Chapter 11
Alternatives to the Proposed Project

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), 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. 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 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.

Originating Organization[a]	Proposed Alternative	Alternative Description [b,c]	Project Objective Component Not Met by the Alternative	Feasibility
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.
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,	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.	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

Originating Organization[a]	Proposed Alternative	Alternative Description [b,c]	Project Objective Component Not Met by the Alternative	Feasibility
AquAlliance, California Sportfishing Protection Alliance, Friends of the River		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.		safety needs during periods of low water availability.
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.

Originating Organization[a]	Proposed Alternative	Alternative Description [b,c]	Project Objective Component Not Met by the Alternative	Feasibility
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.

- **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 percent of the time in December and 5 percent of the time in March (Figures 11-9 and 11-12, respectively). As expected, 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.

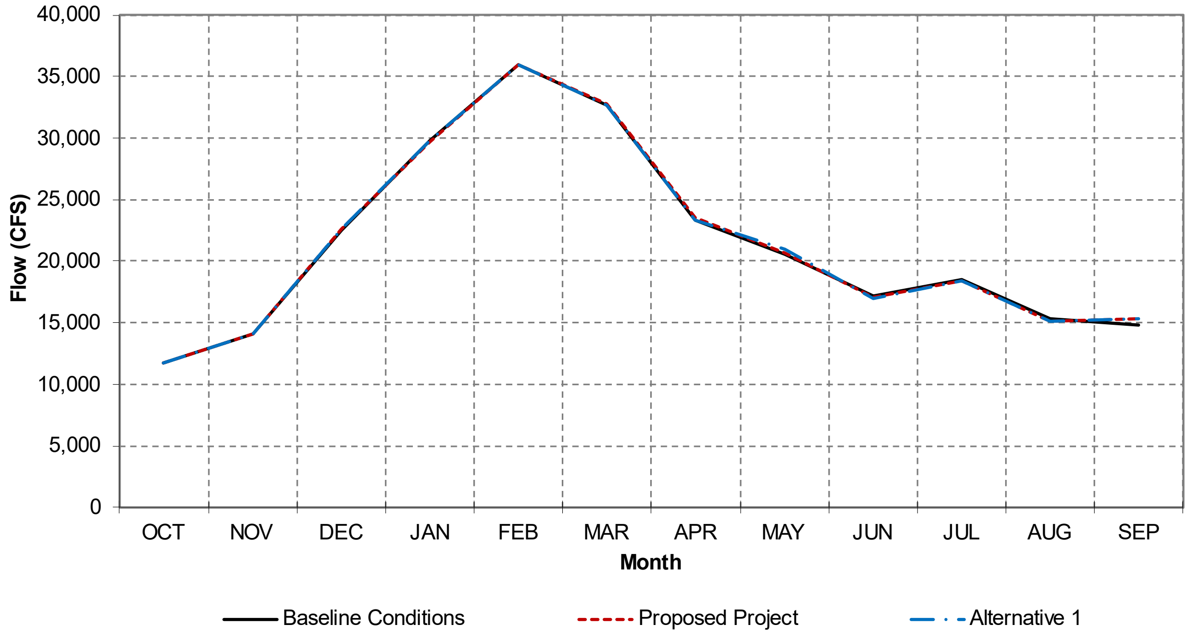


Figure 11-1. Sacramento River at Freeport Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 1

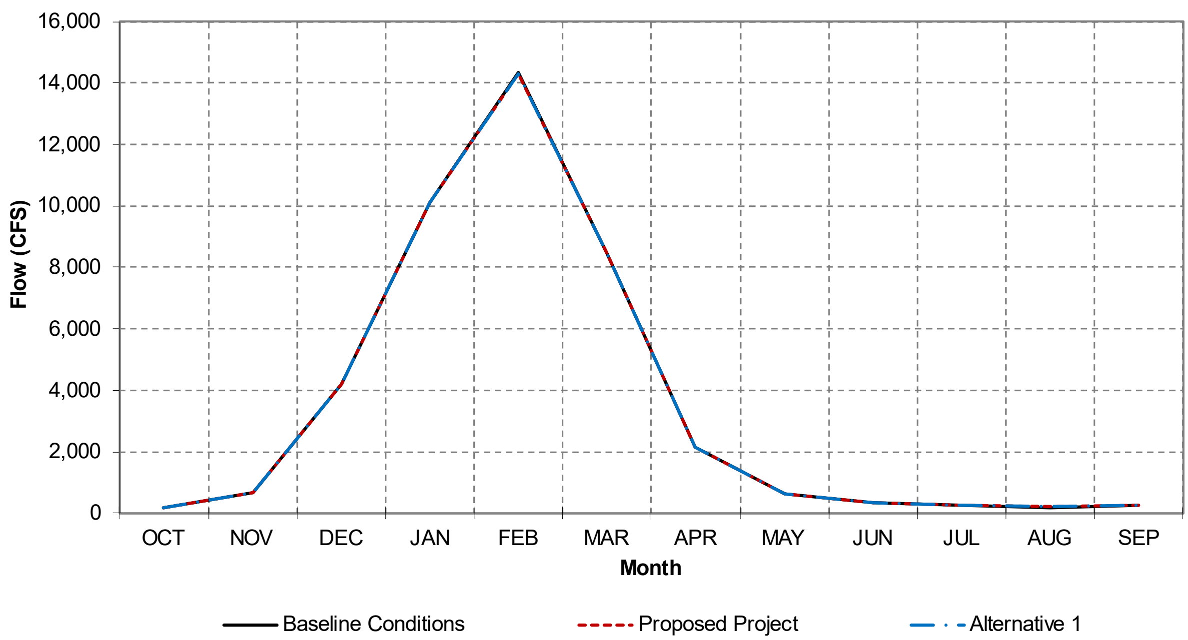


Figure 11-2. Monthly Long-term Average Yolo Bypass Flow for the Baseline Conditions, Proposed Project, and Alternative 1

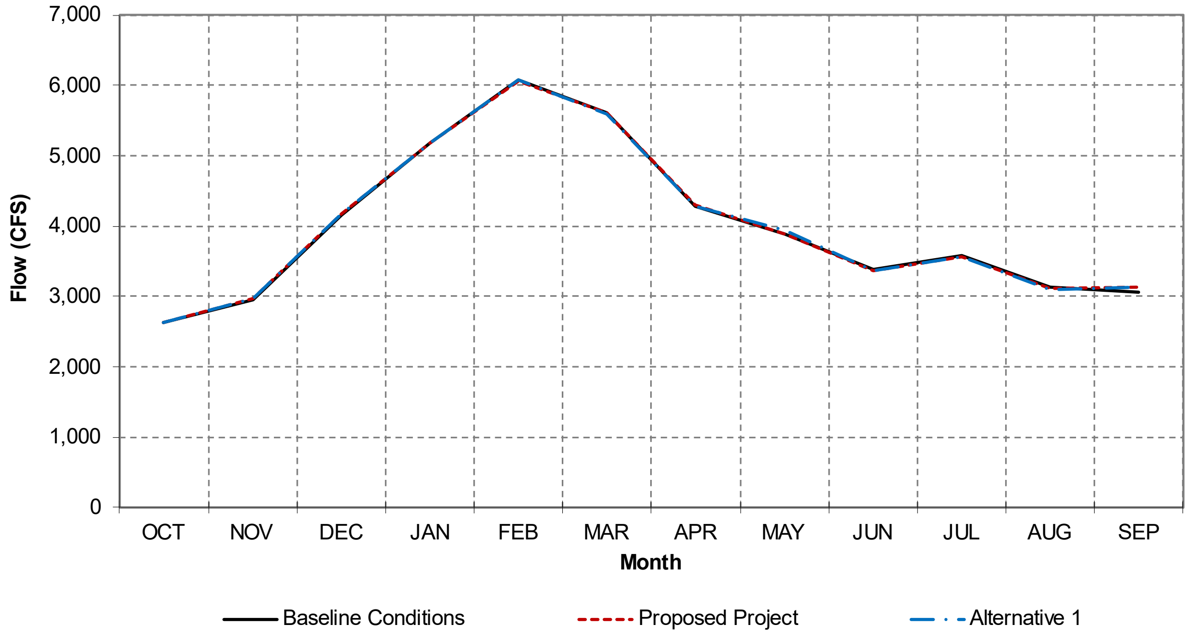


Figure 11-3. Monthly Long-term Average Georgiana Slough Flow for the Baseline Conditions, Proposed Project, and Alternative 1

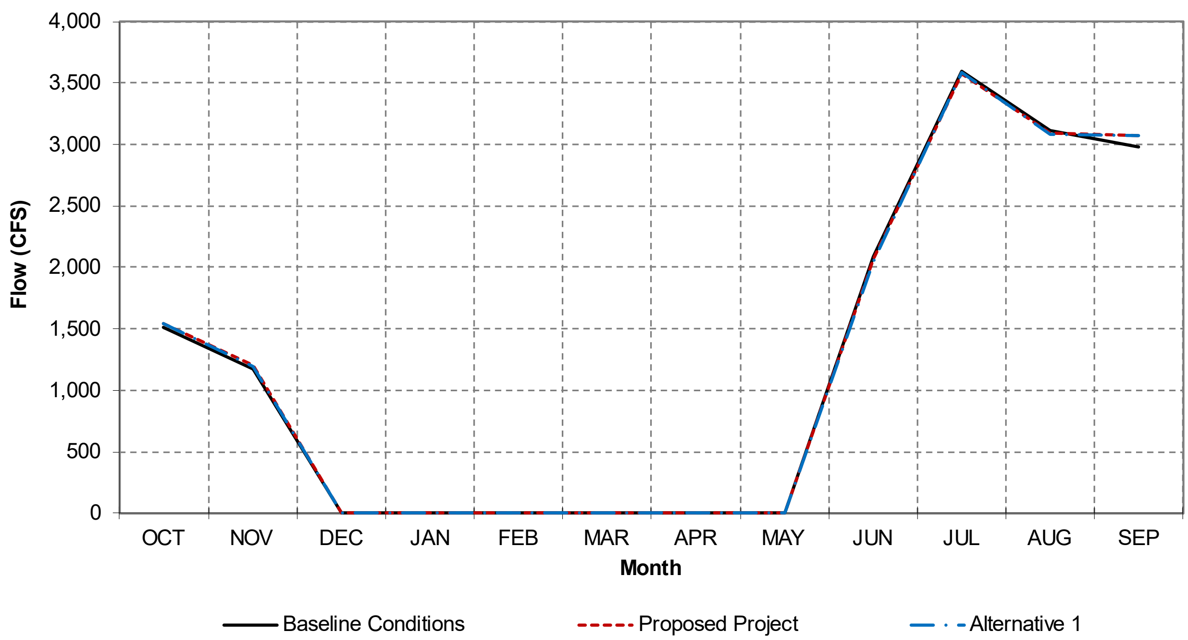


Figure 11-4. Monthly Long-term Average Delta Cross Channel Flow for the Baseline Conditions, Proposed Project, and Alternative 1

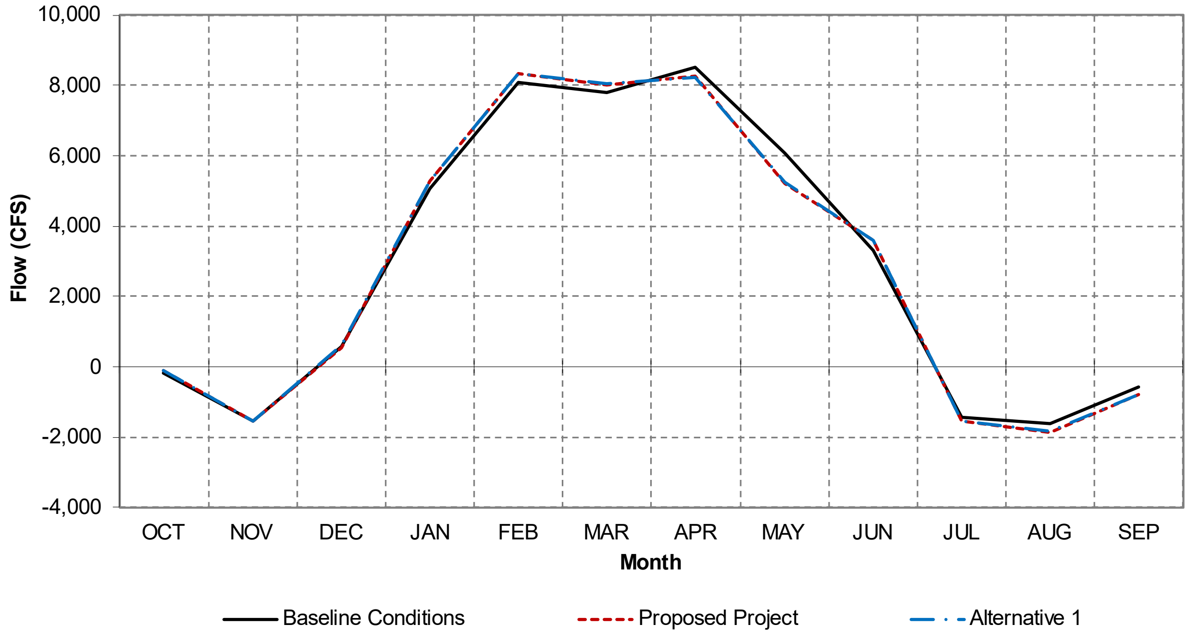


Figure 11-5. Monthly Long-term Average Qwest Flow for the Baseline Conditions, Proposed Project, and Alternative 1

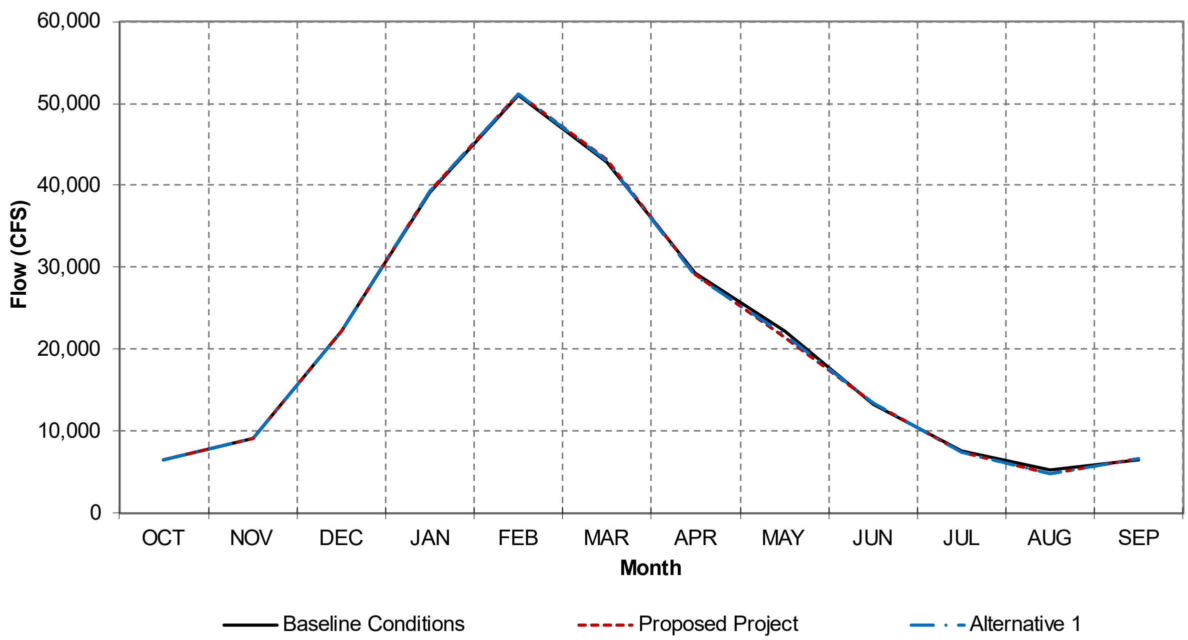


Figure 11-6. Monthly Long-term Average Delta Outflow for the Baseline Conditions, Proposed Project, and Alternative 1

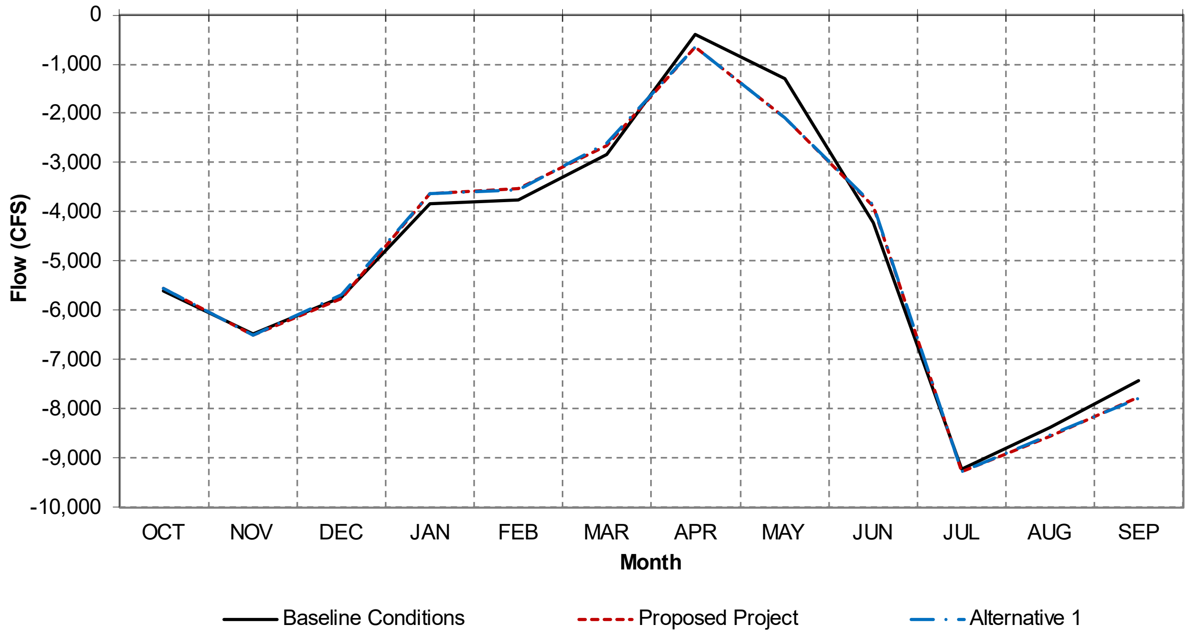


Figure 11-7. Combined Old and Middle River Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 1

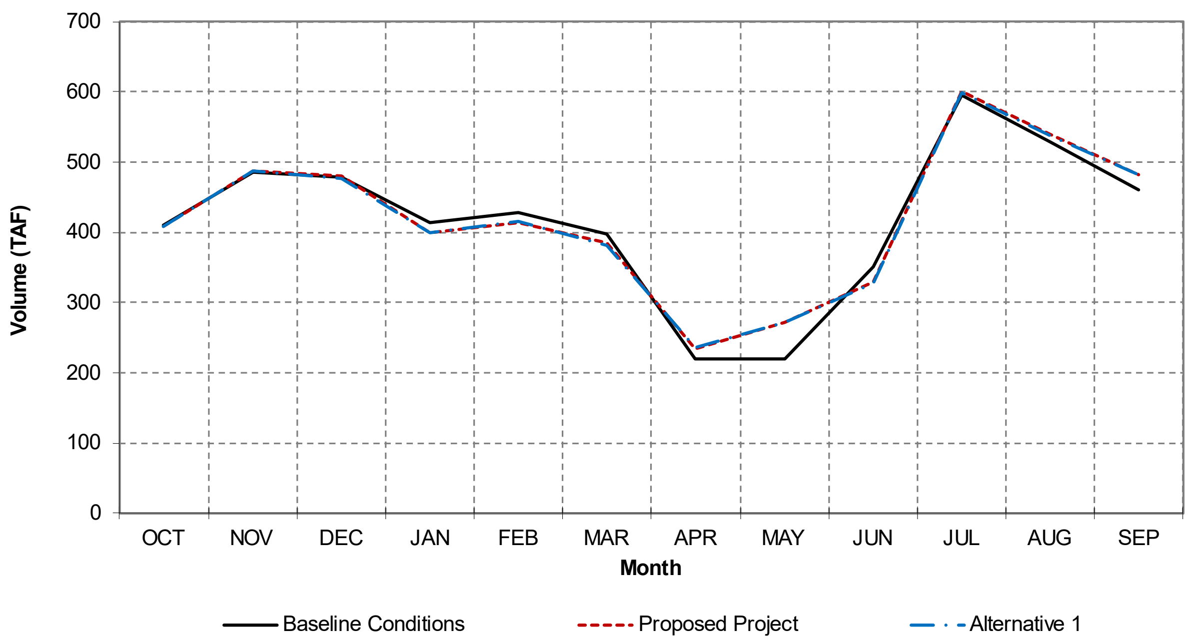


Figure 11-8. Monthly Long-term Average Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1

