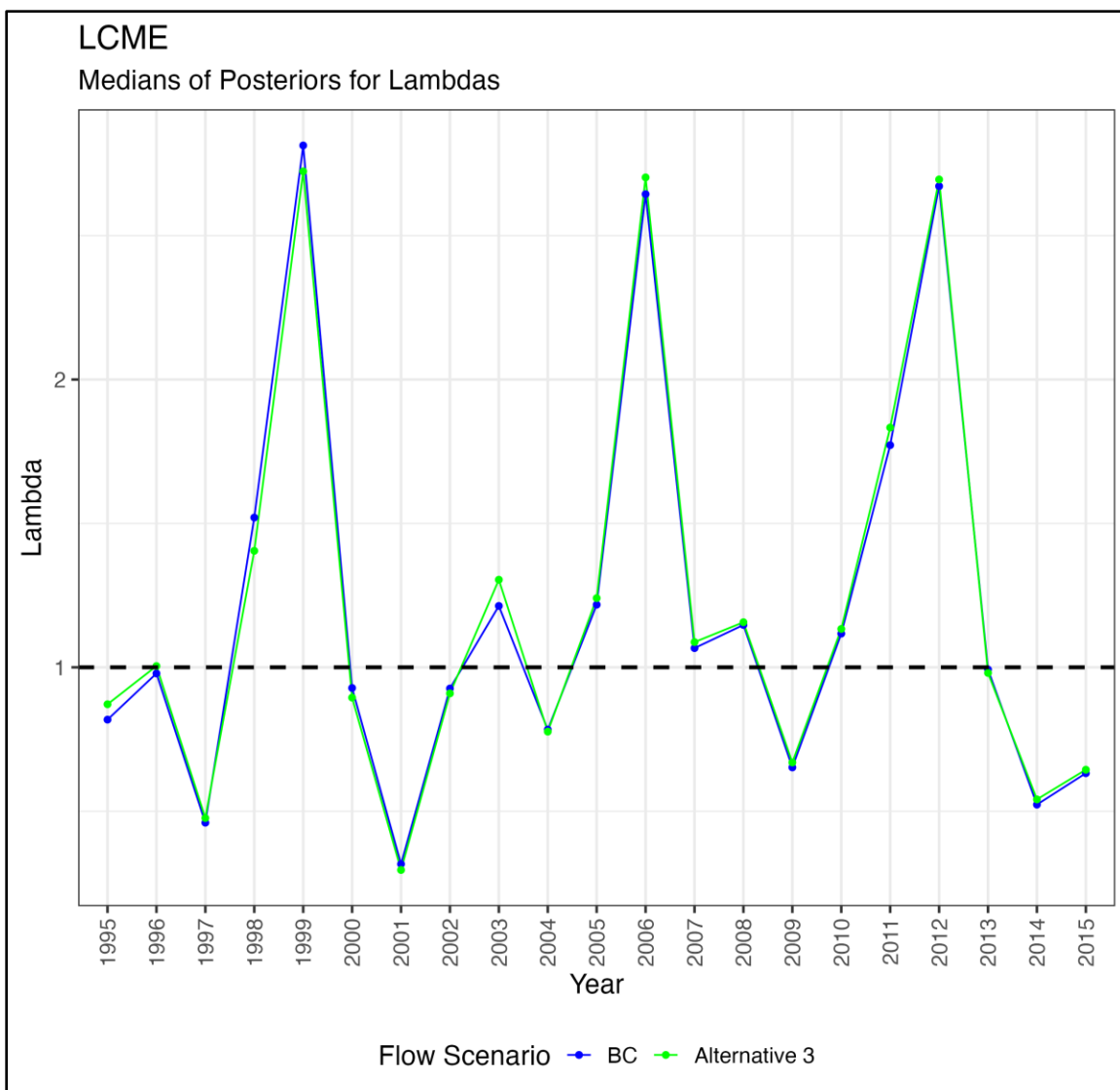
Figure 11-69. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Otter Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 3 and Baseline Conditions (BC) Scenarios

Note: BC = Baseline Conditions; median is 50th percentile of posterior distribution by year. Broken line indicates lambda = 1, i.e., the population replacement rate.

Figure 11-70. Median Population Growth Rate (Lambda) from Delta Smelt LCME Modeling for Baseline Conditions and Alternative 3

Effects related to other Project activities (Delta Smelt Summer and Fall Habitat Actions; John E. Skinner Delta Fish Protective Facility; Habitat Restoration; Delta Smelt Supplementation; Water Transfers; Agricultural Barriers; Barker Slough Pumping Plant; CCF Weed Management; Suisun Marsh Operations; Monitoring and Special Studies; and Drought-related Actions) would be as described for the Proposed Project in Chapter 6, "Aquatic Biological Resources."

Like the Proposed Project, the impact on aquatic biological resources from Alternative 3 would be less than significant.

11.6.4   Other Resources

Because the only difference between Alternative 3 and the Proposed Project is that Alternative 3 keeps the period during which increased diversions from the CCF can occur the same as Baseline Conditions (i.e., mid-December through mid-March rather than December 1 through March 31 under the Proposed Project), overall long-term average Delta outflow, exports, or other hydrologic conditions would be similar under Alternative 3 and the Proposed Project. Because differences in these long-term average hydrologic variables would be minimal, impacts on all other resources under Alternative 3 would be expected to be similar to those described for the Proposed Project.

11.7   Environmentally Superior Alternative

Section 15126.6(e) of the State CEQA Guidelines sets forth the circumstances in which CEQA lead agencies must identify the "environmentally superior alternative" prior to making a decision on a project.

> *(2) If the environmentally superior alternative is the "no project" alternative, the EIR shall also identify an environmentally superior alternative among the other alternatives.*

The State CEQA Guidelines assume that, for many projects, the No Project Alternative would typically be environmentally superior to alternatives that involve implementing an activity that causes physical change in some form. The assumption is that the choice of doing nothing will result in fewer environmental impacts than an activity that causes physical change of some kind. Based on the results of the various technical analyses presented in this ~~DEIR~~ EIR, the No Project Alternative is not the environmentally superior alternative.

The Proposed Project and other alternatives could be implemented without resulting in significant environmental impacts. The analyses presented in this ~~DEIR~~ EIR also describe potential environmental benefits that would result from some of the actions included in the Proposed Project and each alternative that would further contribute to protecting designated aquatic species (e.g., Delta Smelt Summer and Fall Habitat Actions).

The impacts of the Proposed Project and Alternative 3 are essentially equivalent (all less than significant). However, Alternative 3 is considered to be the environmentally superior alternative because it provides the same benefits to migrating salmonids and Delta Smelt habitat during the spring as the Proposed Project, but keeps the diversion limits during early December and late March the same as Baseline Conditions. Because Alternative 3 does not expand the period during which winter diversions from CCF can occur, Alternative 3 potentially has lower entrainment risk than the Proposed Project for special-status fish species during December 1 through December 15 and March 15 through March 31.

Therefore, Alternative 3 is the environmentally superior alternative identified by DWR.