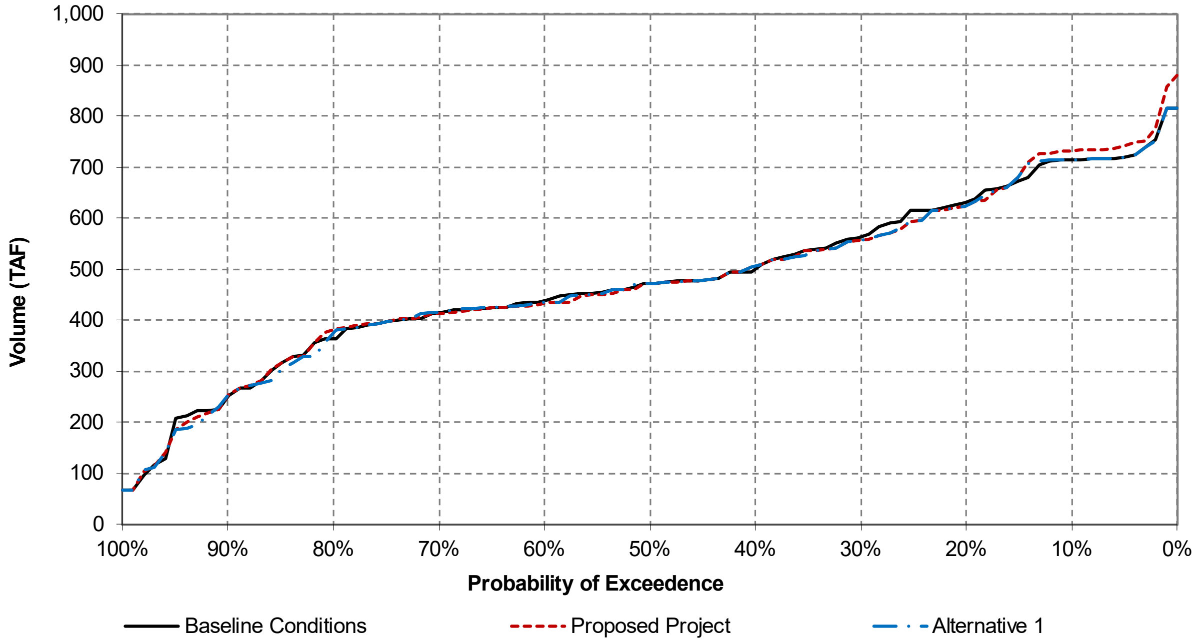


Figure 11-9. December Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1

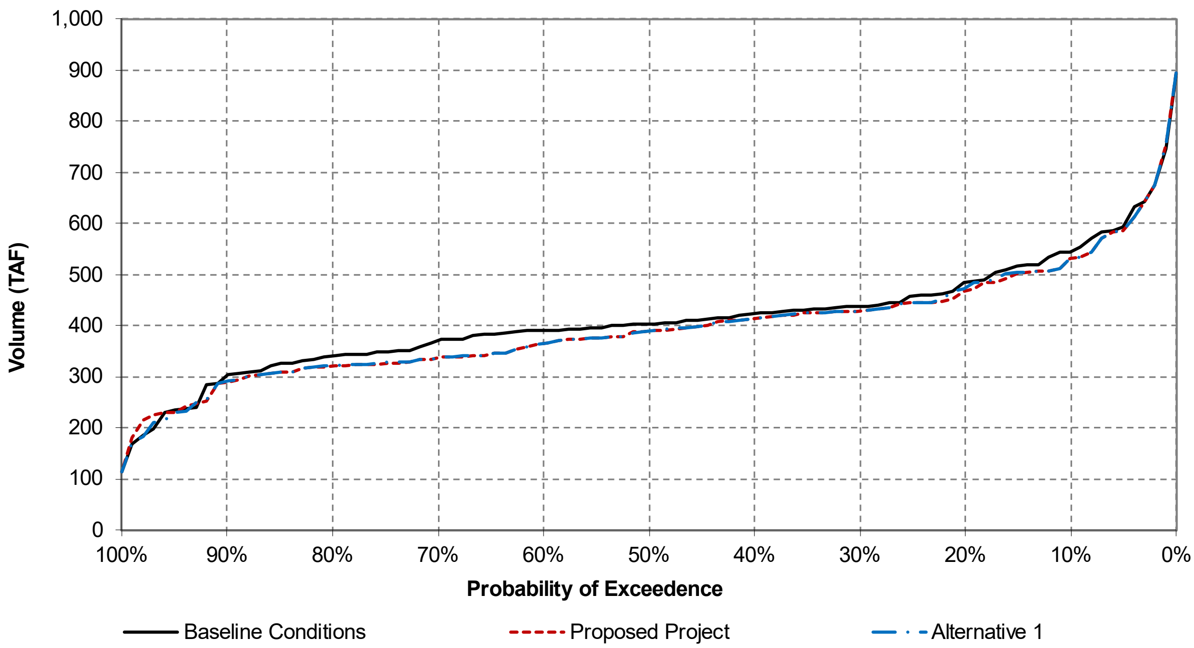


Figure 11-10. January Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1

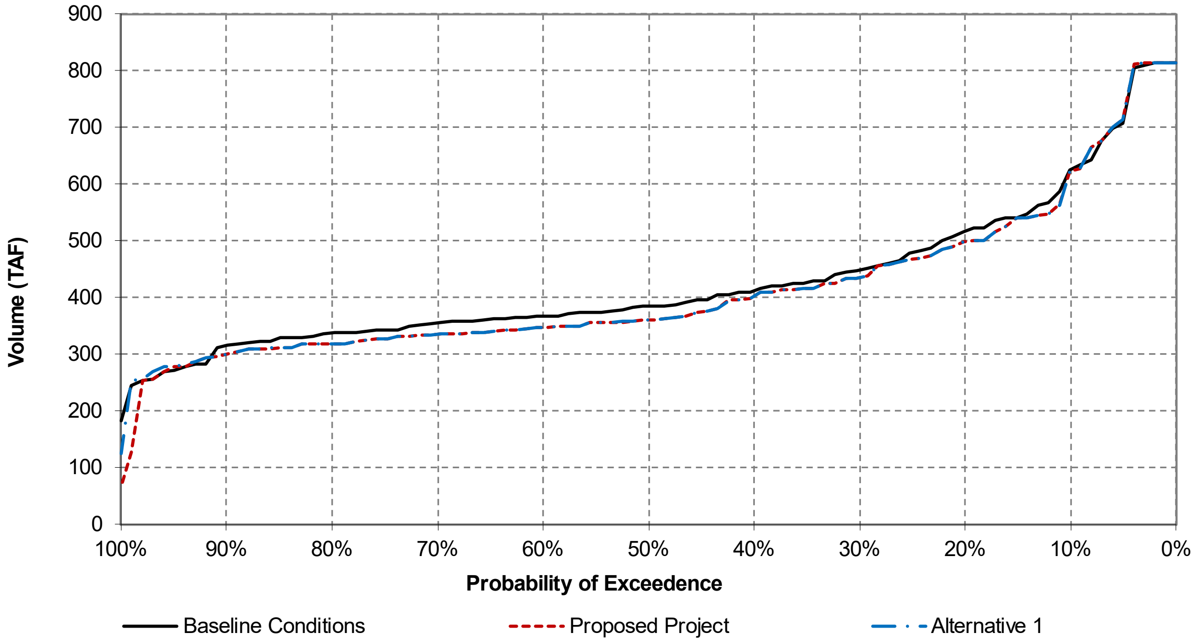


Figure 11-11. February Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1

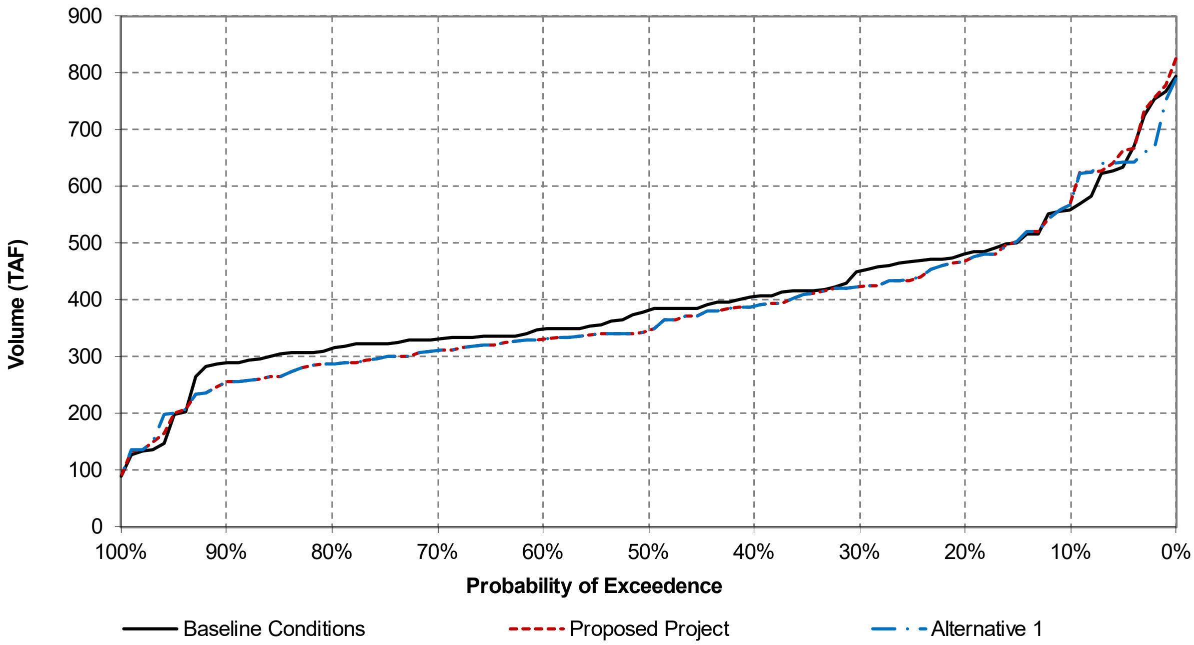


Figure 11-12. March Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1

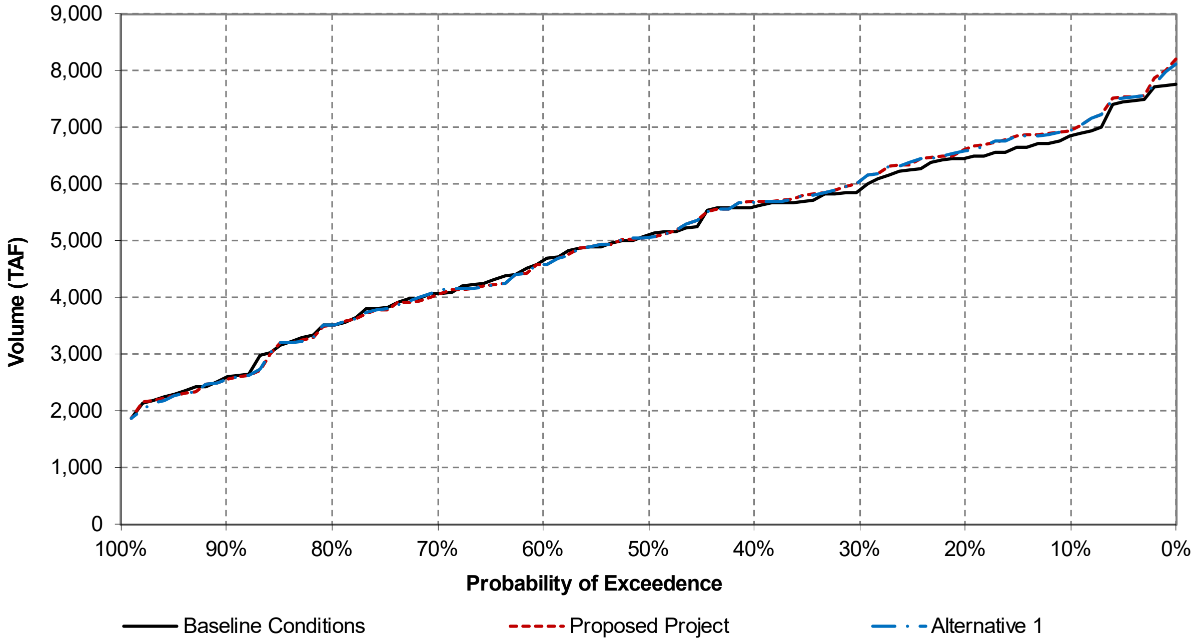


Figure 11-13. Annual Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 1

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	500	12 (2%)	499	11 (2%)
Above Normal	601	617	16 (3%)	606	5 (1%)
Below Normal	699	699	0 (0%)	700	1 (0%)
Dry	896	908	12 (1%)	906	10 (1%)
Critically Dry	1,510	1,503	-7 (0%)	1,494	-16 (-1%)

Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

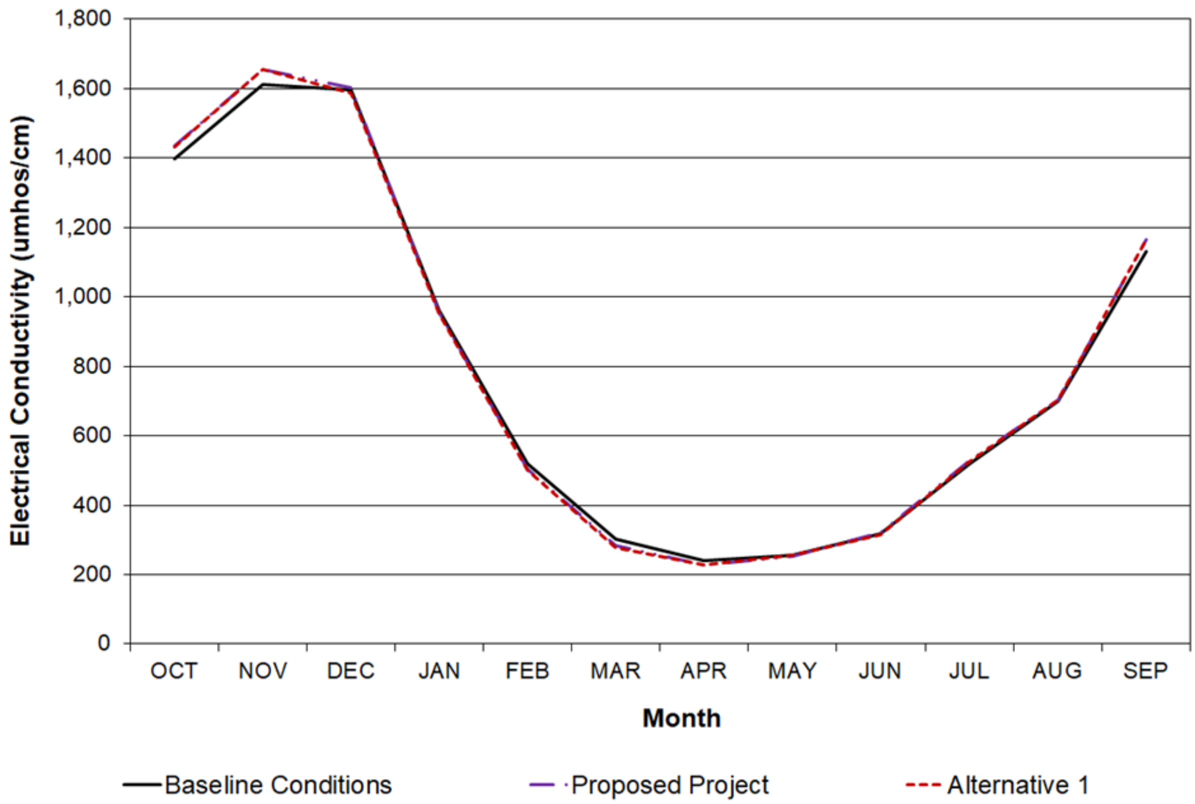


Figure 11-14. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the Sacramento River at Emmaton, Water Years 1922–2021, Alternative 1

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	531	10 (2%)	530	9 (2%)
Above Normal	591	602	11 (2%)	595	4 (1%)
Below Normal	722	722	0 (0%)	722	0 (0%)
Dry	862	868	6 (1%)	866	4 (0%)
Critically Dry	1,048	1,039	-9 (-1%)	1,034	-14 (-1%)

Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

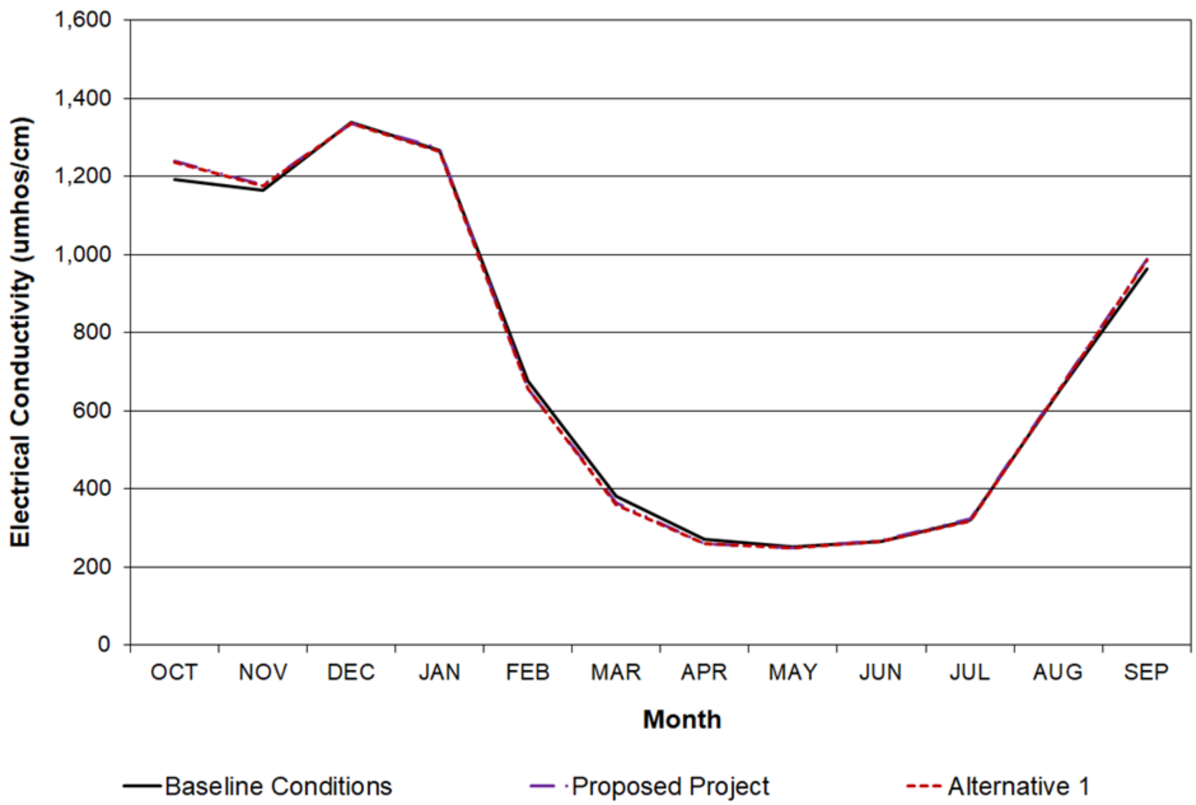


Figure 11-15. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the San Joaquin River at Jersey Point, Water Years 1922–2021, Alternative 1

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	348	1 (0%)	347	0 (0%)
Above Normal	386	385	-1 (0%)	383	-3 (-1%)
Below Normal	443	438	-5 (-1%)	438	-5 (-1%)
Dry	496	495	-1 (0%)	495	-1 (0%)
Critically Dry	572	566	-6 (-1%)	564	-8 (-1%)

Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

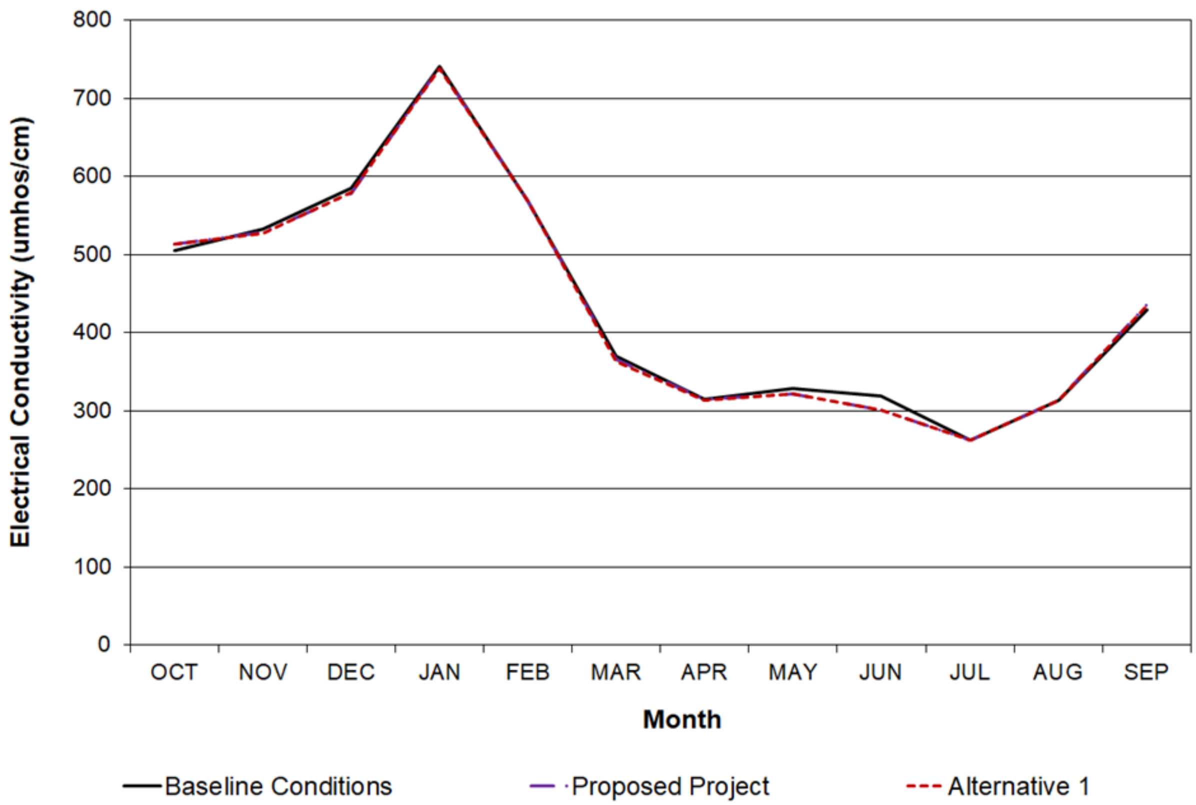
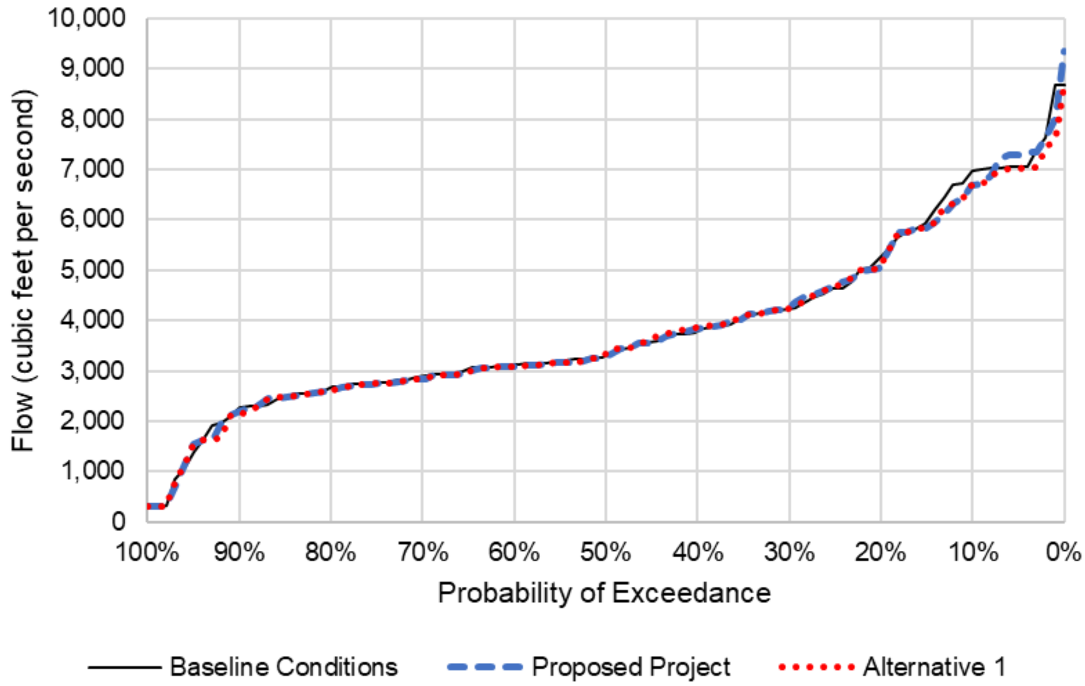


Figure 11-16. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for Old River at Rock Slough, Water Years 1922–2021, Alternative 1

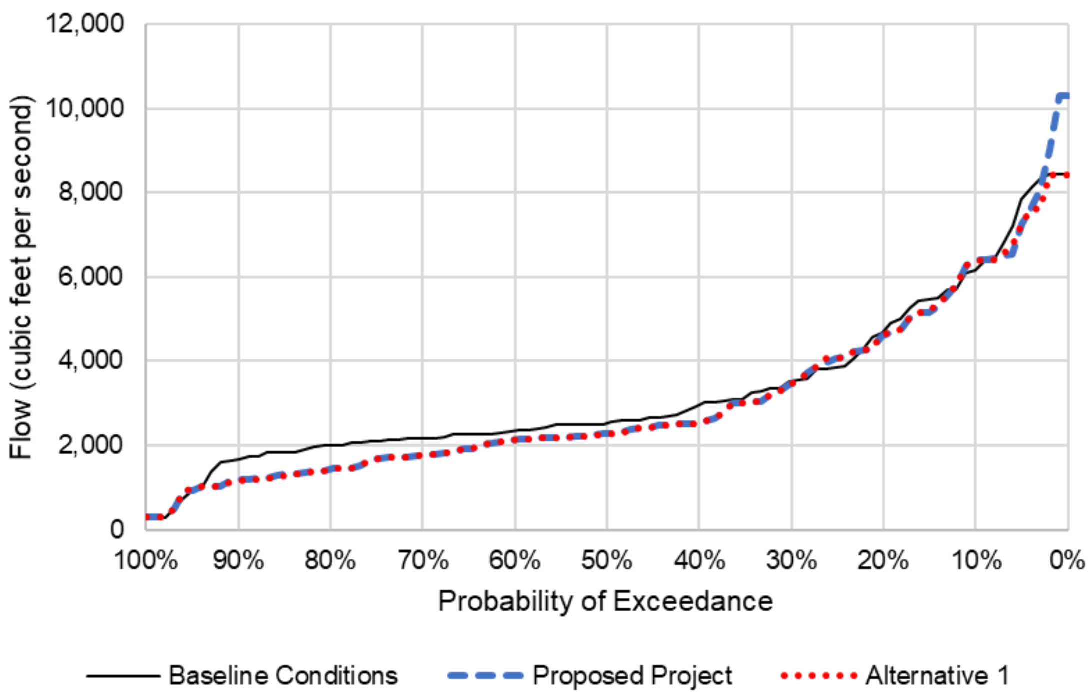
11.4.3 Aquatic Biological Resources

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) 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.

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.

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%)
Above Normal	N/A	(-9%)	(-9%)	(-10%)	(-9%)
Below Normal	571	473 (-17%)	473 (-17%)	473 (-17%)	473 (-17%)
Dry	103	92 (-10%)	92 (-11%)	92 (-11%)	92 (-11%)
Critically Dry	10	11 (13%)	11 (13%)	11 (13%)	11 (13%)

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 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	92 (38%)	91 (37%)	92 (38%)	91 (37%)
Above Normal	N/A	(48%)	(48%)	(48%)	(48%)
Below Normal	53	67 (26%)	67 (26%)	67 (26%)	67 (26%)
Dry	23	25 (7%)	25 (6%)	25 (6%)	25 (6%)
Critically Dry	10	13 (29%)	13 (29%)	13 (29%)	13 (29%)

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. 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	26,594 (19%)	26,565 (19%)	26,582 (19%)	26,575 (19%)
Above Normal	N/A	(20%)	(20%)	(19%)	(20%)
Below Normal	3,673	6,869 (87%)	6,867 (87%)	6,867 (87%)	6,868 (87%)
Dry	4,054	4,923 (21%)	4,904 (21%)	4,906 (21%)	4,913 (21%)
Critically Dry	541	709 (31%)	709 (31%)	709 (31%)	709 (31%)

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. 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	1,396 (-1%)	1,390 (-1%)	1,397 (-1%)	1,390 (-2%)
Above Normal	N/A	(-1%)	(-2%)	(0%)	(-2%)
Below Normal	412	399 (-3%)	399 (-3%)	399 (-3%)	398 (-3%)
Dry	782	741 (-5%)	741 (-5%)	743 (-5%)	742 (-5%)
Critically Dry	477	462 (-3%)	458 (-4%)	458 (-4%)	460 (-3%)

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. 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	5,801 (6%)	5,770 (5%)	5,798 (6%)	5,771 (5%)
Above Normal	N/A	(6%)	(5%)	(5%)	(6%)
Below Normal	3,911	3,872 (-1%)	3,874 (-1%)	3,874 (-1%)	3,872 (-1%)
Dry	2,087	2,035 (-2%)	2,031 (-3%)	2,031 (-3%)	2,032 (-3%)
Critically Dry	822	873 (6%)	869 (6%)	869 (6%)	870 (6%)

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. 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%)	1 (-1%)	1 (2%)	1 (-1%)
Above Normal	N/A	(-13%)	(-13%)	(-13%)	(-13%)
Below Normal	1	1 (-4%)	1 (-4%)	1 (-4%)	1 (-4%)
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. 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	20 (4%)	20 (4%)	20 (4%)	20 (4%)
Above Normal	N/A	(1%)	(1%)	(1%)	(1%)
Below Normal	11	11 (-4%)	11 (-4%)	11 (-4%)	11 (-4%)
Dry	3	4 (18%)	4 (17%)	4 (17%)	4 (18%)
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. 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	863 (0%)	862 (0%)	863 (0%)	863 (0%)
Above Normal	N/A	(-2%)	(-2%)	(-2%)	(-2%)
Below Normal	167	163 (-2%)	163 (-3%)	163 (-3%)	163 (-2%)
Dry	120	118 (-2%)	118 (-2%)	118 (-2%)	118 (-2%)
Critically Dry	125	145 (15%)	144 (15%)	144 (15%)	144 (15%)

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. 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%)	1 (5%)	1 (5%)	1 (5%)
Above Normal	N/A	(100%)	(88%)	(86%)	(101%)
Below Normal	7	7 (-3%)	7 (-3%)	7 (-3%)	7 (-3%)
Dry	1	1 (1%)	1 (1%)	1 (0%)	1 (1%)
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. 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%)	1 (5%)	1 (5%)	1 (5%)
Above Normal	N/A	(100%)	(88%)	(86%)	(101%)
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%)	2 (1%)	2 (0%)	2 (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 11-15. 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%)	0 (-5%)	0 (-5%)	0 (-6%)

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. 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	854,297 (31%)	853,414 (31%)	853,804 (31%)	853,759 (31%)
Above Normal	N/A	(38%)	(38%)	(38%)	(38%)
Below Normal	6,440	6,486 (1%)	6,451 (0%)	6,453 (0%)	6,485 (1%)
Dry	568	594 (5%)	592 (4%)	592 (4%)	593 (5%)
Critically Dry	245	239 (-2%)	238 (-3%)	238 (-3%)	238 (-3%)

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. 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	73 (8%)	73 (7%)	73 (8%)	73 (7%)
Above Normal	N/A	(8%)	(8%)	(8%)	(8%)
Below Normal	134	155 (16%)	155 (15%)	155 (15%)	155 (16%)
Dry	17	19 (15%)	19 (15%)	19 (15%)	19 (15%)
Critically Dry	1	1 (-1%)	1 (0%)	1 (0%)	1 (-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 11-18. 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	336,672 (1%)	335,937 (1%)	336,648 (1%)	335,972 (1%)
Above Normal	N/A	(1%)	(1%)	(1%)	(1%)
Below Normal	357,342	367,797 (3%)	366,775 (3%)	366,863 (3%)	367,682 (3%)
Dry	113,048	111,194 (-2%)	110,994 (-2%)	111,020 (-2%)	111,337 (-2%)
Critically Dry	33,928	34,518 (2%)	34,421 (1%)	34,423 (1%)	34,463 (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 11-19. 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	350,797 (3%)	350,459 (2%)	350,803 (3%)	350,470 (2%)
Above Normal	N/A	(2%)	(2%)	(3%)	(2%)
Below Normal	258,010	257,564 (0%)	257,661 (0%)	257,823 (0%)	257,332 (0%)
Dry	107,352	105,332 (-2%)	105,695 (-2%)	105,776 (-1%)	105,561 (-2%)
Critically Dry	17,821	17,410 (-2%)	17,279 (-3%)	17,286 (-3%)	17,342 (-3%)

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. 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	534,190 (3%)	533,968 (3%)	534,209 (3%)	533,947 (3%)
Above Normal	N/A	(3%)	(3%)	(3%)	(3%)
Below Normal	1,464,036	1,444,340 (-1%)	1,444,533 (-1%)	1,444,788 (-1%)	1,443,871 (-1%)
Dry	960,634	970,990 (1%)	982,256 (2%)	981,386 (2%)	978,142 (2%)
Critically Dry	159,786	159,176 (0%)	158,774 (-1%)	158,789 (-1%)	158,829 (-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. 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	21,409 (0%)	21,397 (0%)	21,409 (0%)	21,397 (0%)
Above Normal	N/A	(0%)	(0%)	(0%)	(0%)
Below Normal	16,846	19,794 (17%)	19,773 (17%)	19,776 (17%)	19,792 (17%)
Dry	14,163	14,408 (2%)	14,448 (2%)	14,439 (2%)	14,464 (2%)
Critically Dry	12,230	11,548 (-6%)	11,536 (-6%)	11,535 (-6%)	11,541 (-6%)

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. 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%)	7 (0%)	7 (0%)	7 (0%)
Above Normal	N/A	(-6%)	(-7%)	(-7%)	(-7%)
Below Normal	8	8 (-3%)	8 (-3%)	8 (-3%)	8 (-3%)
Dry	8	8 (1%)	8 (1%)	8 (0%)	8 (1%)
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. 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

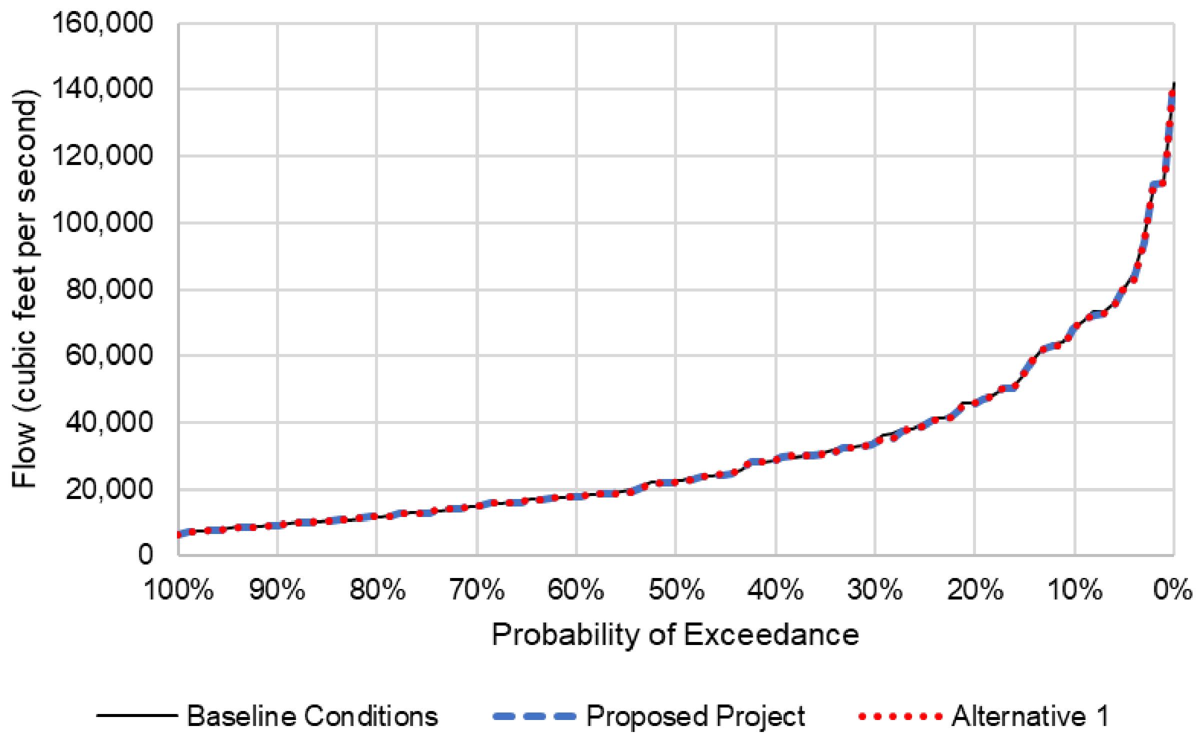
Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Above Normal	N/A	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Below Normal	2	1 (-20%)	1 (-20%)	1 (-20%)	1 (-20%)
Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Critically Dry	0	0 (0%)	0 (0%)	0 (0%)	0 (0%)

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, Figure 11-19), March through June (relevant for Starry Flounder; Table 11-25 and Figure 11-20), and February through June (relevant for American Shad; Table 11-26 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 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. 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	58,526 (-1%)	58,559 (-1%)	58,513 (-1%)	58,564 (-1%)
Above Normal	36,887	36,600 (-1%)	36,644 (-1%)	36,639 (-1%)	36,613 (-1%)
Below Normal	23,120	22,980 (-1%)	23,007 (0%)	22,995 (-1%)	22,980 (-1%)
Dry	14,912	15,144 (2%)	15,187 (2%)	15,191 (2%)	15,142 (2%)
Critically Dry	9,573	9,449 (-1%)	9,436 (-1%)	9,436 (-1%)	9,435 (-1%)

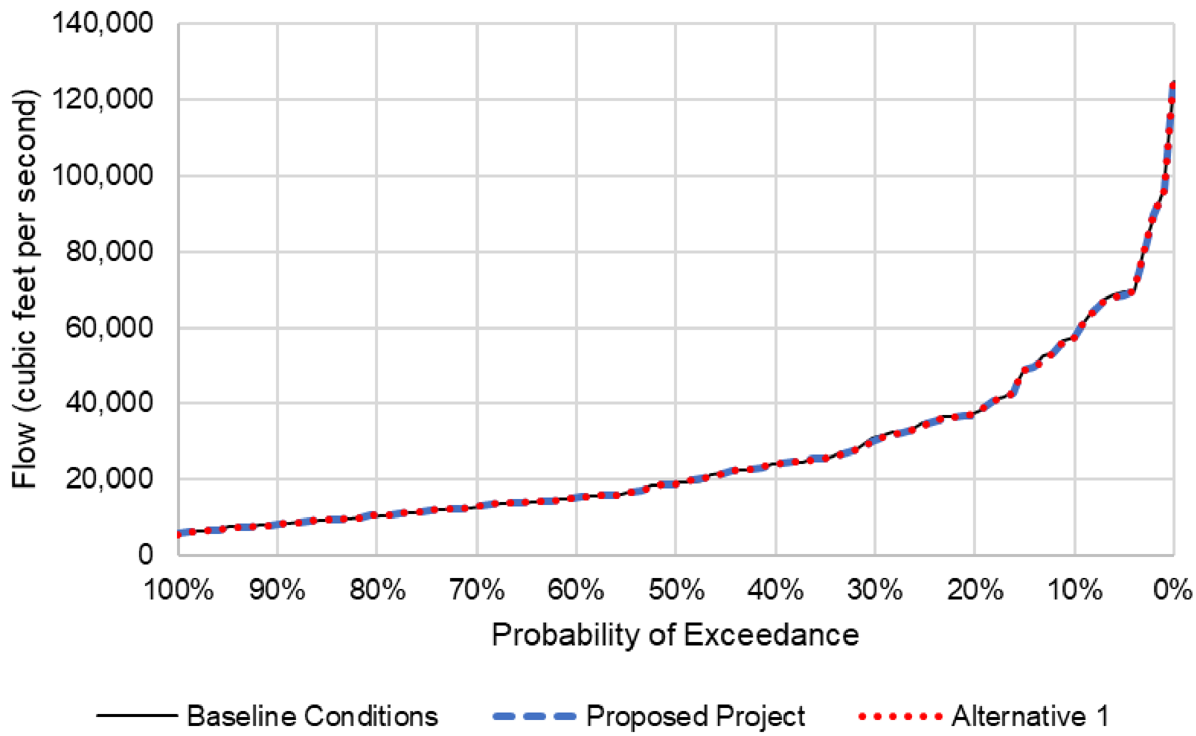


Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

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

Table 11-25. 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	50,433 (-1%)	50,457 (-1%)	50,423 (-1%)	50,461 (-1%)
Above Normal	31,287	31,184 (0%)	31,192 (0%)	31,189 (0%)	31,179 (0%)
Below Normal	19,561	19,550 (0%)	19,536 (0%)	19,527 (0%)	19,550 (0%)
Dry	12,901	13,085 (1%)	13,088 (1%)	13,091 (1%)	13,085 (1%)
Critically Dry	8,486	8,393 (-1%)	8,383 (-1%)	8,383 (-1%)	8,382 (-1%)

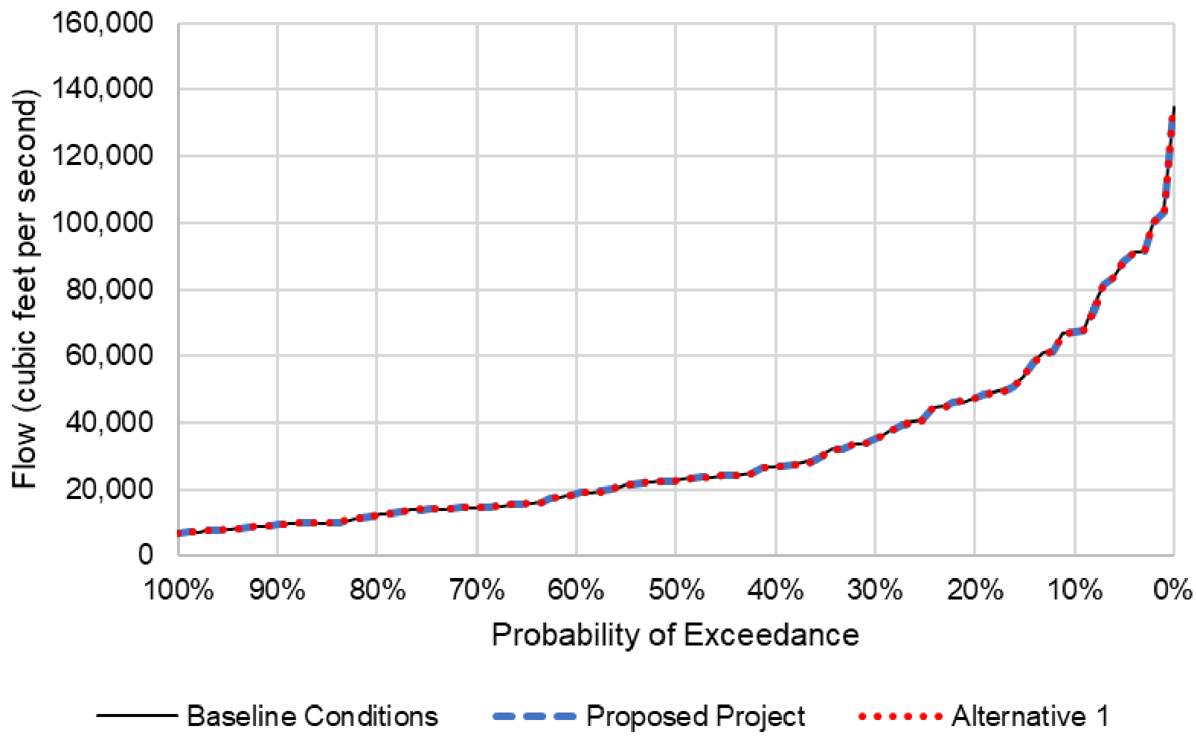


Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

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

Table 11-26. 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	60,055 (-1%)	60,080 (0%)	60,048 (-1%)	60,081 (0%)
Above Normal	36,558	36,531 (0%)	36,526 (0%)	36,540 (0%)	36,533 (0%)
Below Normal	22,102	22,097 (0%)	22,090 (0%)	22,082 (0%)	22,098 (0%)
Dry	14,516	14,763 (2%)	14,786 (2%)	14,785 (2%)	14,784 (2%)
Critically Dry	9,507	9,511 (0%)	9,526 (0%)	9,523 (0%)	9,527 (0%)

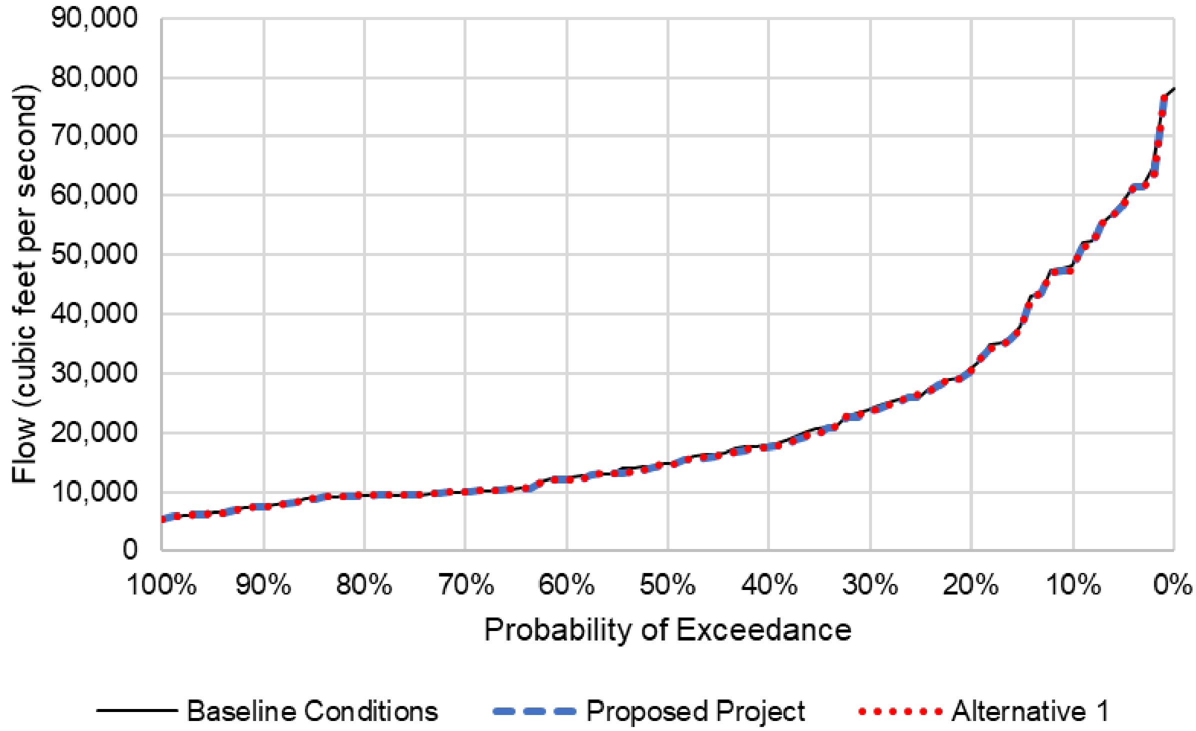


Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

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

Table 11-27. 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	39,737 (-1%)	39,723 (-1%)	39,728 (-1%)	39,724 (-1%)
Above Normal	22,832	22,538 (-1%)	22,633 (-1%)	22,640 (-1%)	22,519 (-1%)
Below Normal	16,587	16,309 (-2%)	16,358 (-1%)	16,346 (-1%)	16,309 (-2%)
Dry	10,801	10,839 (0%)	10,933 (1%)	10,933 (1%)	10,839 (0%)
Critically Dry	7,338	7,222 (-2%)	7,223 (-2%)	7,223 (-2%)	7,222 (-2%)



Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

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) that are very similar to those previously described for the Proposed Project in Chapter 6 (Figures 6-50, 6-50a, and 6-50b).

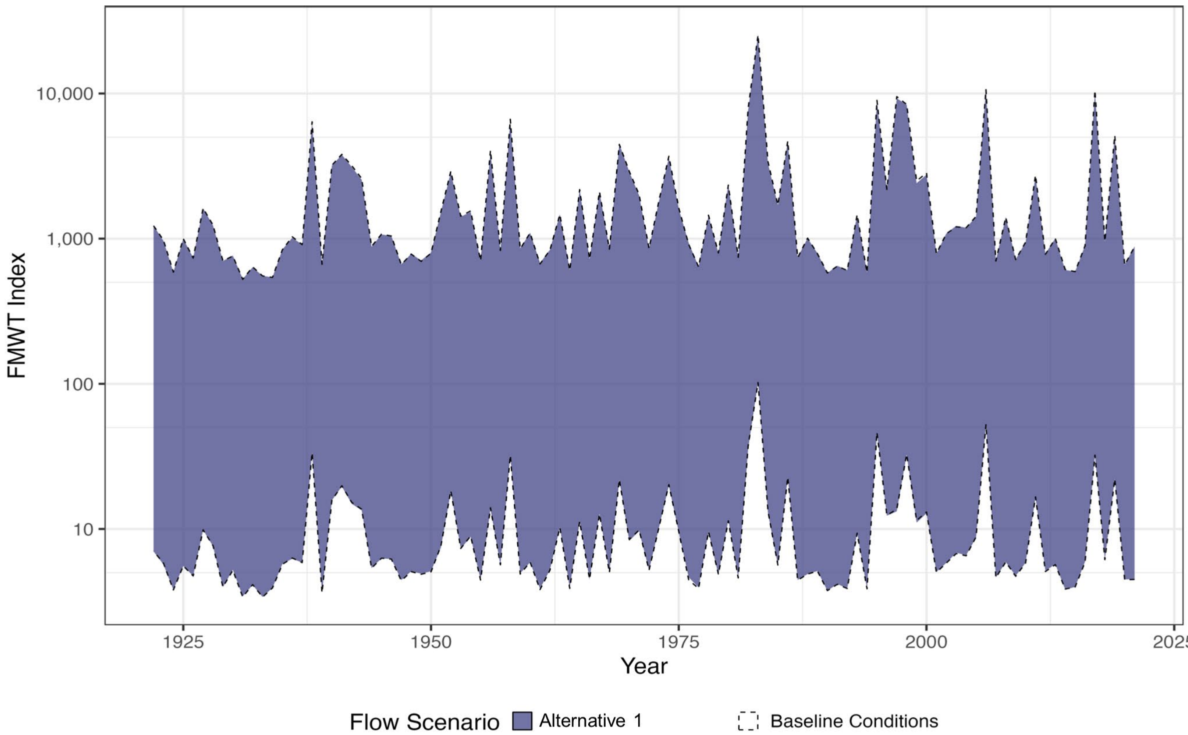


Figure 11-23. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Fall Midwater Trawl Index from Application of the Delta Outflow-Abundance Index Method for Alternative 1 and Baseline Conditions Scenarios

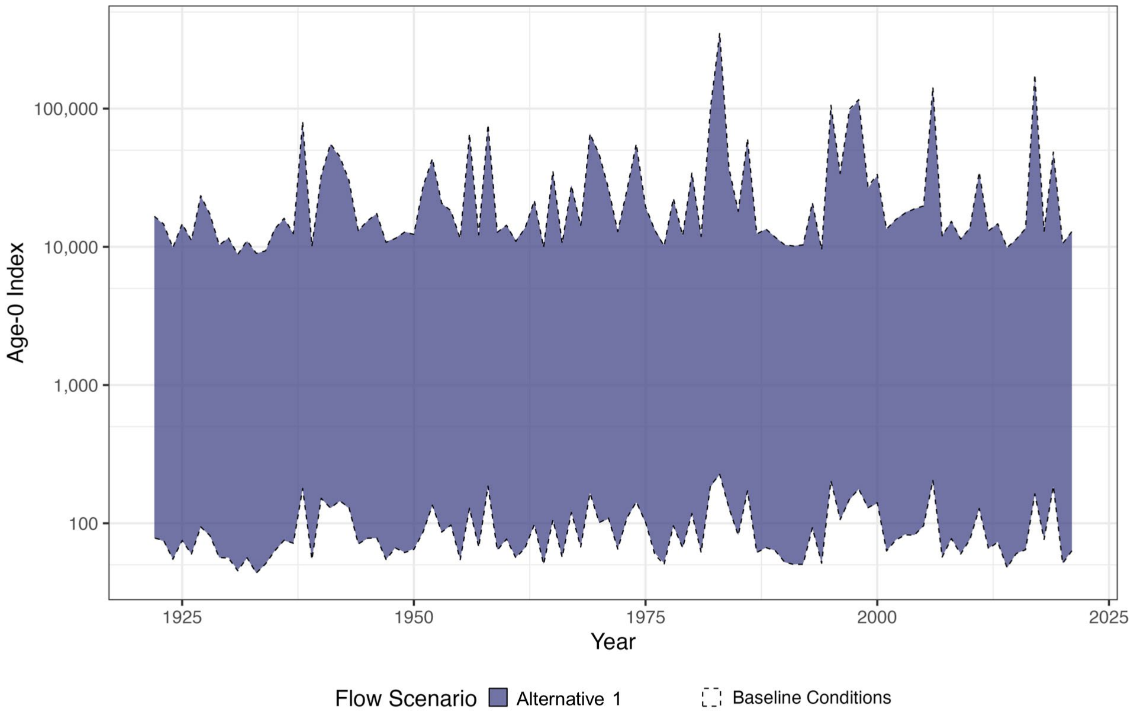


Figure 11-24. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Midwater Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 1 and Baseline Conditions Scenarios

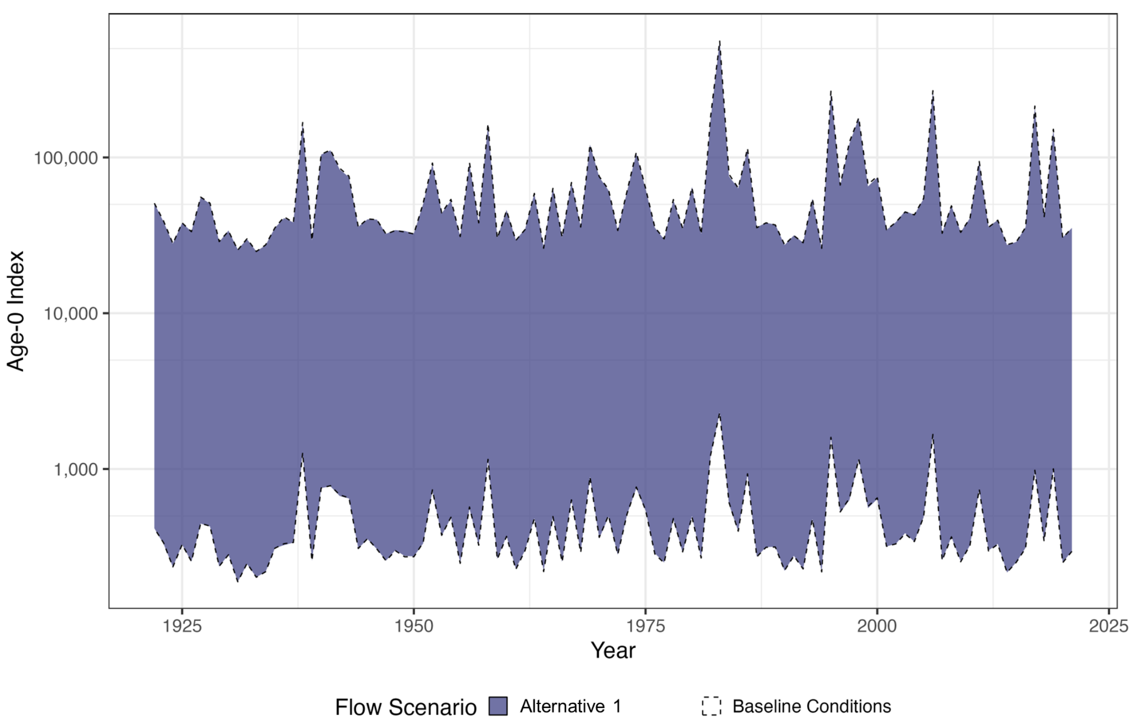


Figure 11-25. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Otter Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 1 and Baseline Conditions Scenarios

Table 11-28. 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	Proportion of Posterior Distribution Less Under			
						Proposed Project	Alternative 1	Alternative 2	Alternative 3
Wet	330.6	327.5(-0.9%)	330.4 (-0.1%)	327.6 (-0.9%)	326.1(-1.4%)	0.506	0.502	0.515	0.509
Above Normal	120.5	119.7(-0.7%)	120.7 (0.2%)	119.6 (-0.7%)	119.5(-0.8%)	0.504	0.497	0.510	0.501
Below Normal	72.6	72.4(-0.3%)	72.6 (0.0%)	72.0 (-0.8%)	72.3(-0.4%)	0.502	0.497	0.505	0.498
Dry	59.8	60.0(0.3%)	60.2 (0.5%)	59.7 (0.2%)	59.9(0.2%)	0.497	0.492	0.495	0.492
Critically Dry	52.6	52.6(0.0%)	52.8 (0.3%)	52.3 (-0.6%)	52.6(0.0%)	0.500	0.495	0.498	0.494

Table 11-29. 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	12,332.2(-0.4%)	12,410.8 (0.2%)	12,332.9 (-0.4%)	12,468.7(0.7%)	0.509	0.502	0.507	0.501
Above Normal	5,149.9	5,144.5(-0.1%)	5,181.7 (0.6%)	5,164.3 (0.3%)	5,196.6(0.9%)	0.504	0.498	0.503	0.496
Below Normal	3,271	3,275.7(0.1%)	3,289.5 (0.6%)	3,283.5 (0.4%)	3,302.5(1.0%)	0.501	0.497	0.503	0.494
Dry	2,713.2	2,731.3(0.7%)	2,741.1 (1.0%)	2,738.3 (0.9%)	2,751.0(1.4%)	0.495	0.493	0.496	0.489
Critically Dry	2,417.4	2,427.1(0.4%)	2,436.8 (0.8%)	2,435.6 (0.8%)	2,447.4(1.2%)	0.499	0.493	0.498	0.492

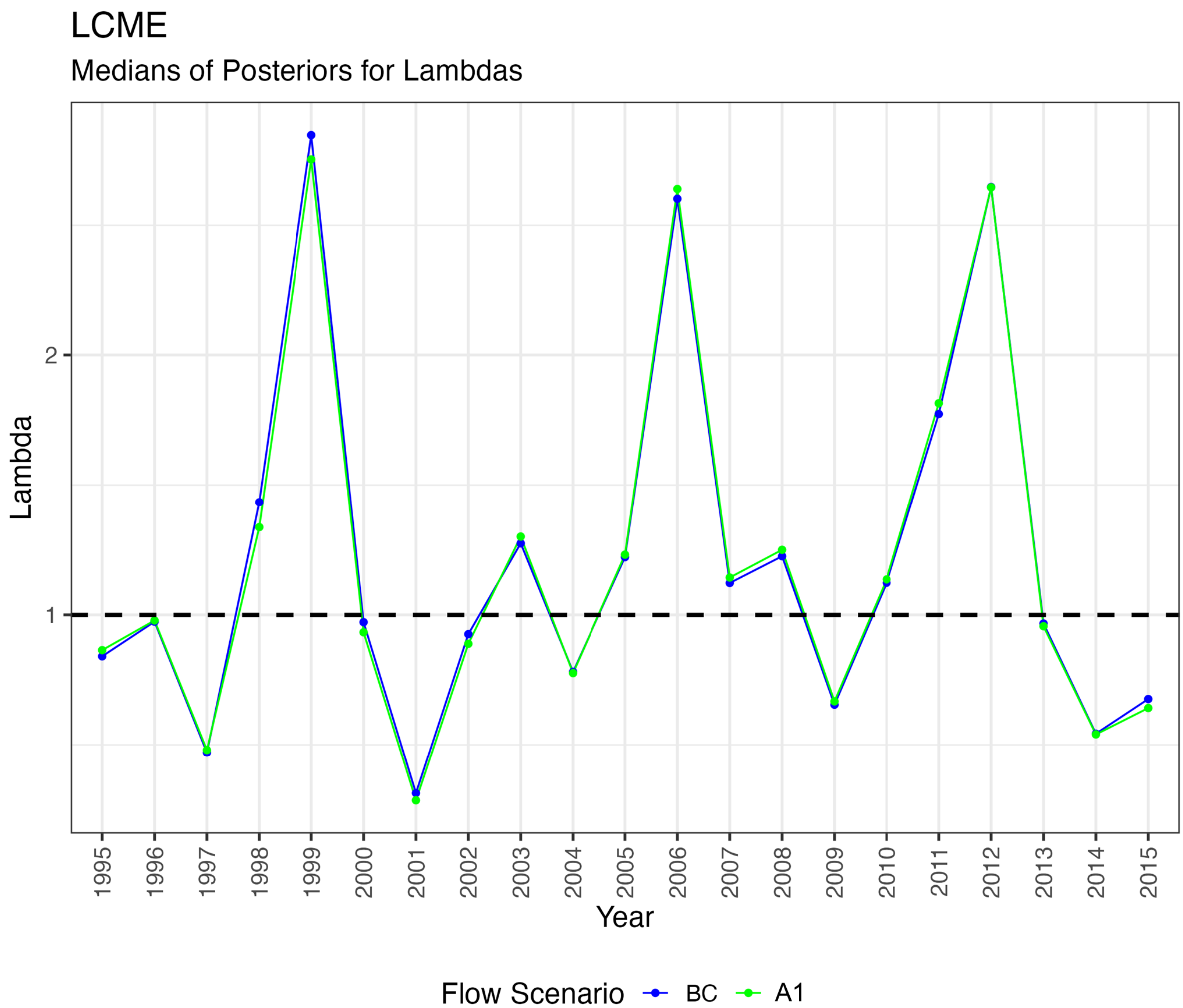
Table 11-30. Mean Predicted Longfin Smelt Bay Otter Trawl Age-0 Index under the Proposed Project/Alternative 1/Alternative 2/Alternative 3 and Baseline Conditions Modeling Scenarios, and Differences between the Scenarios (Proposed Project/Alternative 1/Alternative 2/Alternative 3 minus Baseline Conditions) 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	13,174.3(-0.3%)	13,191.1 (-0.2%)	13,213.4 (0.0%)	13,125.6(-0.7%)	0.501	0.497	0.501	0.506
Above Normal	5,726.2	5,740.9(0.3%)	5,755.4 (0.5%)	5,775.4 (0.9%)	5,735.8(0.2%)	0.502	0.492	0.494	0.501
Below Normal	3,799.1	3,815.5(0.4%)	3,819.4 (0.5%)	3,838.4 (1.0%)	3,818.3(0.5%)	0.500	0.491	0.491	0.497
Dry	3,234.6	3,264.3(0.9%)	3,267.1 (1.0%)	3,286.0 (1.6%)	3,268.3(1.0%)	0.492	0.487	0.484	0.492
Critically Dry	2,912.1	2,933.4(0.7%)	2,934.6 (0.8%)	2,953.7 (1.4%)	2,940.1(1.0%)	0.494	0.489	0.485	0.495

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; 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. 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
1996	0.974	0.979 (0%)	0.979 (0%)	0.978 (0%)	0.977 (0%)	0.499	0.499	0.500	0.500
1997	0.471	0.476 (1%)	0.480 (2%)	0.476 (1%)	0.480 (2%)	0.500	0.498	0.497	0.495
1998	1.434	1.335 (-7%)	1.337 (-7%)	1.335 (-7%)	1.337 (-7%)	0.512	0.511	0.514	0.513
1999	2.846	2.747 (-4%)	2.753 (-3%)	2.746 (-4%)	2.753 (-3%)	0.506	0.505	0.505	0.505
2000	0.972	0.942 (-3%)	0.933 (-4%)	0.941 (-3%)	0.933 (-4%)	0.510	0.511	0.510	0.512
2001	0.314	0.288 (-8%)	0.286 (-9%)	0.286 (-9%)	0.288 (-8%)	0.515	0.515	0.515	0.515
2002	0.926	0.902 (-3%)	0.889 (-4%)	0.889 (-4%)	0.902 (-3%)	0.503	0.506	0.507	0.504
2003	1.275	1.322 (4%)	1.301 (2%)	1.301 (2%)	1.322 (4%)	0.495	0.498	0.498	0.495
2004	0.781	0.774 (-1%)	0.776 (-1%)	0.776 (-1%)	0.774 (-1%)	0.503	0.503	0.502	0.502
2005	1.222	1.238 (1%)	1.231 (1%)	1.231 (1%)	1.238 (1%)	0.496	0.497	0.498	0.497
2006	2.602	2.638 (1%)	2.639 (1%)	2.639 (1%)	2.638 (1%)	0.495	0.495	0.496	0.496
2007	1.123	1.143 (2%)	1.143 (2%)	1.143 (2%)	1.143 (2%)	0.497	0.496	0.495	0.495
2008	1.225	1.250 (2%)	1.250 (2%)	1.249 (2%)	1.253 (2%)	0.498	0.498	0.499	0.499
2009	0.655	0.668 (2%)	0.668 (2%)	0.668 (2%)	0.668 (2%)	0.497	0.497	0.496	0.496
2010	1.123	1.136 (1%)	1.136 (1%)	1.136 (1%)	1.136 (1%)	0.496	0.496	0.496	0.496
2011	1.773	1.814 (2%)	1.814 (2%)	1.815 (2%)	1.814 (2%)	0.496	0.496	0.497	0.497
2012	2.647	2.645 (0%)	2.645 (0%)	2.645 (0%)	2.645 (0%)	0.501	0.501	0.500	0.500
2013	0.967	0.962 (0%)	0.957 (-1%)	0.957 (-1%)	0.962 (0%)	0.502	0.503	0.499	0.498
2014	0.543	0.541 (-1%)	0.541 (-1%)	0.541 (-1%)	0.541 (-1%)	0.501	0.501	0.501	0.501
2015	0.677	0.642 (-5%)	0.642 (-5%)	0.642 (-5%)	0.642 (-5%)	0.509	0.509	0.510	0.510



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). 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. 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	13,642 (2%)	13,611 (1%)	13,643 (2%)	13,612 (1%)
January	Above Normal	7,297	7,448 (2%)	7,451 (2%)	7,451 (2%)	7,448 (2%)
January	Below Normal	1,694	1,891 (12%)	1,883 (11%)	1,883 (11%)	1,896 (12%)
January	Dry	-166	-10 (94%)	-13 (92%)	-15 (91%)	-11 (93%)
January	Critically Dry	-606	-158 (74%)	-66 (89%)	-65 (89%)	-157 (74%)
February	Wet	17,812	17,759 (0%)	17,760 (0%)	17,759 (0%)	17,761 (0%)
February	Above Normal	10,365	10,749 (4%)	10,743 (4%)	10,780 (4%)	10,778 (4%)
February	Below Normal	5,156	5,419 (5%)	5,422 (5%)	5,420 (5%)	5,419 (5%)
February	Dry	1,918	2,518 (31%)	2,387 (24%)	2,393 (25%)	2,387 (24%)
February	Critically Dry	624	874 (40%)	892 (43%)	889 (42%)	894 (43%)
March	Wet	16,867	16,750 (-1%)	16,886 (0%)	16,738 (-1%)	16,898 (0%)
March	Above Normal	9,445	9,844 (4%)	9,795 (4%)	9,794 (4%)	9,844 (4%)
March	Below Normal	4,891	5,542 (13%)	5,514 (13%)	5,514 (13%)	5,542 (13%)
March	Dry	1,996	2,363 (18%)	2,324 (16%)	2,325 (16%)	2,362 (18%)
March	Critically Dry	1,388	1,429 (3%)	1,392 (0%)	1,392 (0%)	1,395 (1%)
April	Wet	15,380	15,172 (-1%)	15,168 (-1%)	15,173 (-1%)	15,172 (-1%)
April	Above Normal	8,649	8,057 (-7%)	7,934 (-8%)	7,952 (-8%)	8,062 (-7%)
April	Below Normal	7,897	7,457 (-6%)	7,402 (-6%)	7,398 (-6%)	7,457 (-6%)
April	Dry	4,004	3,978 (-1%)	3,948 (-1%)	3,949 (-1%)	3,981 (-1%)
April	Critically Dry	2,603	2,467 (-5%)	2,469 (-5%)	2,469 (-5%)	2,467 (-5%)
May	Wet	11,221	9,818 (-13%)	9,822 (-12%)	9,820 (-12%)	9,820 (-12%)
May	Above Normal	5,257	4,152 (-21%)	4,235 (-19%)	4,235 (-19%)	4,152 (-21%)
May	Below Normal	5,591	4,579 (-18%)	4,668 (-17%)	4,668 (-17%)	4,579 (-18%)
May	Dry	2,980	2,711 (-9%)	2,798 (-6%)	2,797 (-6%)	2,711 (-9%)
May	Critically Dry	1,811	1,568 (-13%)	1,567 (-13%)	1,567 (-13%)	1,568 (-13%)

Marginally lower Sacramento River inflow in March through April under Alternative 1 compared to the Proposed Project (Table 11-33) 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).

Table 11-33. 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	20,557 (5%)	20,555 (5%)	20,556 (5%)	20,555 (5%)
September	Above Normal	18,945	20,658 (9%)	20,728 (9%)	20,726 (9%)	20,661 (9%)
September	Below Normal	14,947	14,902 (0%)	14,923 (0%)	14,929 (0%)	14,886 (0%)
September	Dry	10,808	10,837 (0%)	10,887 (1%)	10,884 (1%)	10,835 (0%)
September	Critically Dry	8,516	8,522 (0%)	8,516 (0%)	8,517 (0%)	8,517 (0%)
October	Wet	14,238	14,178 (0%)	14,147 (-1%)	14,147 (-1%)	14,177 (0%)
October	Above Normal	10,754	10,839 (1%)	10,793 (0%)	10,790 (0%)	10,824 (1%)
October	Below Normal	12,008	12,046 (0%)	12,057 (0%)	12,056 (0%)	12,046 (0%)
October	Dry	11,242	11,218 (0%)	11,223 (0%)	11,220 (0%)	11,220 (0%)
October	Critically Dry	8,193	8,233 (0%)	8,232 (0%)	8,228 (0%)	8,230 (0%)
November	Wet	19,275	19,333 (0%)	19,329 (0%)	19,330 (0%)	19,333 (0%)
November	Above Normal	12,798	12,876 (1%)	12,833 (0%)	12,825 (0%)	12,883 (1%)
November	Below Normal	13,863	13,704 (-1%)	13,672 (-1%)	13,675 (-1%)	13,703 (-1%)
November	Dry	12,156	12,232 (1%)	12,228 (1%)	12,229 (1%)	12,232 (1%)
November	Critically Dry	8,304	8,346 (1%)	8,514 (3%)	8,487 (2%)	8,345 (1%)
December	Wet	38,326	38,325 (0%)	38,318 (0%)	38,332 (0%)	38,308 (0%)
December	Above Normal	19,238	19,295 (0%)	19,331 (0%)	19,306 (0%)	19,254 (0%)
December	Below Normal	16,409	16,624 (1%)	16,562 (1%)	16,640 (1%)	16,552 (1%)
December	Dry	16,120	15,913 (-1%)	15,917 (-1%)	15,928 (-1%)	15,916 (-1%)
December	Critically Dry	12,175	12,414 (2%)	12,319 (1%)	12,314 (1%)	12,400 (2%)
January	Wet	49,611	49,620 (0%)	49,625 (0%)	49,622 (0%)	49,624 (0%)
January	Above Normal	40,840	40,836 (0%)	40,854 (0%)	40,853 (0%)	40,837 (0%)
January	Below Normal	22,233	22,278 (0%)	22,279 (0%)	22,279 (0%)	22,313 (0%)
January	Dry	16,110	15,964 (-1%)	15,965 (-1%)	15,970 (-1%)	15,963 (-1%)

Month	Water Year Type	Baseline Conditions	Proposed Project	Alternative 1	Alternative 2	Alternative 3
January	Critically Dry	13,504	13,529 (0%)	13,574 (1%)	13,576 (1%)	13,525 (0%)
February	Wet	58,955	58,946 (0%)	58,956 (0%)	58,943 (0%)	58,959 (0%)
February	Above Normal	44,381	44,348 (0%)	44,305 (0%)	44,343 (0%)	44,354 (0%)
February	Below Normal	28,831	28,645 (-1%)	28,651 (-1%)	28,646 (-1%)	28,649 (-1%)
February	Dry	21,943	21,854 (0%)	22,123 (1%)	22,093 (1%)	22,125 (1%)
February	Critically Dry	15,633	15,836 (1%)	15,956 (2%)	15,940 (2%)	15,961 (2%)
March	Wet	51,700	51,704 (0%)	51,704 (0%)	51,703 (0%)	51,704 (0%)
March	Above Normal	44,719	44,896 (0%)	44,554 (0%)	44,544 (0%)	44,907 (0%)
March	Below Normal	26,880	27,027 (1%)	26,832 (0%)	26,831 (0%)	27,026 (1%)
March	Dry	20,280	20,572 (1%)	20,309 (0%)	20,317 (0%)	20,573 (1%)
March	Critically Dry	13,458	13,381 (-1%)	13,378 (-1%)	13,377 (-1%)	13,375 (-1%)
April	Wet	41,478	41,478 (0%)	41,477 (0%)	41,477 (0%)	41,478 (0%)
April	Above Normal	25,970	26,201 (1%)	26,034 (0%)	26,033 (0%)	26,202 (1%)
April	Below Normal	17,525	17,917 (2%)	17,528 (0%)	17,496 (0%)	17,916 (2%)
April	Dry	12,680	12,881 (2%)	12,639 (0%)	12,641 (0%)	12,869 (1%)
April	Critically Dry	9,842	9,834 (0%)	9,834 (0%)	9,835 (0%)	9,834 (0%)
May	Wet	34,789	34,790 (0%)	34,788 (0%)	34,788 (0%)	34,790 (0%)
May	Above Normal	23,271	23,470 (1%)	24,116 (4%)	24,116 (4%)	23,469 (1%)
May	Below Normal	17,000	16,918 (0%)	17,572 (3%)	17,567 (3%)	16,918 (0%)
May	Dry	11,993	12,229 (2%)	12,849 (7%)	12,848 (7%)	12,231 (2%)
May	Critically Dry	8,603	8,650 (1%)	8,650 (1%)	8,651 (1%)	8,650 (1%)
June	Wet	25,726	25,757 (0%)	25,757 (0%)	25,757 (0%)	25,757 (0%)
June	Above Normal	18,576	18,535 (0%)	18,431 (-1%)	18,434 (-1%)	18,472 (-1%)
June	Below Normal	13,942	13,889 (0%)	13,752 (-1%)	13,751 (-1%)	13,889 (0%)
June	Dry	13,111	12,655 (-3%)	12,478 (-5%)	12,484 (-5%)	12,612 (-4%)
June	Critically Dry	9,802	9,696 (-1%)	9,602 (-2%)	9,601 (-2%)	9,668 (-1%)

Table 11-34. 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	7,544 (0%)	7,544 (0%)	7,545 (0%)	7,545 (0%)
January	Above Normal	3,596	3,591 (0%)	3,591 (0%)	3,591 (0%)	3,592 (0%)
January	Below Normal	2,527	2,524 (0%)	2,525 (0%)	2,524 (0%)	2,524 (0%)
January	Dry	1,990	1,984 (0%)	1,984 (0%)	1,984 (0%)	1,984 (0%)
January	Critically Dry	1,865	1,861 (0%)	1,864 (0%)	1,865 (0%)	1,864 (0%)
February	Wet	10,551	10,547 (0%)	10,547 (0%)	10,547 (0%)	10,547 (0%)
February	Above Normal	6,027	6,030 (0%)	6,031 (0%)	6,030 (0%)	6,033 (0%)
February	Below Normal	4,114	4,111 (0%)	4,112 (0%)	4,111 (0%)	4,111 (0%)
February	Dry	2,317	2,312 (0%)	2,312 (0%)	2,313 (0%)	2,312 (0%)
February	Critically Dry	2,204	2,200 (0%)	2,202 (0%)	2,202 (0%)	2,201 (0%)
March	Wet	11,407	11,402 (0%)	11,401 (0%)	11,401 (0%)	11,401 (0%)
March	Above Normal	5,884	5,881 (0%)	5,880 (0%)	5,880 (0%)	5,880 (0%)
March	Below Normal	4,179	4,176 (0%)	4,176 (0%)	4,176 (0%)	4,176 (0%)
March	Dry	2,311	2,308 (0%)	2,308 (0%)	2,308 (0%)	2,307 (0%)
March	Critically Dry	2,100	2,097 (0%)	2,097 (0%)	2,097 (0%)	2,097 (0%)
April	Wet	11,918	11,912 (0%)	11,912 (0%)	11,912 (0%)	11,912 (0%)
April	Above Normal	6,777	6,785 (0%)	6,774 (0%)	6,774 (0%)	6,784 (0%)
April	Below Normal	5,216	5,212 (0%)	5,212 (0%)	5,212 (0%)	5,212 (0%)
April	Dry	2,817	2,812 (0%)	2,812 (0%)	2,812 (0%)	2,812 (0%)
April	Critically Dry	2,363	2,361 (0%)	2,361 (0%)	2,361 (0%)	2,361 (0%)
May	Wet	9,664	9,655 (0%)	9,655 (0%)	9,655 (0%)	9,655 (0%)
May	Above Normal	5,170	5,167 (0%)	5,166 (0%)	5,166 (0%)	5,167 (0%)
May	Below Normal	4,162	4,158 (0%)	4,157 (0%)	4,158 (0%)	4,157 (0%)
May	Dry	2,338	2,333 (0%)	2,333 (0%)	2,333 (0%)	2,333 (0%)
May	Critically Dry	1,763	1,761 (0%)	1,761 (0%)	1,761 (0%)	1,761 (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).

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.

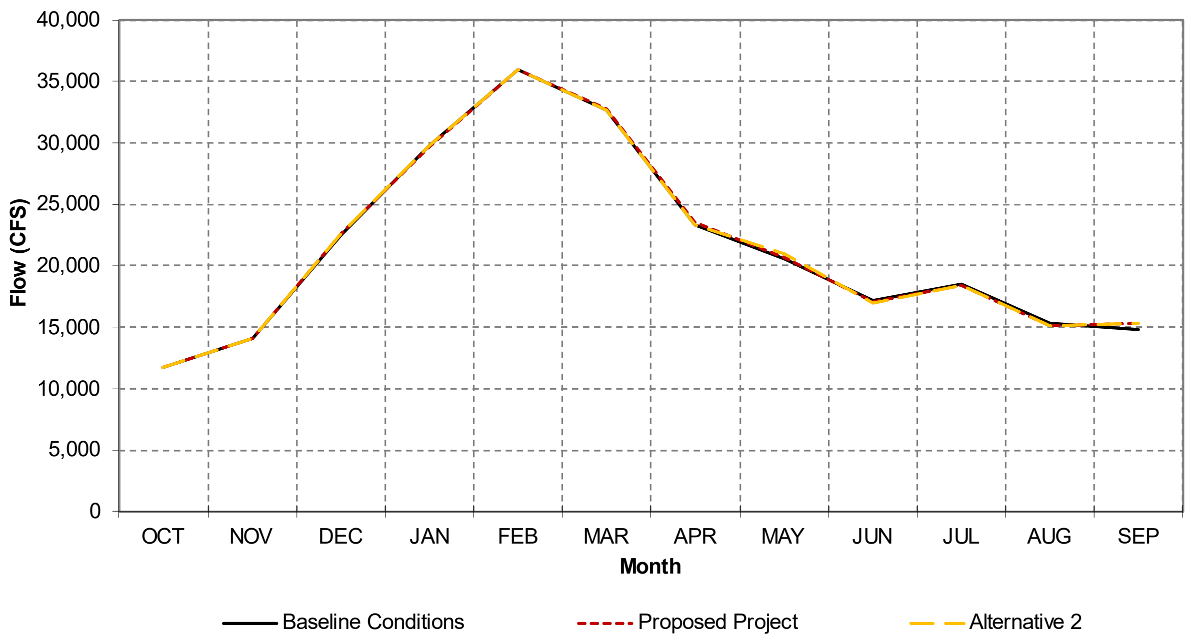


Figure 11-27. Sacramento River at Freeport Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 2

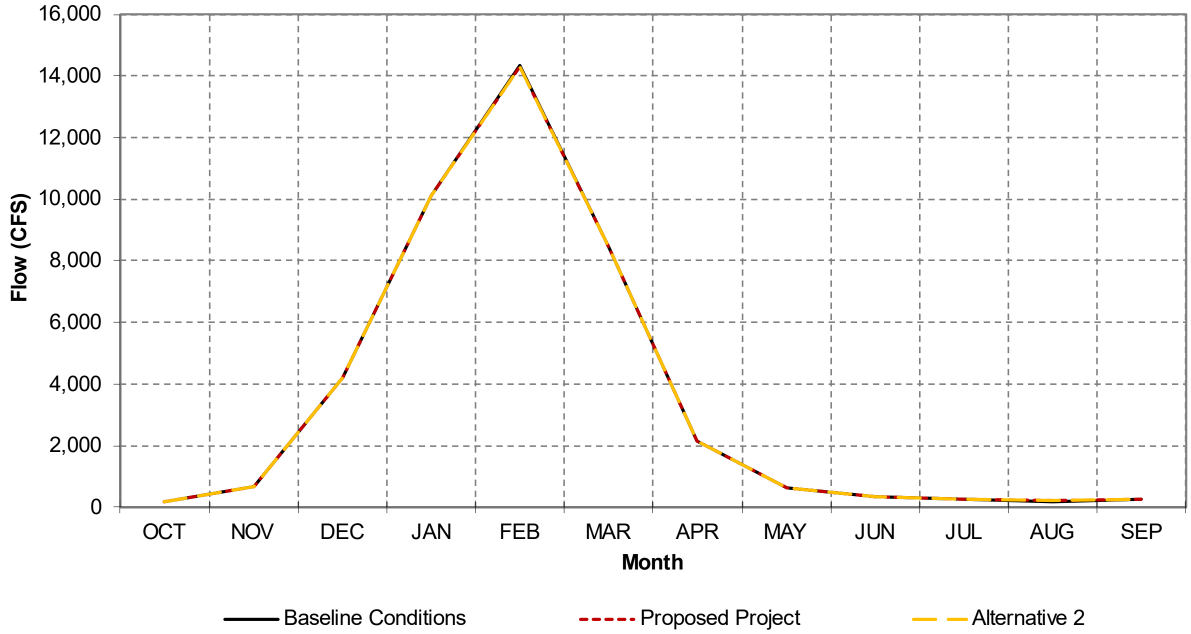


Figure 11-28. Monthly Long-term Average Yolo Bypass Flow for the Baseline Conditions, Proposed Project, and Alternative 2

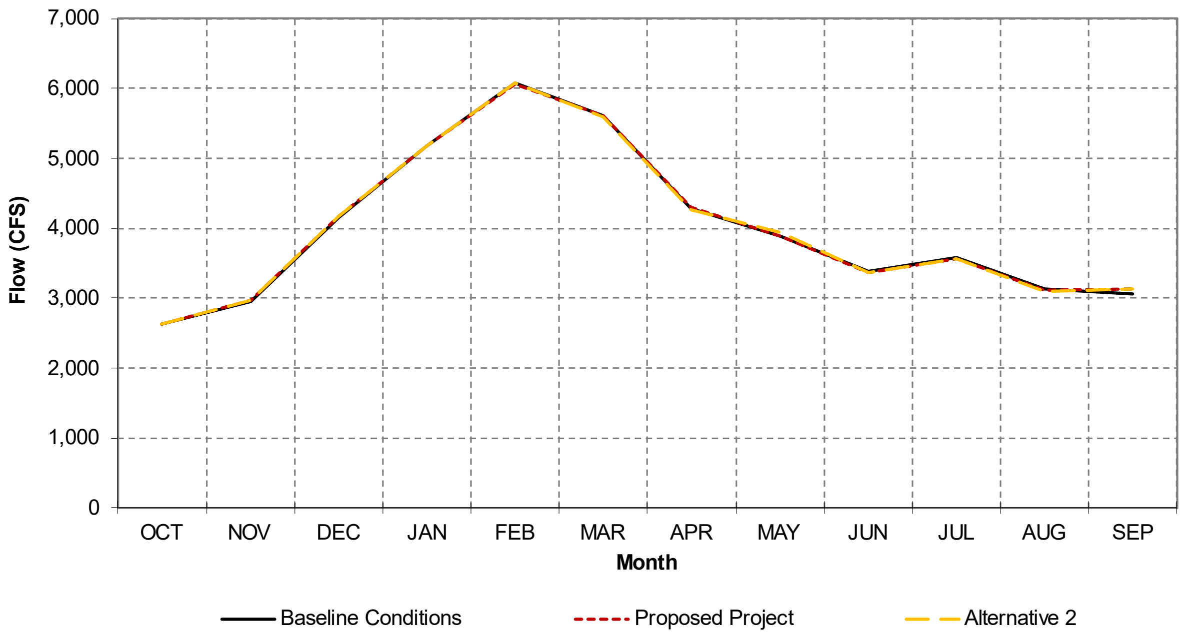


Figure 11-29. Monthly Long-term Average Georgiana Slough Flow for the Baseline Conditions, Proposed Project, and Alternative 2

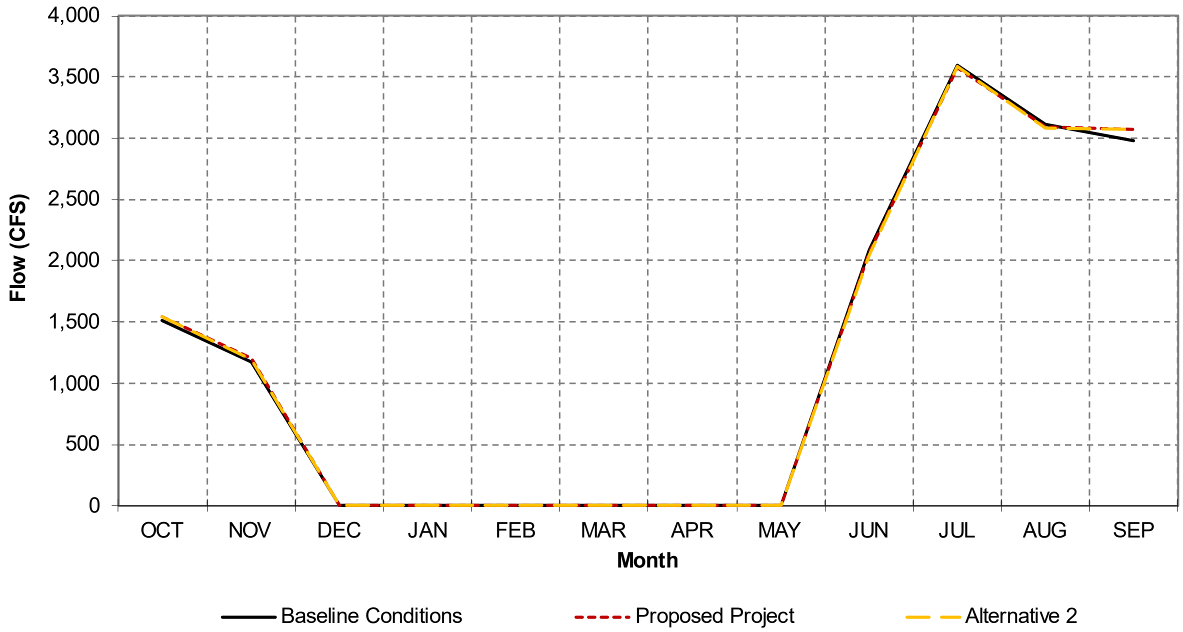


Figure 11-30. Monthly Long-term Average Delta Cross Channel Flow for the Baseline Conditions, Proposed Project, and Alternative 2

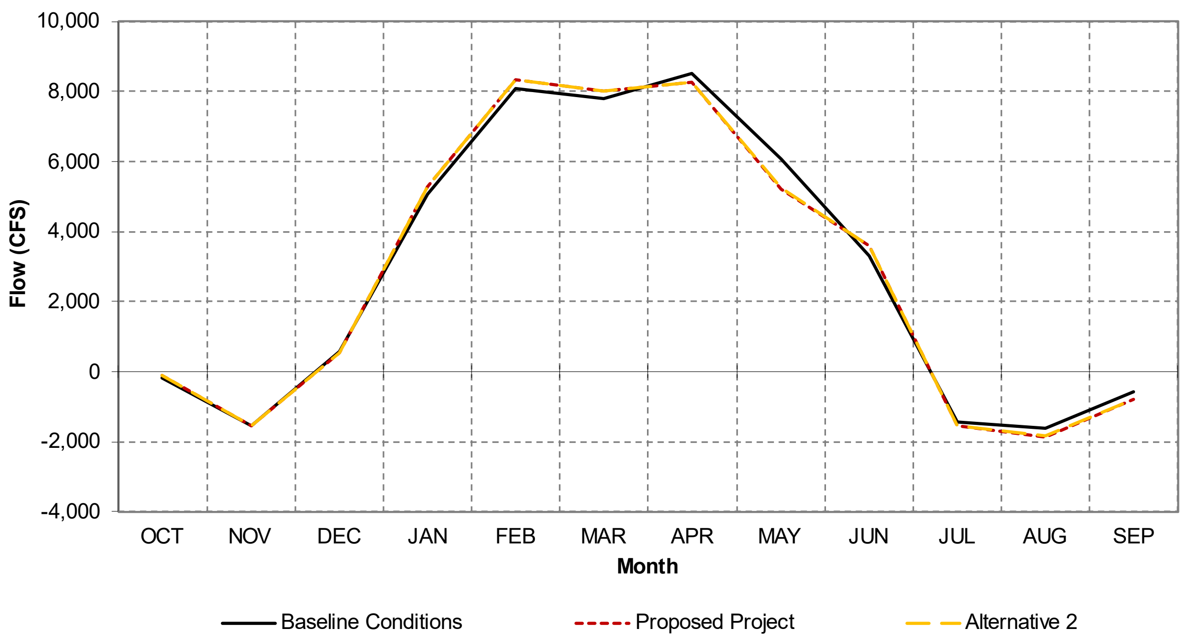


Figure 11-31. Monthly Long-term Average Qwest Flow for the Baseline Conditions, Proposed Project, and Alternative 2

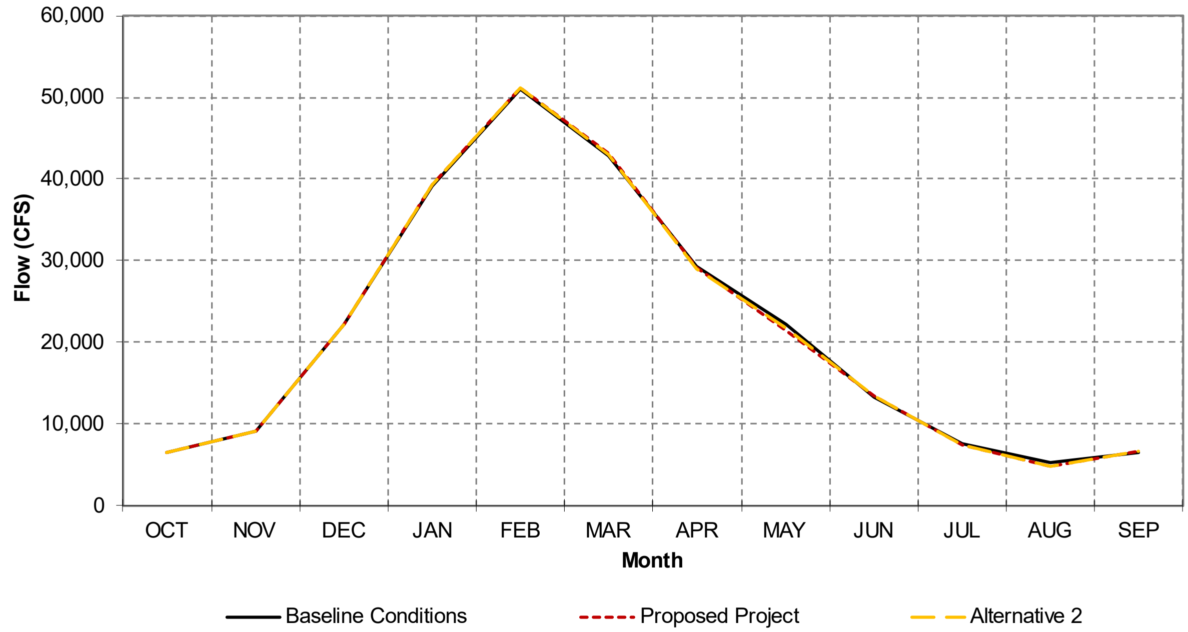


Figure 11-32. Monthly Long-term Average Delta Outflow for the Baseline Conditions, Proposed Project, and Alternative 2

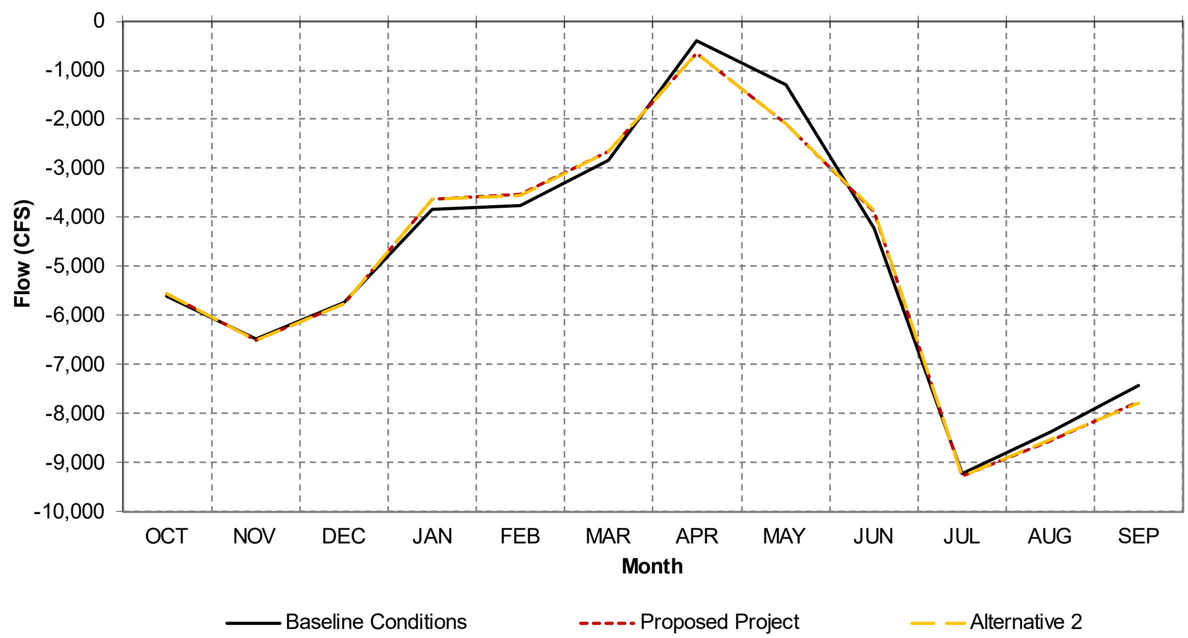


Figure 11-33. Combined Old and Middle River Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 2

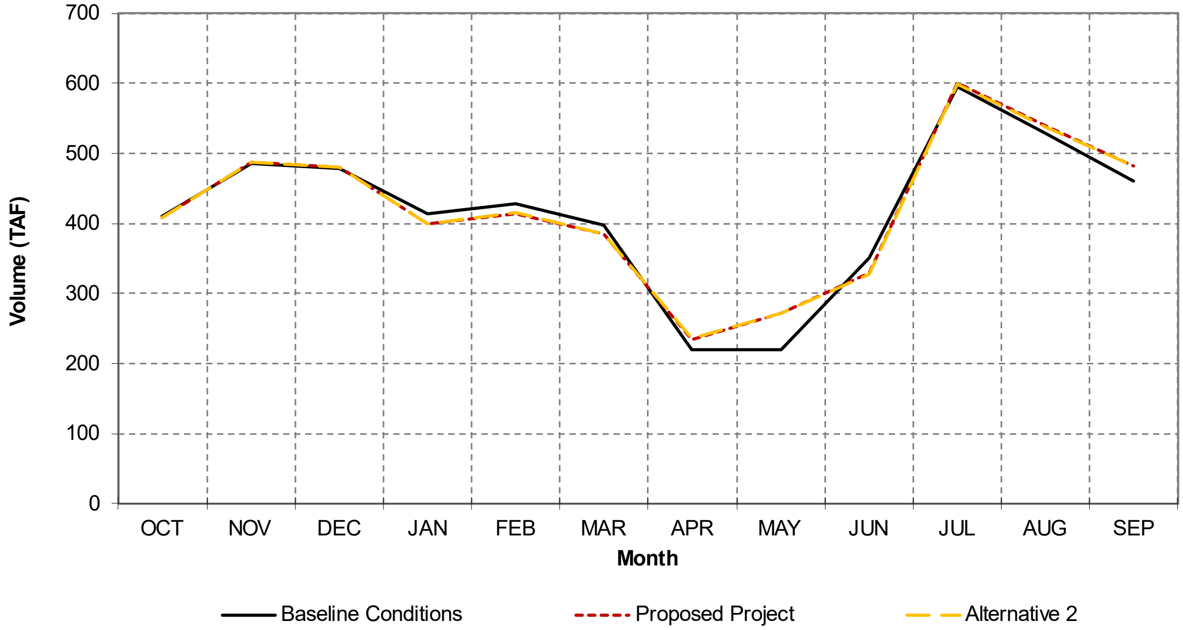


Figure 11-34. Monthly Long-term Average Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 2

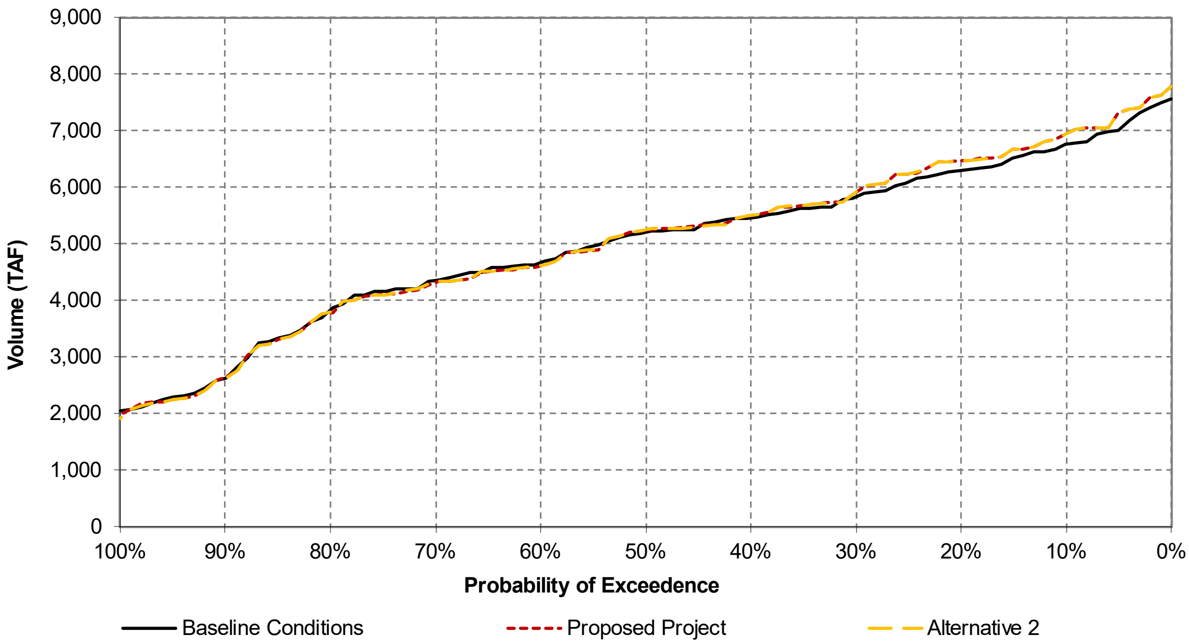


Figure 11-35. Annual Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 2

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 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 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. 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	500	12 (2%)	500	12 (2%)
Above Normal	601	617	16 (3%)	607	6 (1%)
Below Normal	699	699	0 (0%)	699	0 (0%)
Dry	896	908	12 (1%)	906	10 (1%)
Critically Dry	1,510	1,503	-7 (0%)	1,494	-16 (-1%)

Source: LTO_9-series_trendrpt_20231201_noMacros.xlsx.

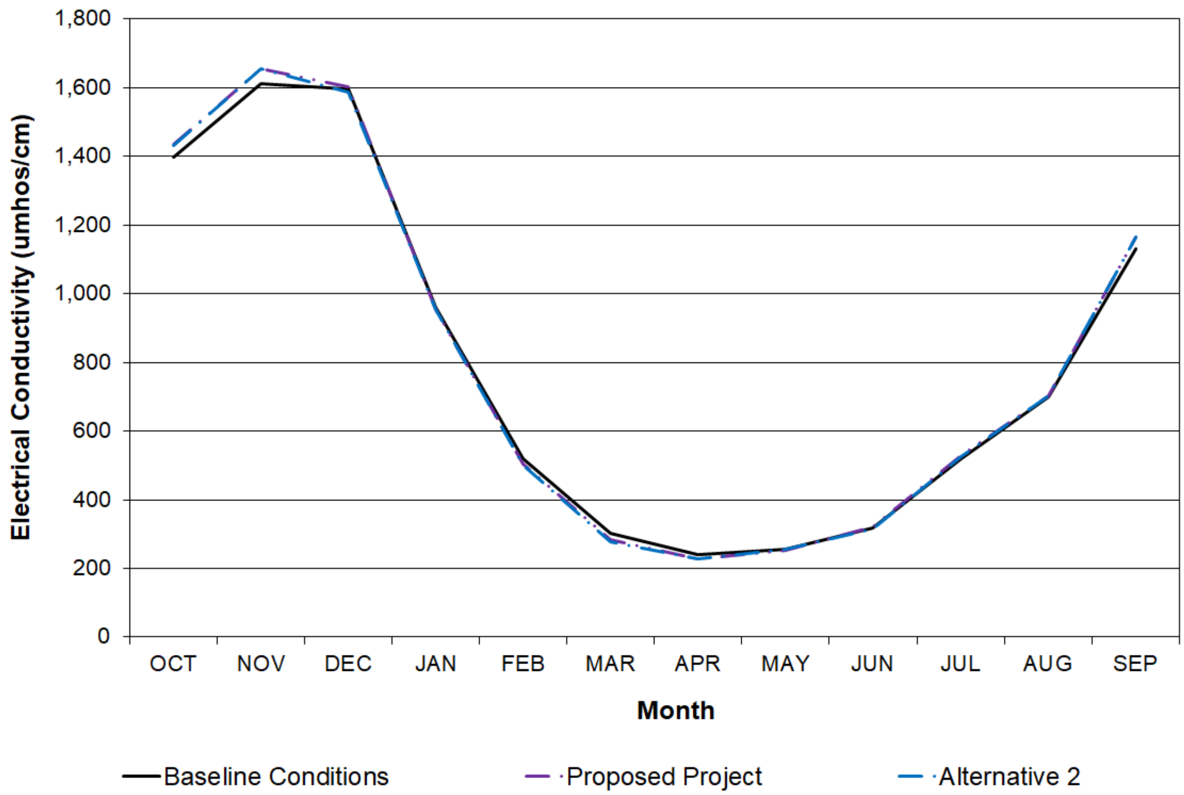


Figure 11-36. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the Sacramento River at Emmaton, Water Years 1922–2021, Alternative 2

Table 11-36. 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	531	10 (2%)	531	10 (2%)
Above Normal	591	602	11 (2%)	596	5 (1%)
Below Normal	722	722	0 (0%)	721	-1 (0%)
Dry	862	868	6 (1%)	867	5 (1%)
Critically Dry	1,048	1,039	-9 (-1%)	1,036	-12 (-1%)

Source: LTO_9-series_trendrpt_20231201_noMacros.xlsx.

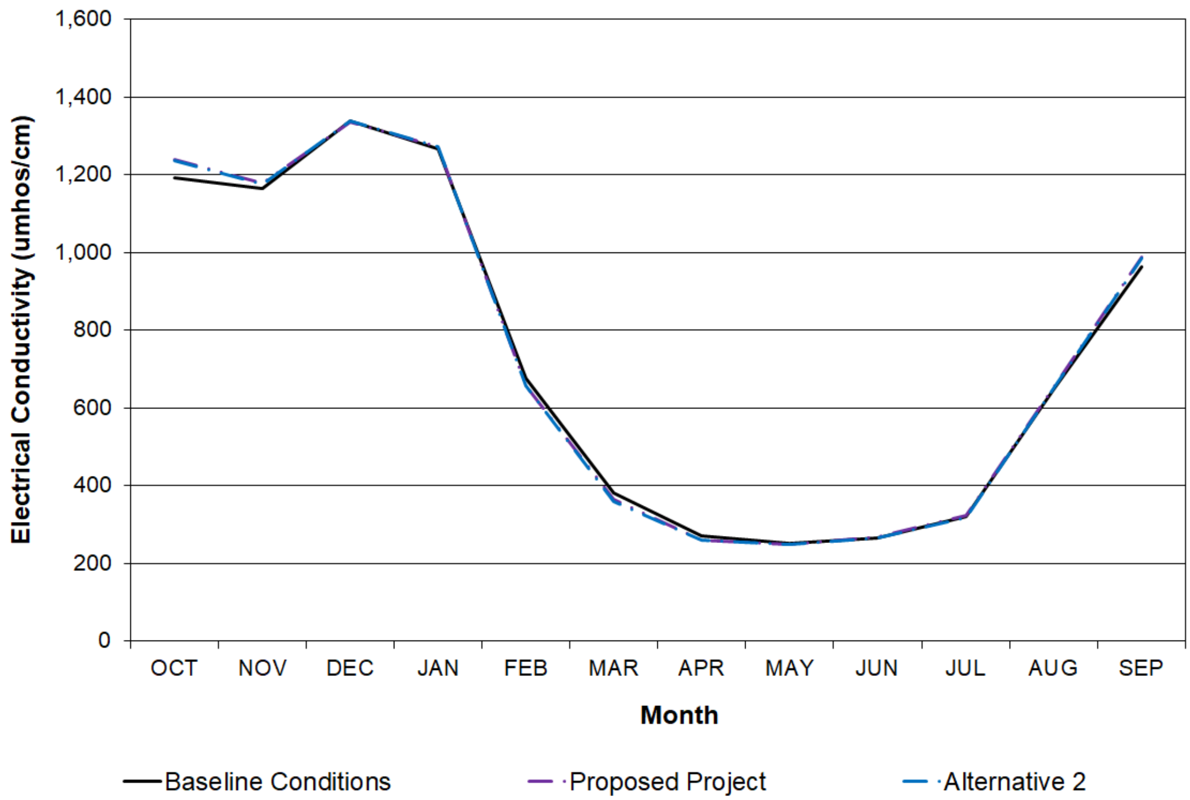


Figure 11-37. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the San Joaquin River at Jersey Point, Water Years 1922–2021, Alternative 2

Table 11-37. 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	348	1 (0%)	347	0 (0%)
Above Normal	386	385	-1 (0%)	384	-2 (-1%)
Below Normal	443	438	-5 (-1%)	438	-5 (-1%)
Dry	496	495	-1 (0%)	495	-1 (0%)
Critically Dry	572	566	-6 (-1%)	566	-6 (-1%)

Source: LTO_9-series_trendrpt_20231201_noMacros.xlsx.

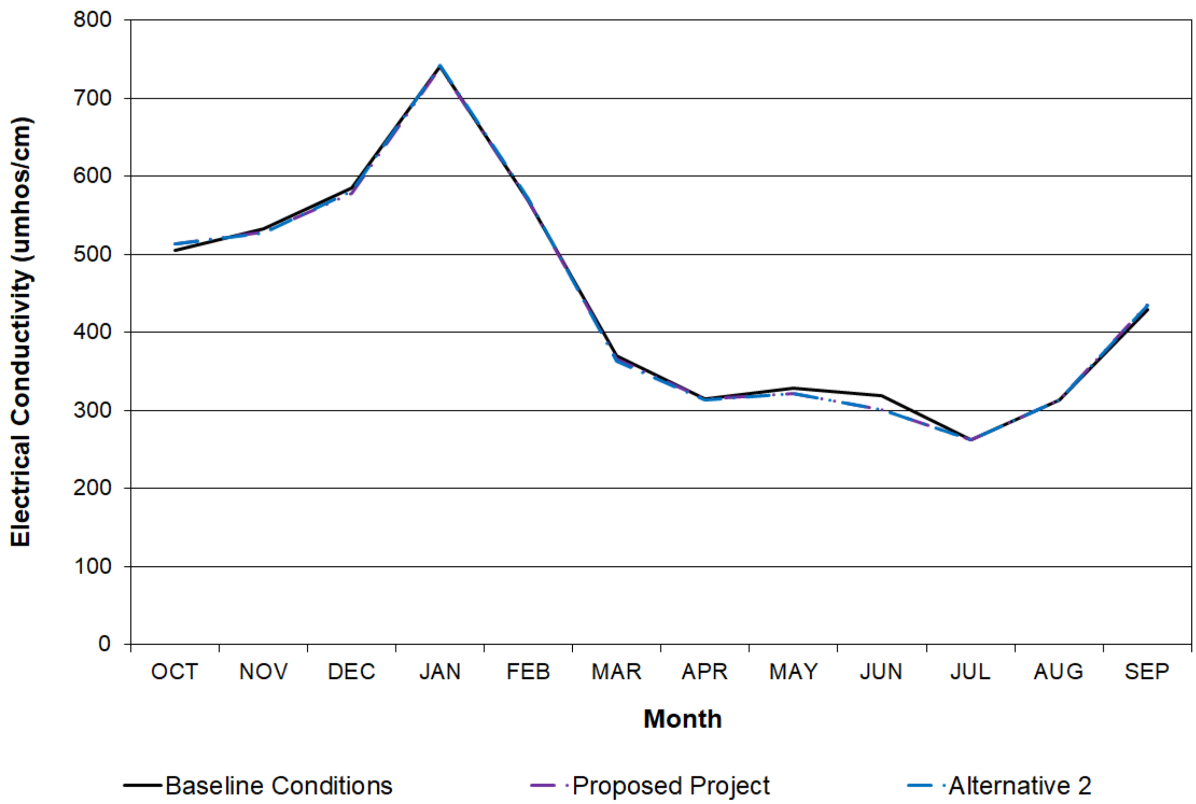
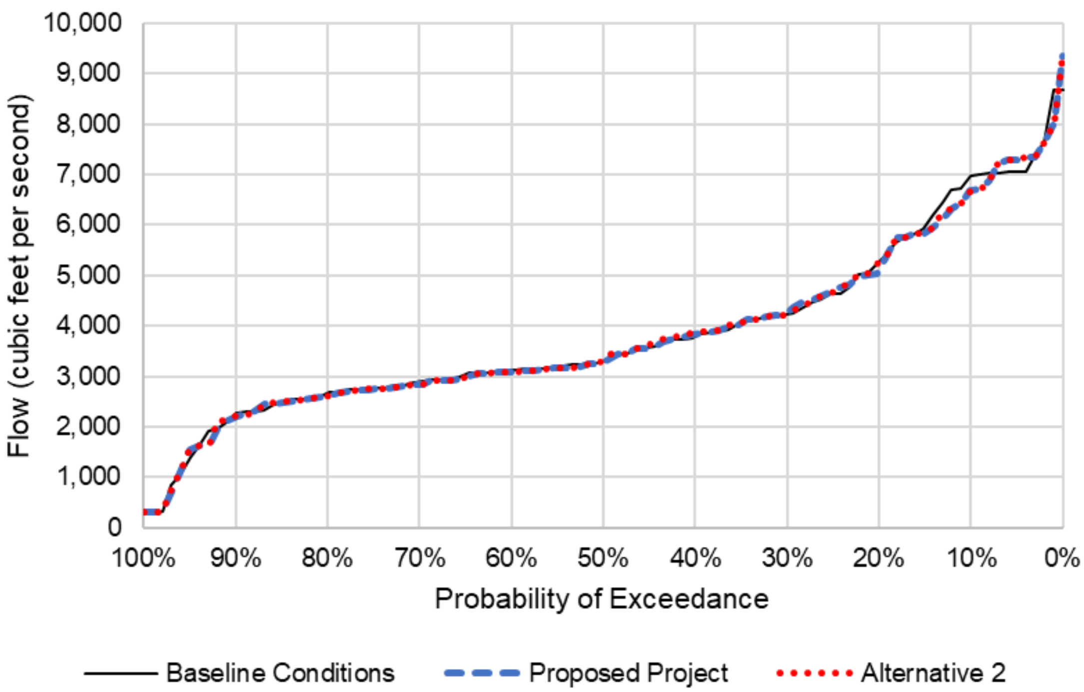


Figure 11-38. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for Old River at Rock Slough, Water Years 1922–2021, Alternative 2

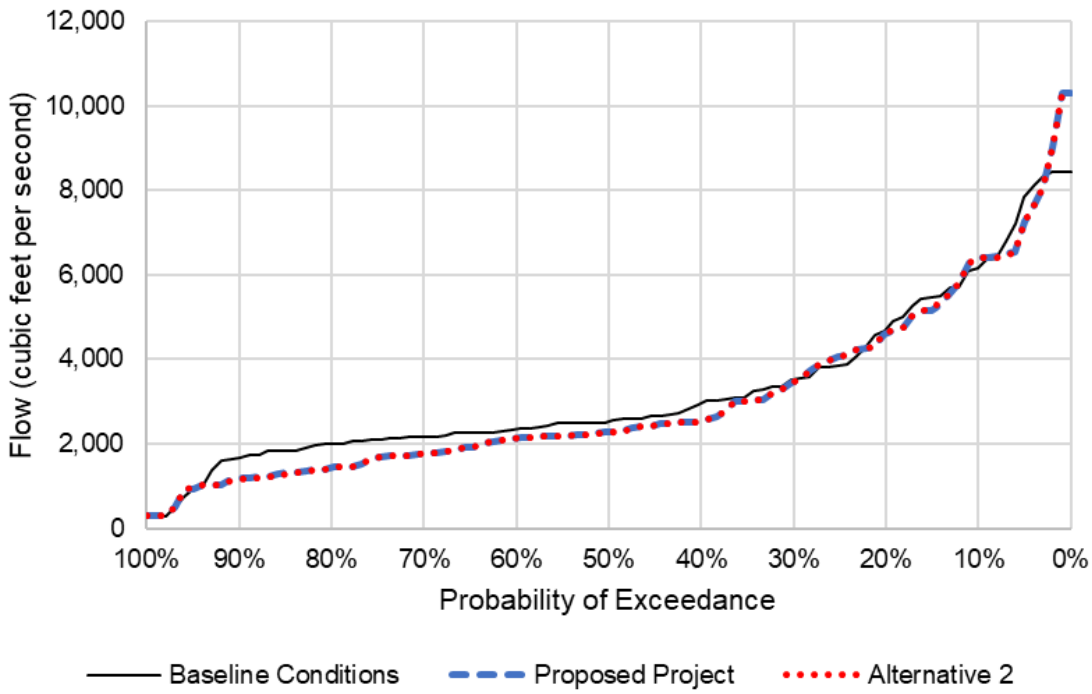
11.5.3 Aquatic Biological Resources

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). 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) 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; Figures 11-41, 11-42, 11-43, 6-50, 6-50a, and 6-50b). 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; Figures 11-44 and 6-43).



Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

Figure 11-39. Mean Modeled SWP South Delta Exports (Baseline Conditions, Proposed Project, and Alternative 2), December



Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

Figure 11-40. Mean Modeled SWP South Delta Exports (Baseline Conditions, Proposed Project, and Alternative 2), March

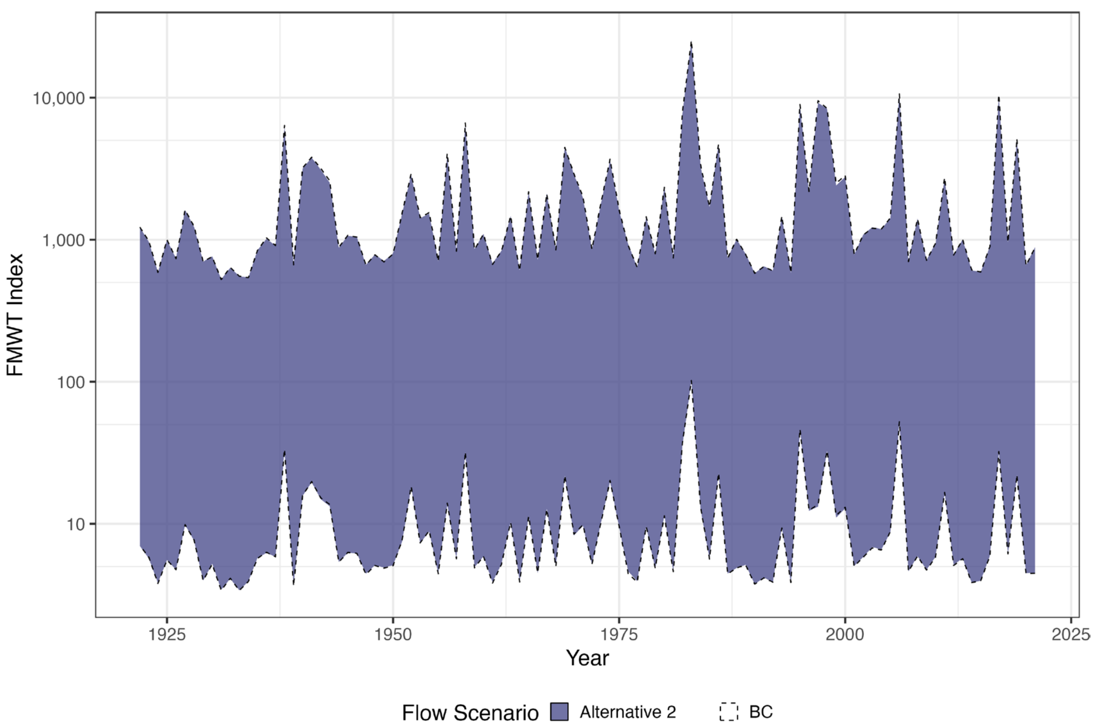


Figure 11-41. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Fall Midwater Trawl Index from Application of the Delta Outflow-Abundance Index Method for Alternative 2 and Baseline Conditions (BC) Scenarios

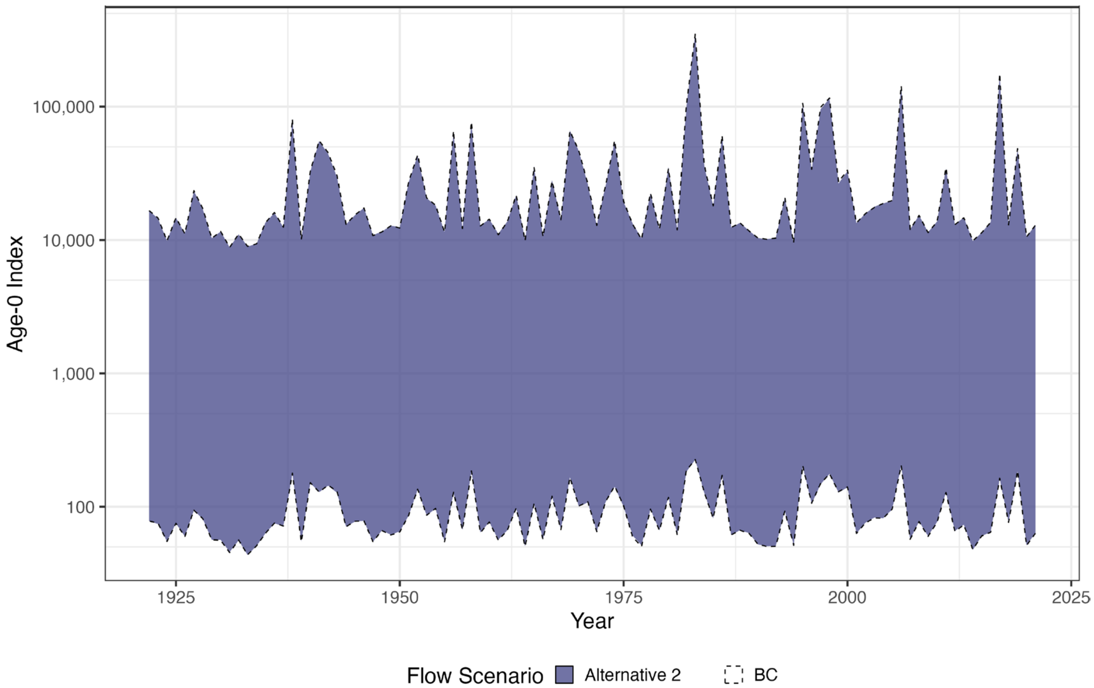


Figure 11-42. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Midwater Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 2 and Baseline Conditions (BC) Scenarios

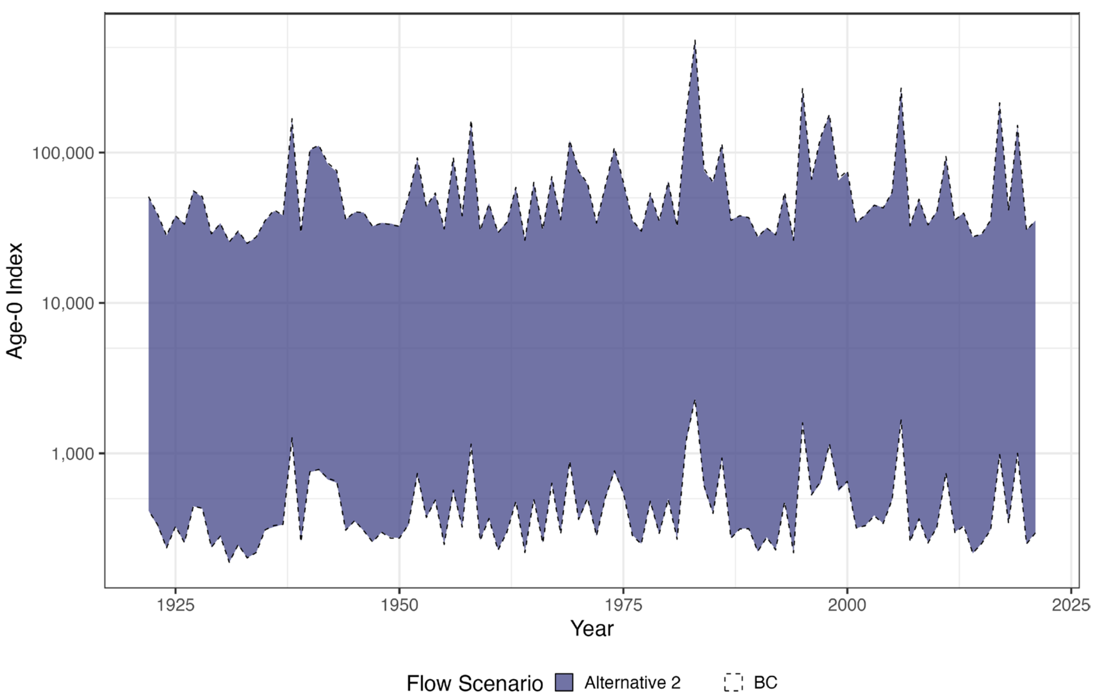
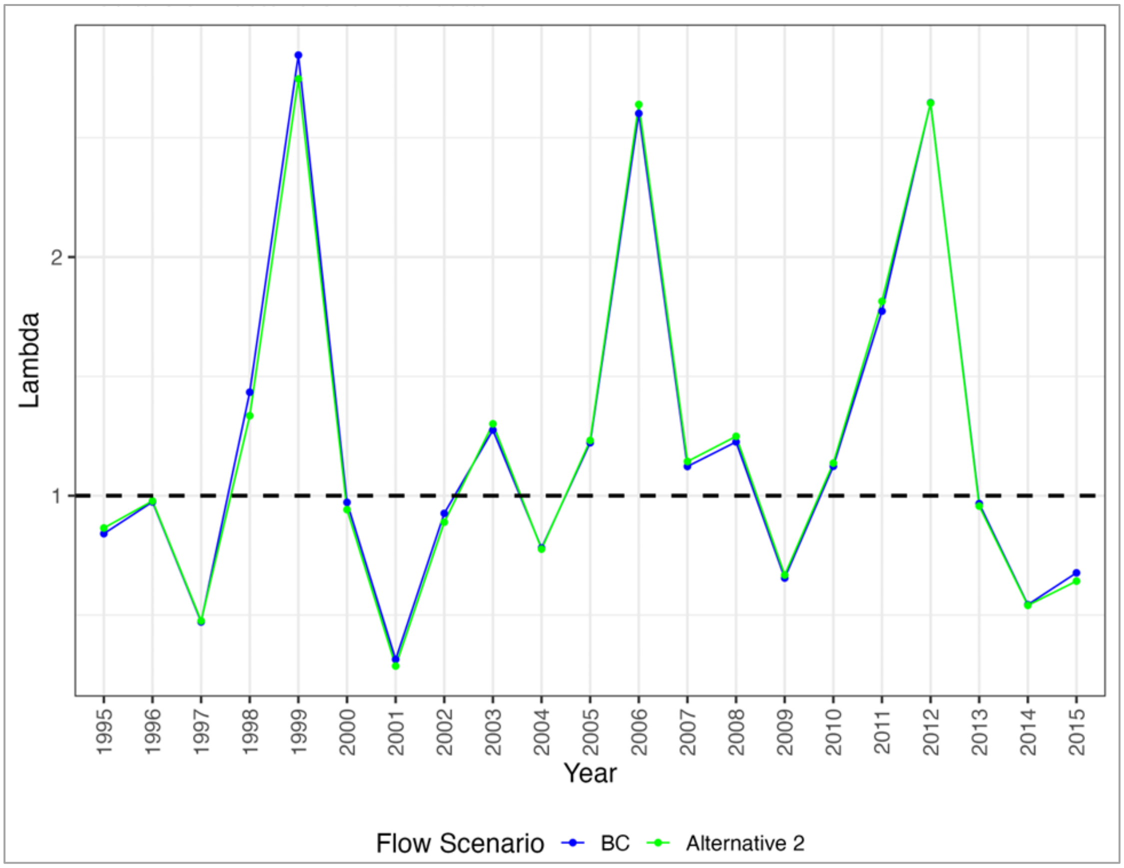


Figure 11-43. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Otter Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 2 and Baseline Conditions (BC) Scenarios



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 percent of the time in December and 5 percent of the time in March (Figures 11-53 and 11-56, respectively). As expected, 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.

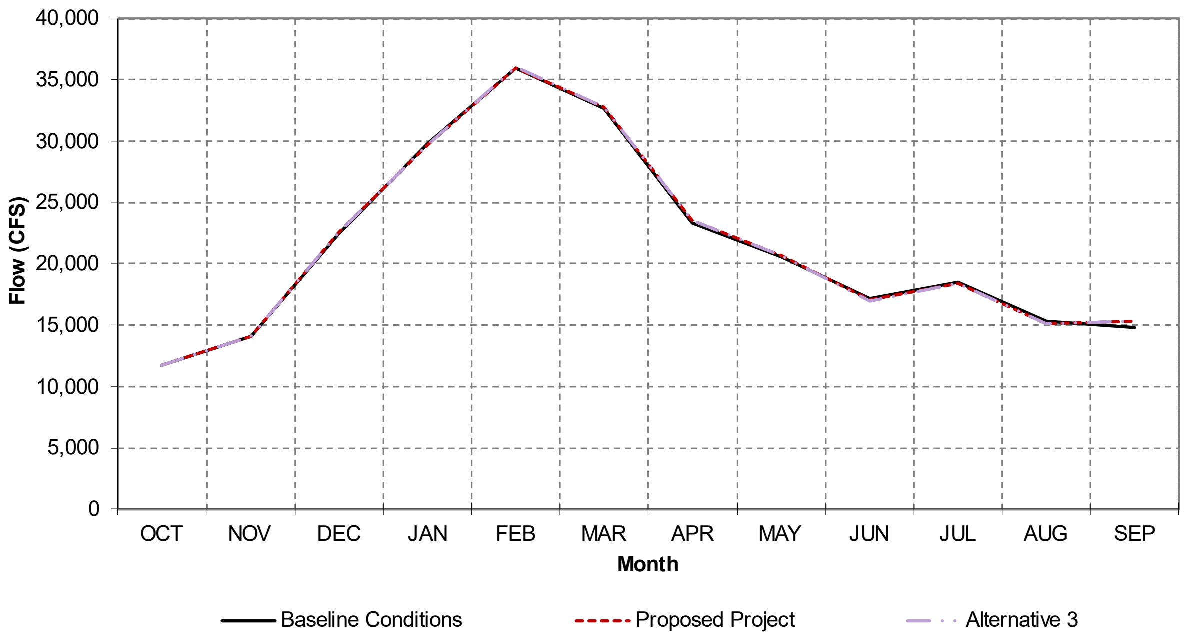


Figure 11-45. Sacramento River at Freeport Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 3

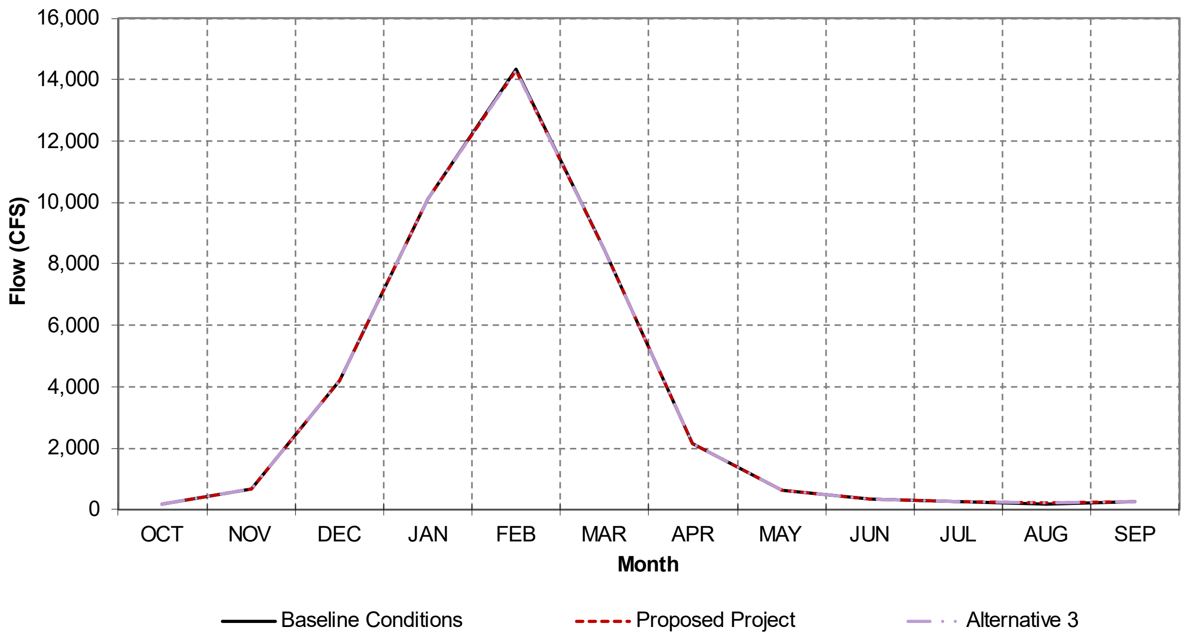


Figure 11-46. Monthly Long-term Average Yolo Bypass Flow for the Baseline Conditions, Proposed Project, and Alternative 3

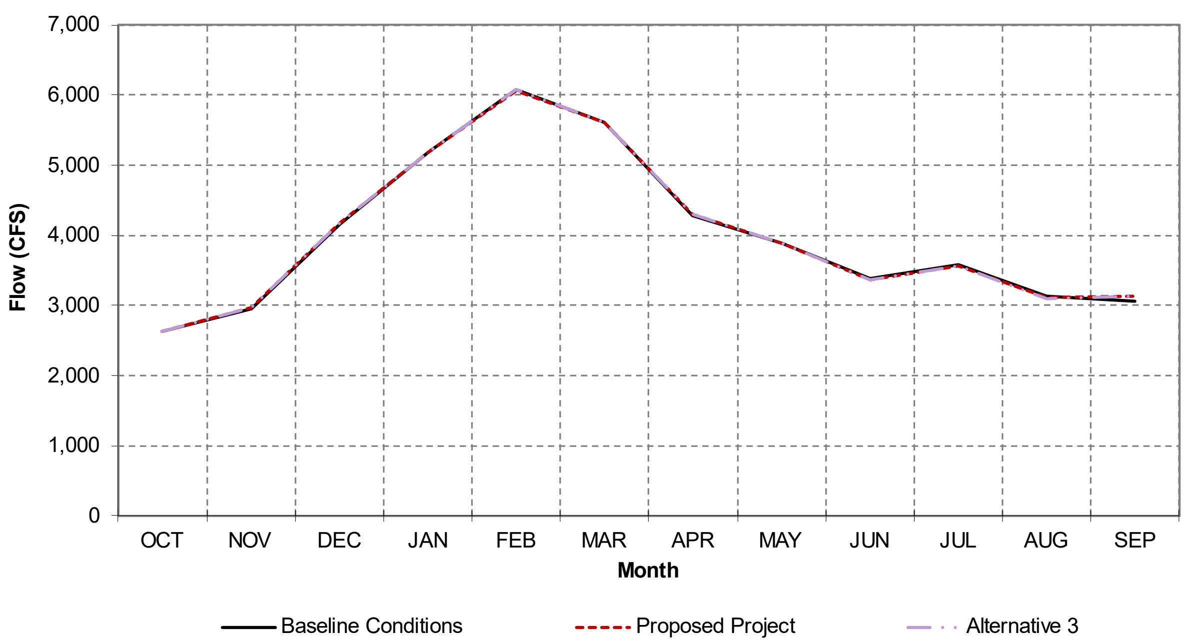


Figure 11-47. Monthly Long-term Average Georgiana Slough Flow for the Baseline Conditions, Proposed Project, and Alternative 3

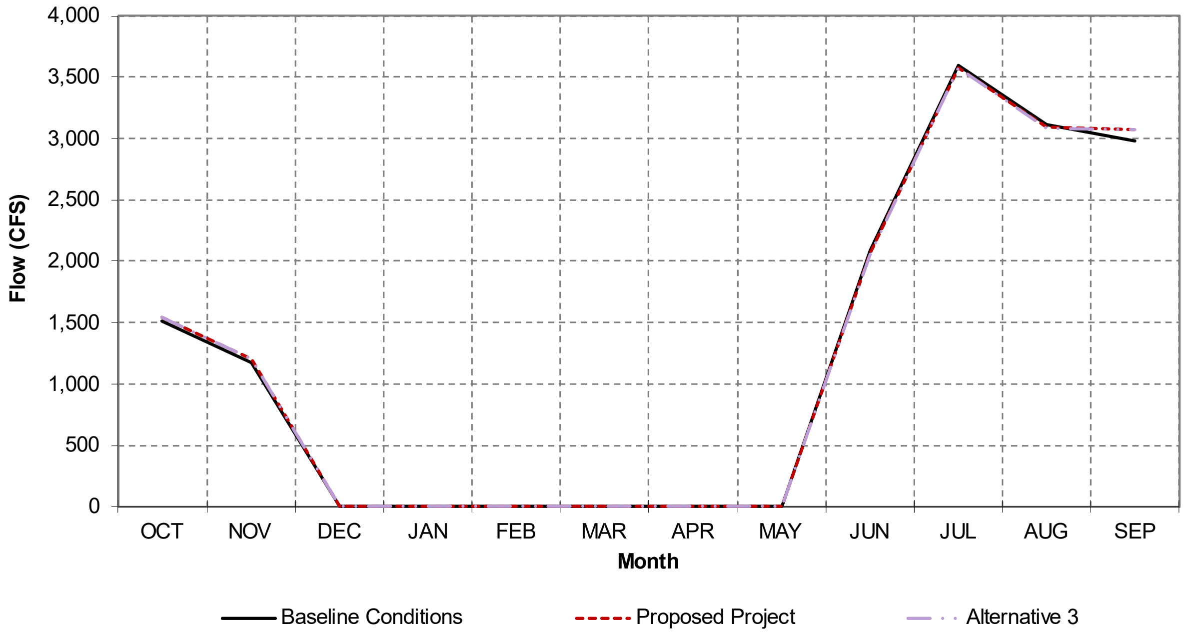


Figure 11-48. Monthly Long-term Average Delta Cross Channel Flow for the Baseline Conditions, Proposed Project, and Alternative 3

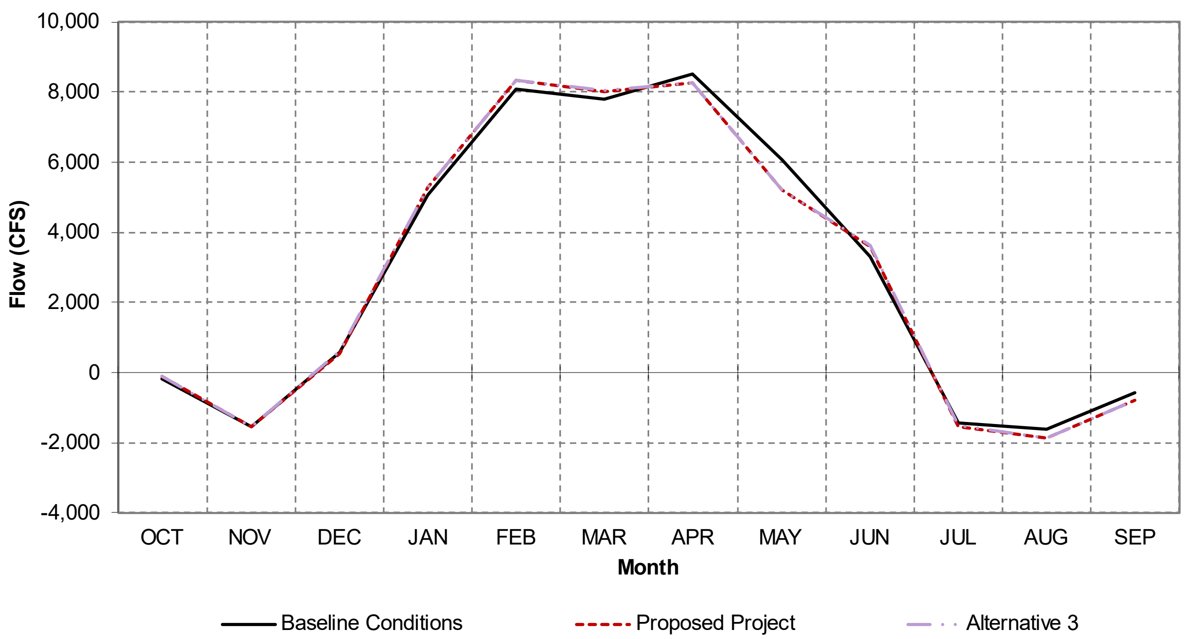


Figure 11-49. Monthly Long-term Average Qwest Flow for the Baseline Conditions, Proposed Project, and Alternative 3

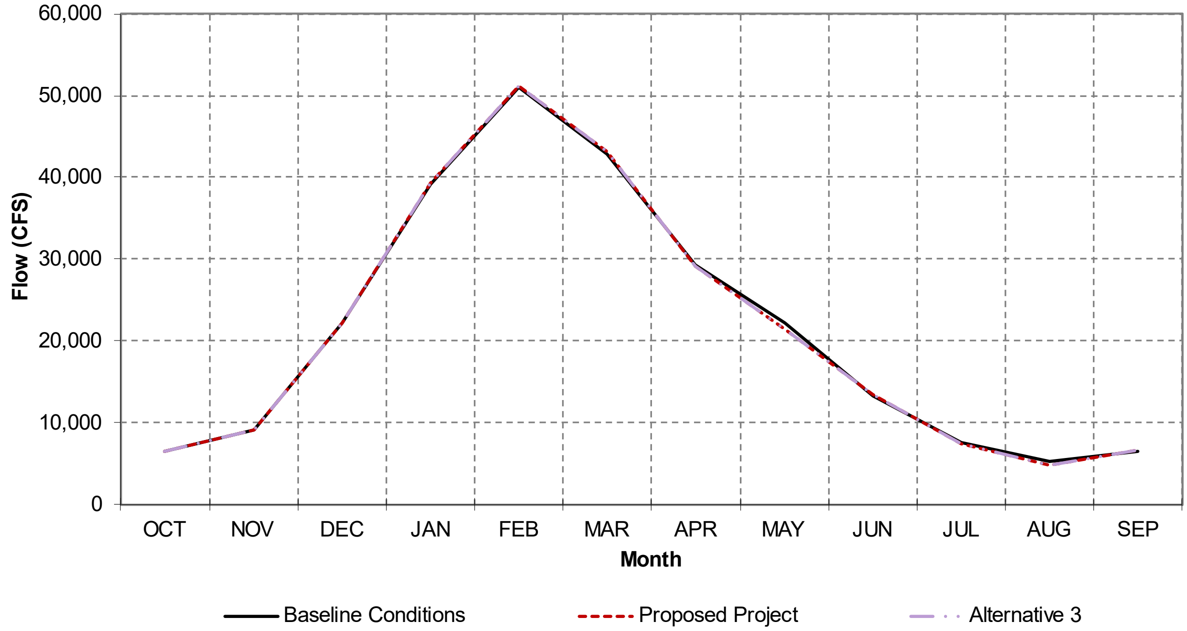


Figure 11-50. Monthly Long-term Average Delta Outflow for the Baseline Conditions, Proposed Project, and Alternative 3

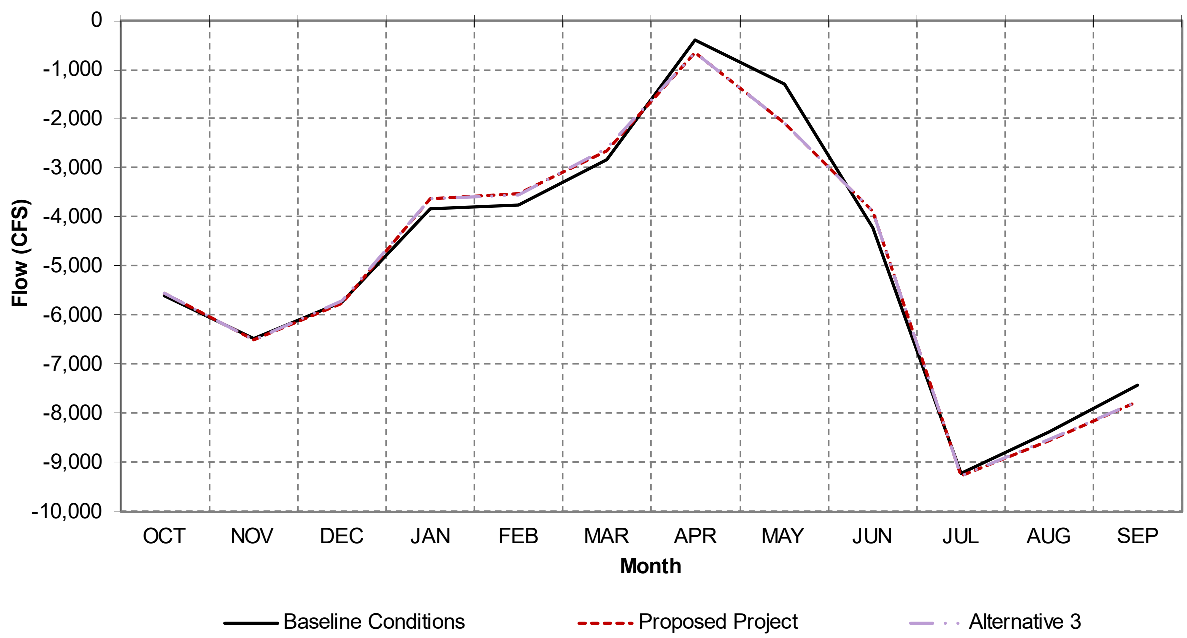


Figure 11-51. Combined Old and Middle River Monthly Long-term Average Flow for the Baseline Conditions, Proposed Project, and Alternative 3

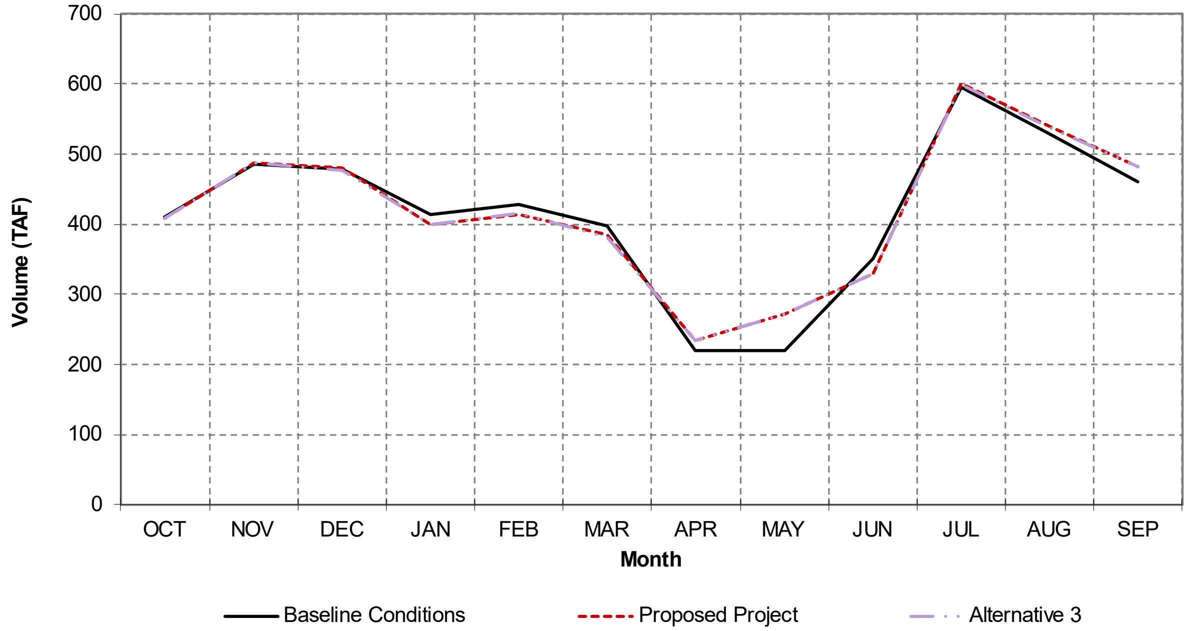


Figure 11-52. Monthly Long-term Average Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3

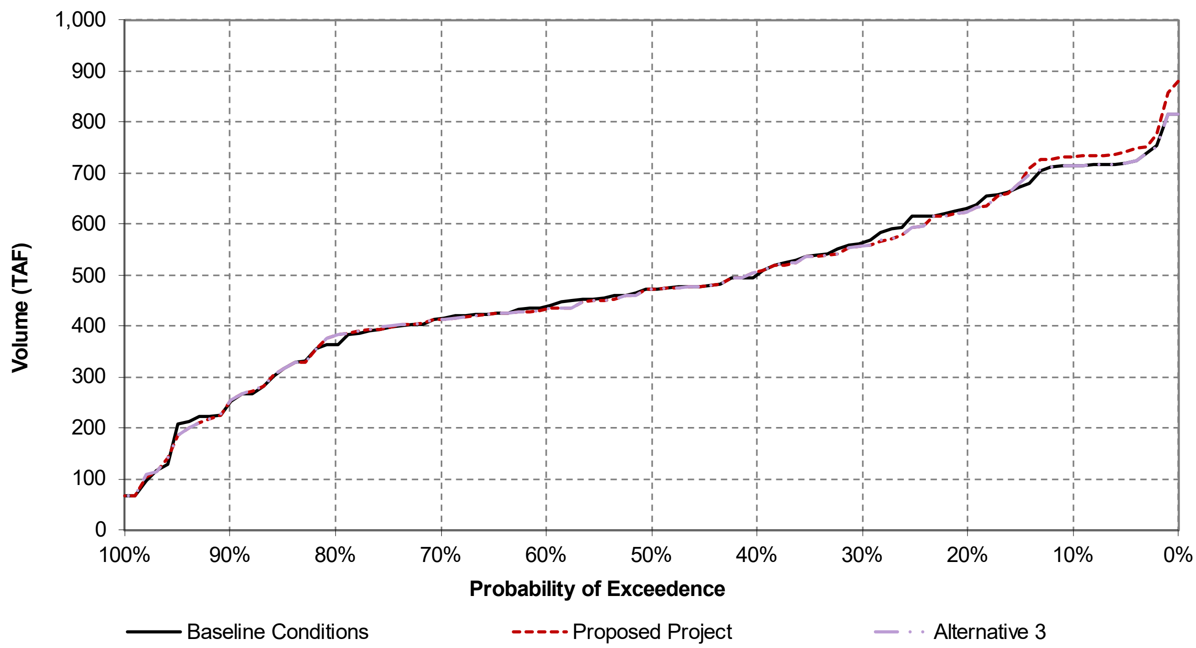


Figure 11-53. December Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3

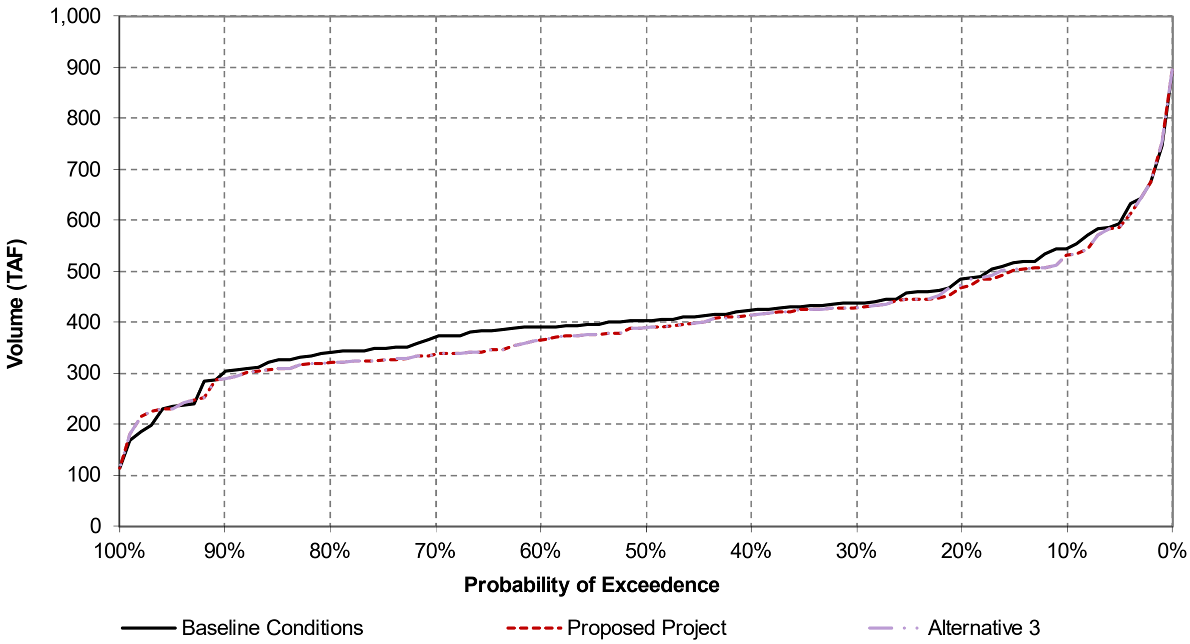


Figure 11-54. January Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3

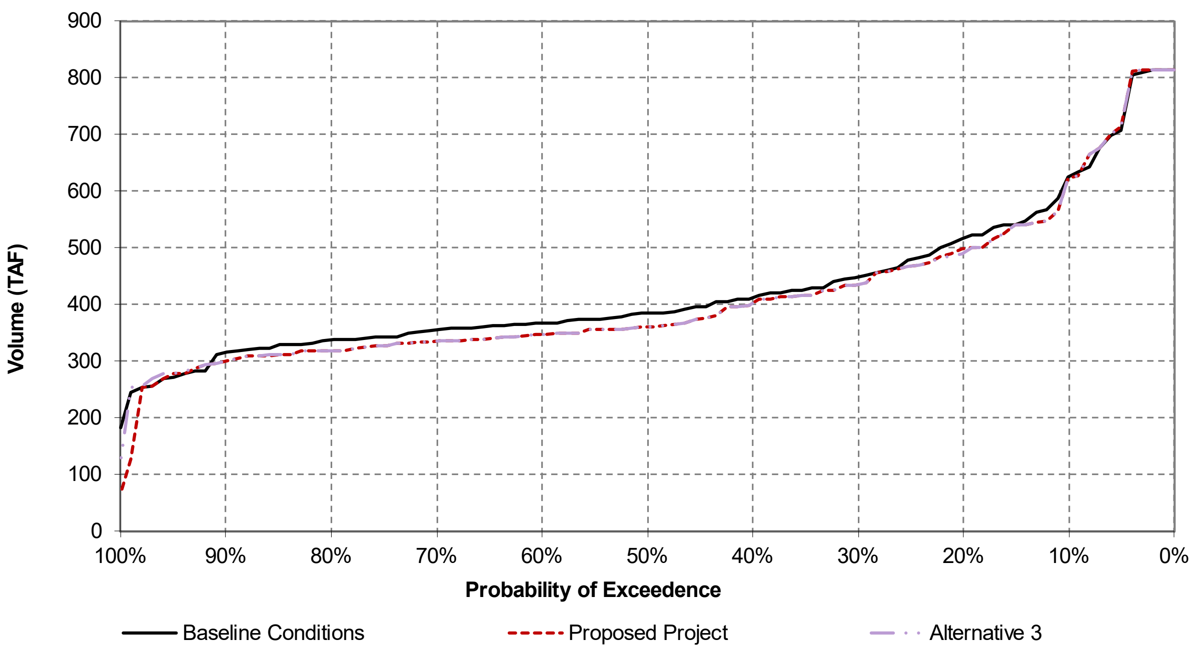


Figure 11-55. February Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3

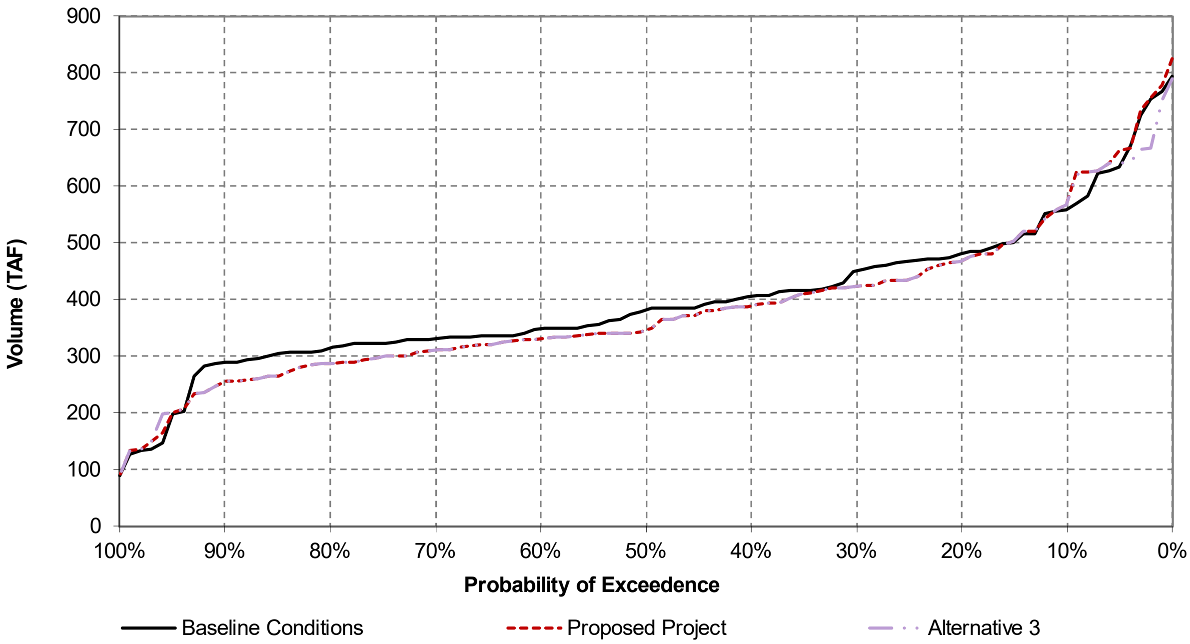


Figure 11-56. March Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3

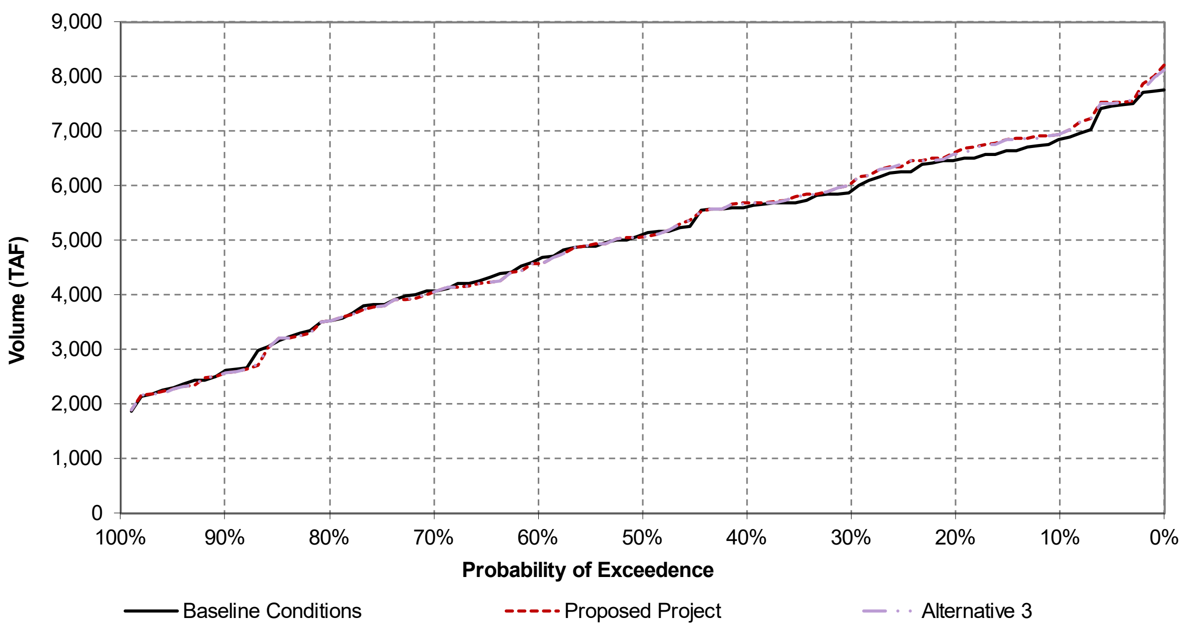


Figure 11-57. Annual Delta Exports for the Baseline Conditions, Proposed Project, and Alternative 3

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 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. 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	500	12 (2%)	500	12 (2%)
Above Normal	601	617	16 (3%)	617	16 (3%)
Below Normal	699	699	0 (0%)	699	0 (0%)
Dry	896	908	12 (1%)	908	12 (1%)
Critically Dry	1,510	1,503	-7 (0%)	1,501	-9 (-1%)

Source: LTO_9-series_trendrpt_20231201_noMacros.xlsx.

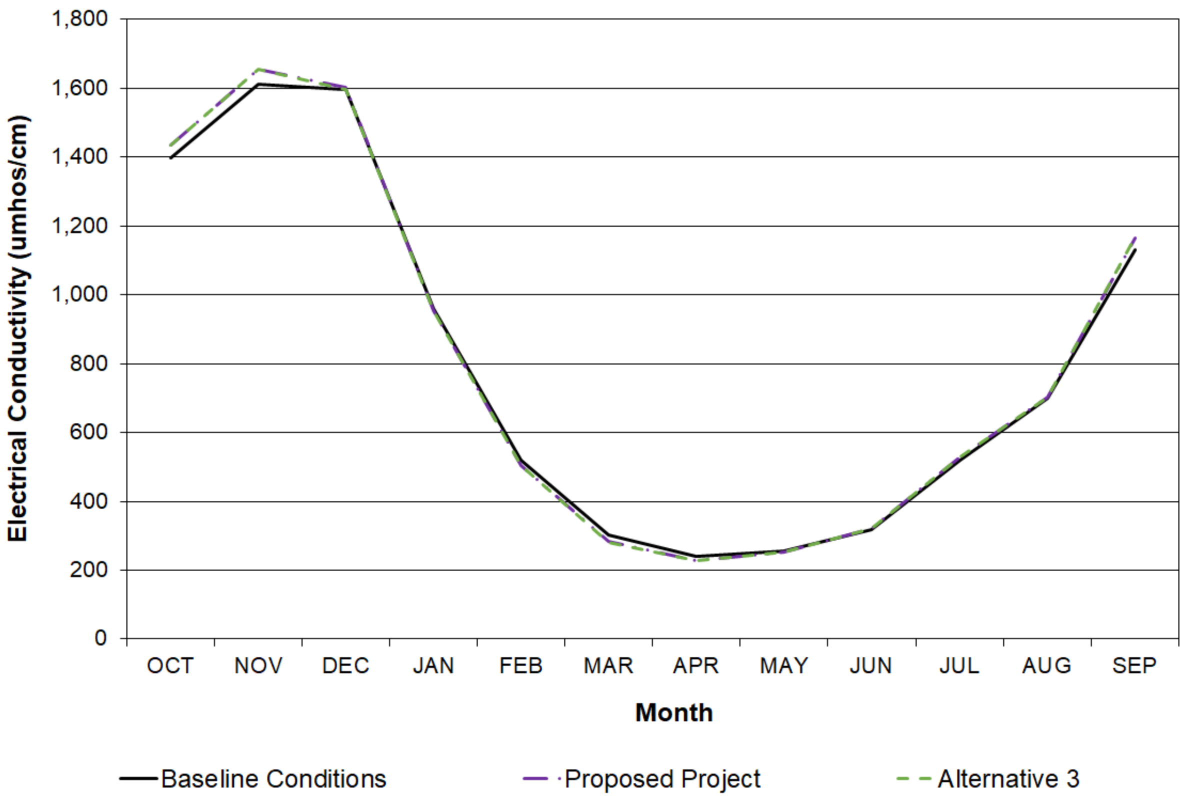


Figure 11-58. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the Sacramento River at Emmaton, Water Years 1922–2021, Alternative 3

Table 11-39. 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	531	10 (2%)	531	10 (2%)
Above Normal	591	602	11 (2%)	600	9 (2%)
Below Normal	722	722	0 (0%)	722	0 (0%)
Dry	862	868	6 (1%)	867	5 (1%)
Critically Dry	1,048	1,039	-9 (-1%)	1,037	-11 (-1%)

Source: LTO_9-series_trendrpt_20231201_noMacros.xlsx.

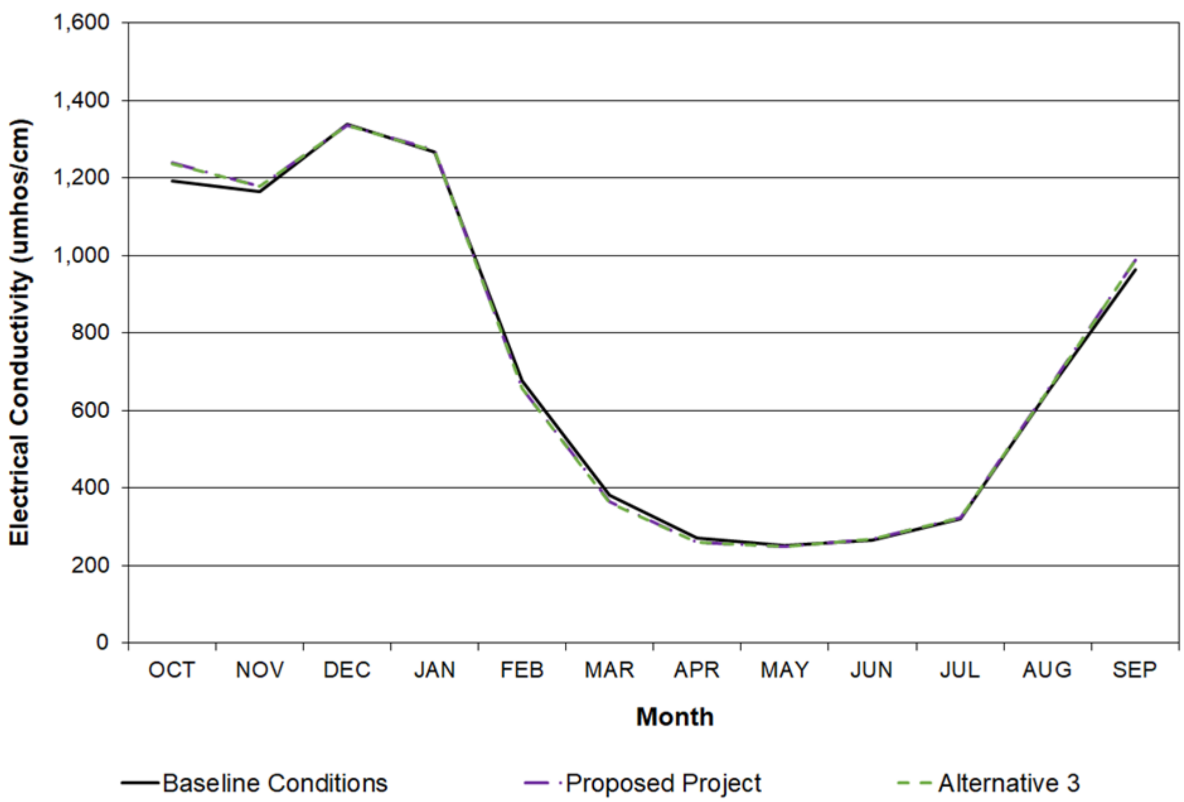


Figure 11-59. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for the San Joaquin River at Jersey Point, Water Years 1922–2021, Alternative 3

Table 11-40. 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	348	1 (0%)	347	0 (0%)
Above Normal	386	385	-1 (0%)	384	-2 (-1%)
Below Normal	443	438	-5 (-1%)	438	-5 (-1%)
Dry	496	495	-1 (0%)	494	-2 (0%)
Critically Dry	572	566	-6 (-1%)	565	-7 (-1%)

Source: LTO_9-series_trendrpt_20231201_noMacros.xlsx.

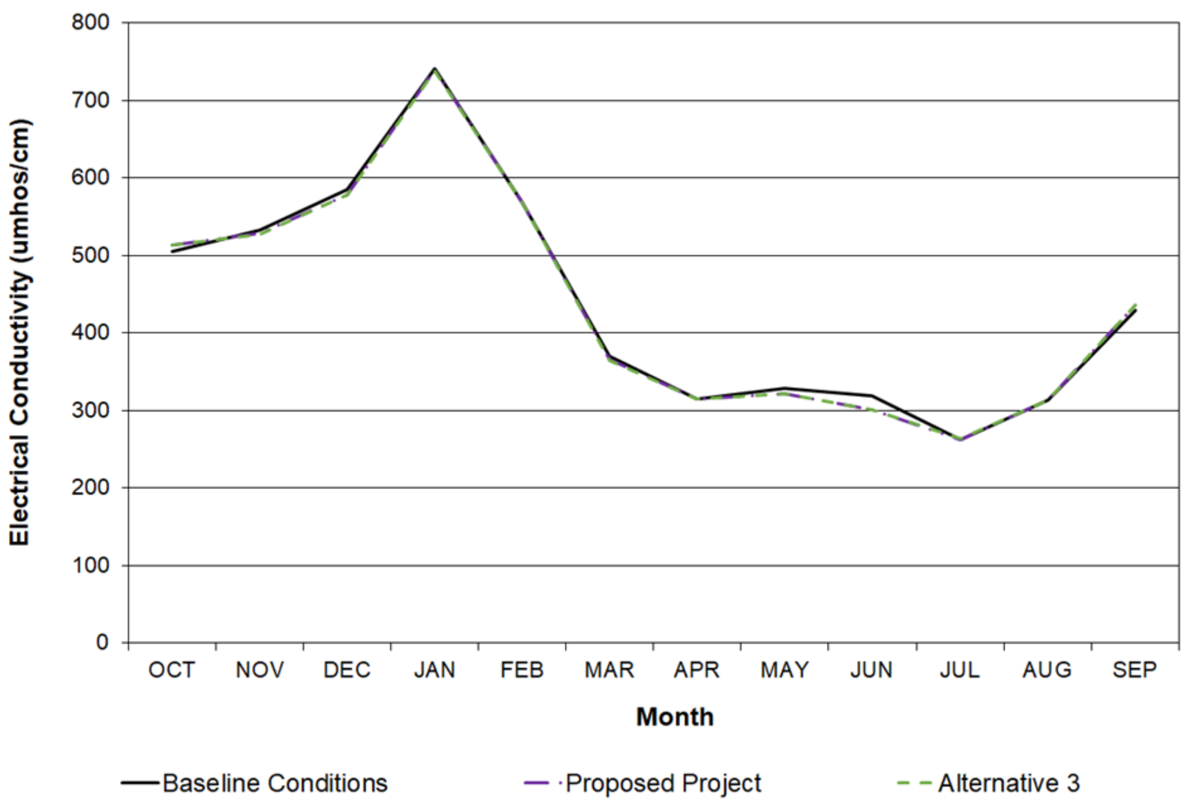
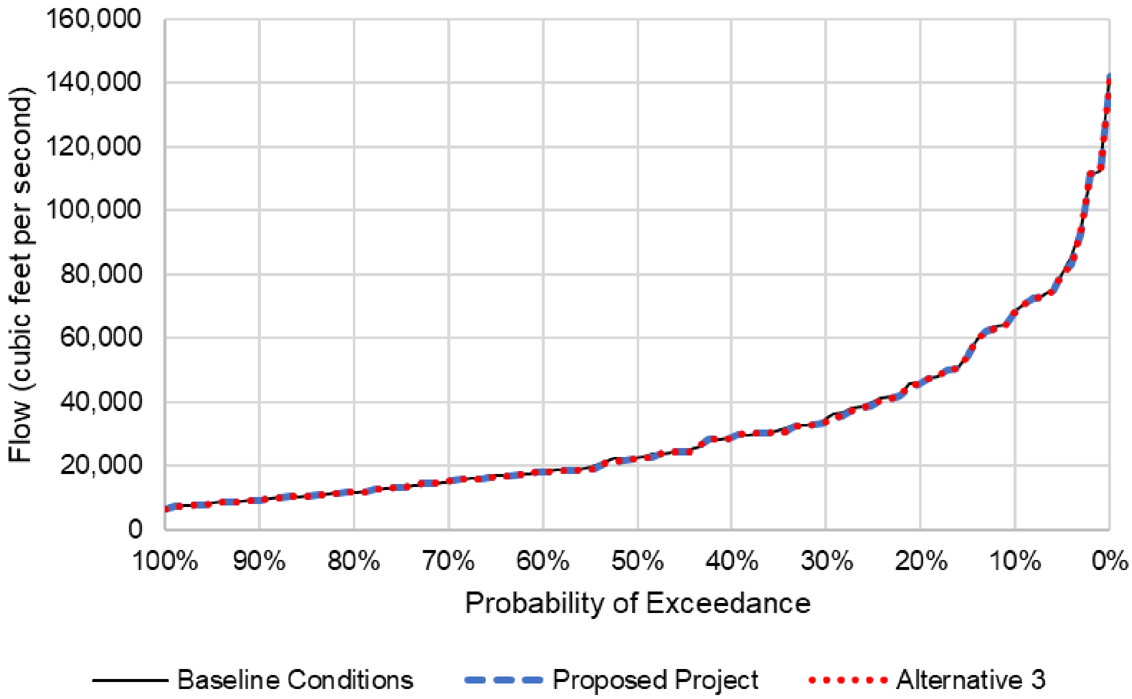


Figure 11-60. CalSim-modeled Monthly Average Electrical Conductivity (in micromhos/cm) for Old River at Rock Slough, Water Years 1922–2021, Alternative 3

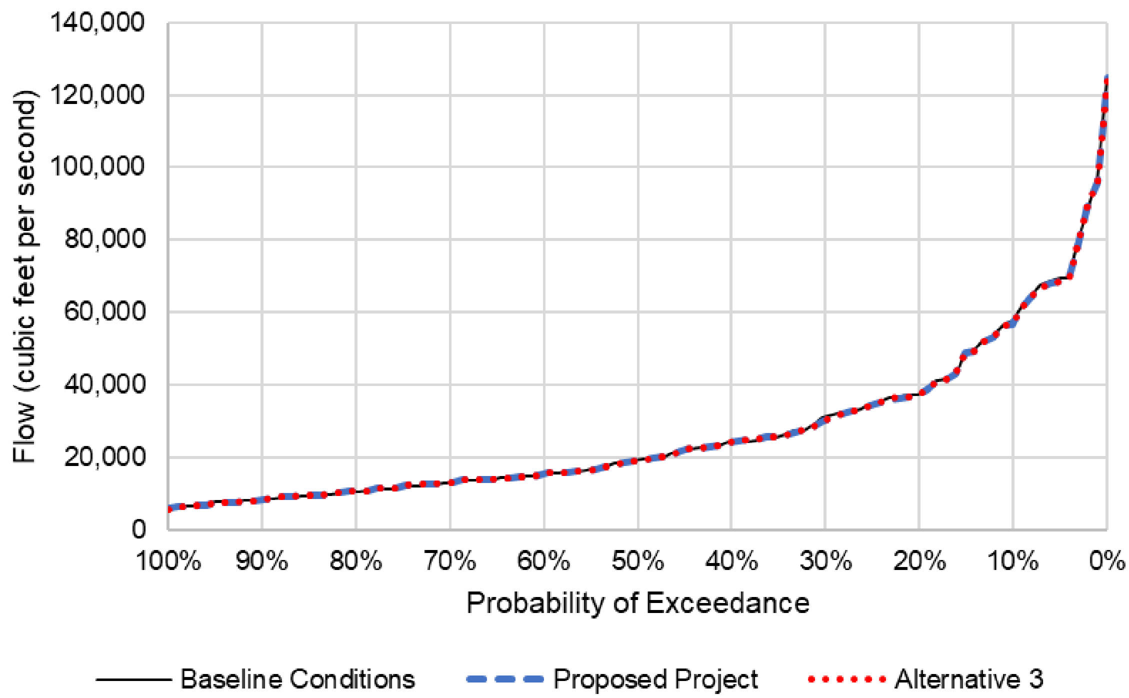
11.6.3 Aquatic Biological Resources

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; 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.



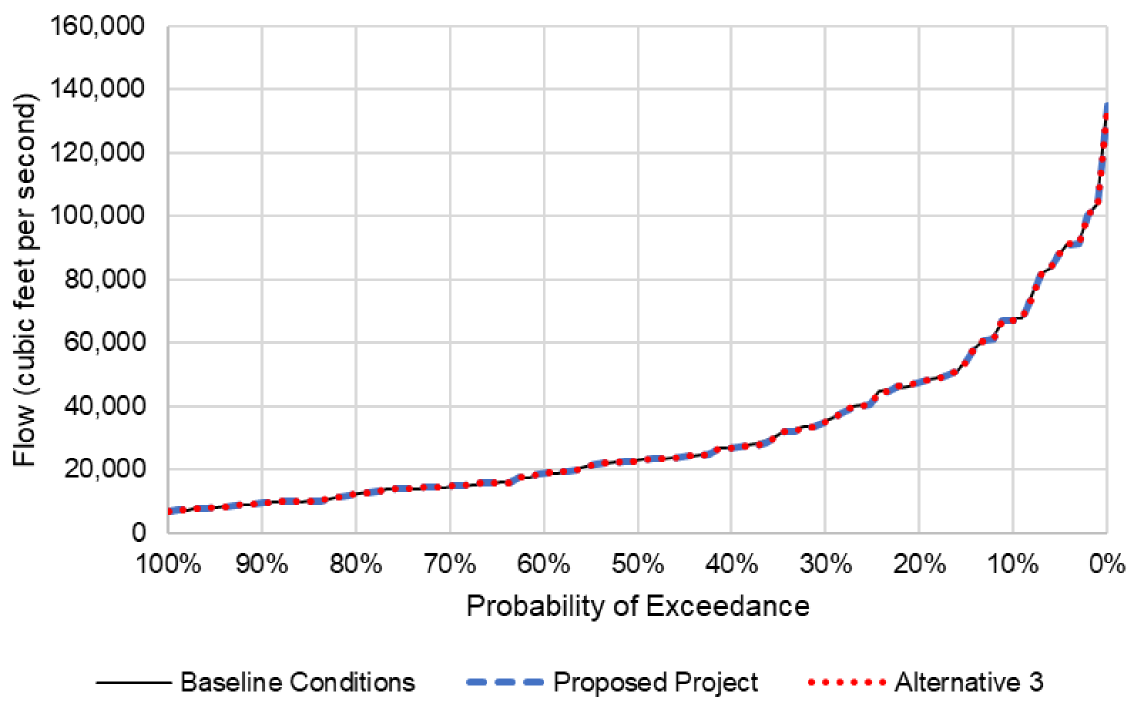
Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

Figure 11-61. Mean Modeled March–May Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 3



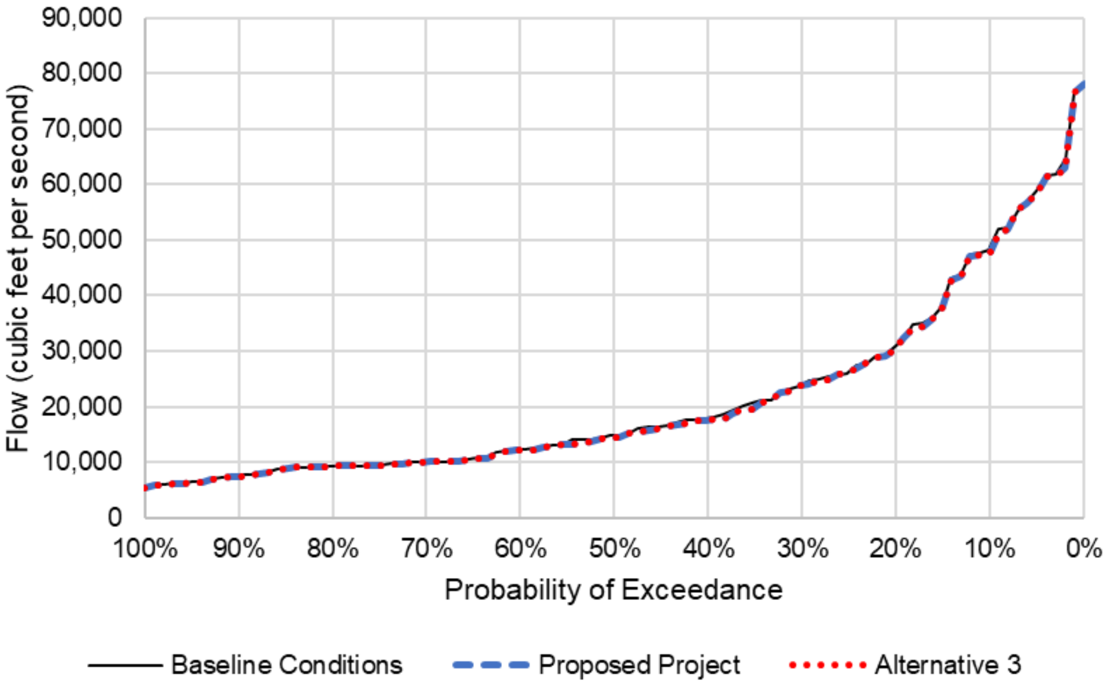
Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

Figure 11-62. Mean Modeled March–June Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 3



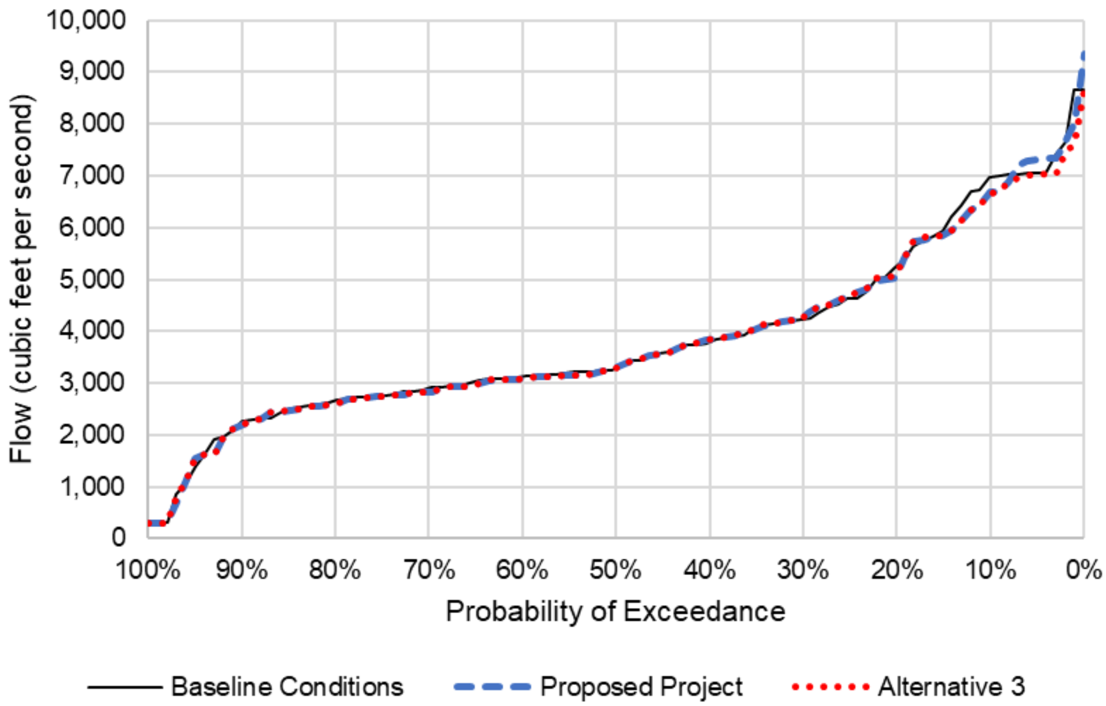
Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

Figure 11-63. Mean Modeled February–June Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 3



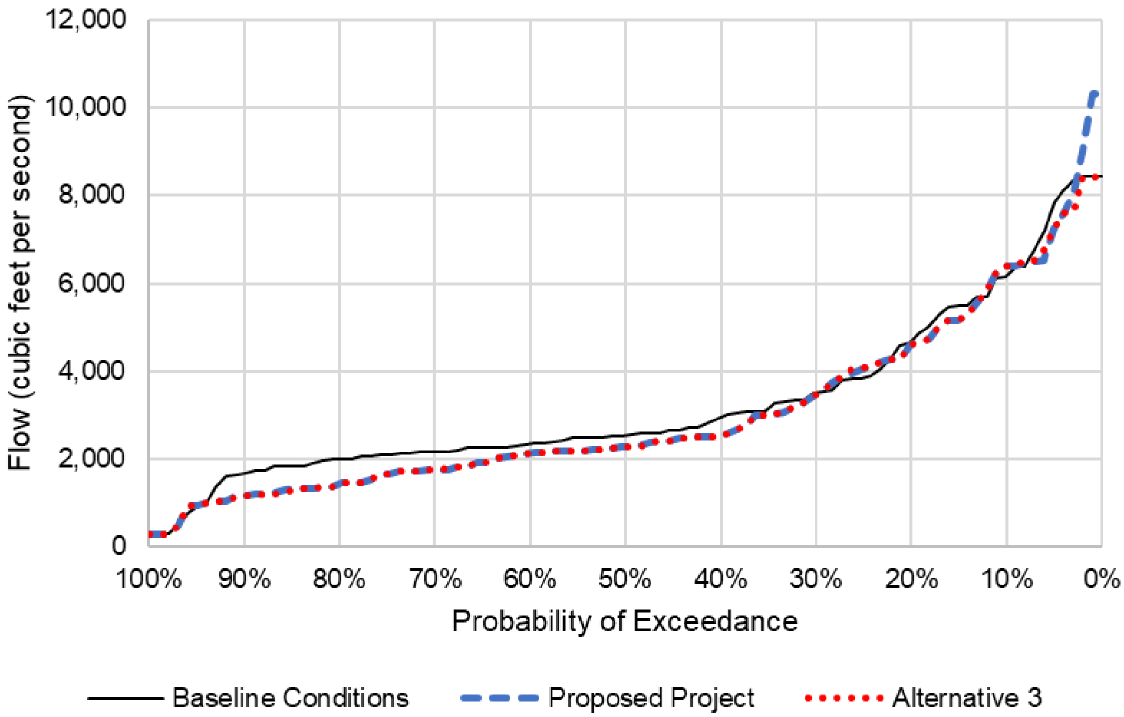
Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

Figure 11-64. Mean Modeled April–June Delta Outflow for Baseline Conditions, Proposed Project, and Alternative 3



Source: DRAFT_TrendReport_MultiCalSim_rev11_NoMacro_S1_S7_S7v2_S9b_S9bv2.xlsm.

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.

Figure 11-66. Mean Modeled SWP South Delta Exports (Baseline Conditions, Proposed Project, and Alternative 3), March

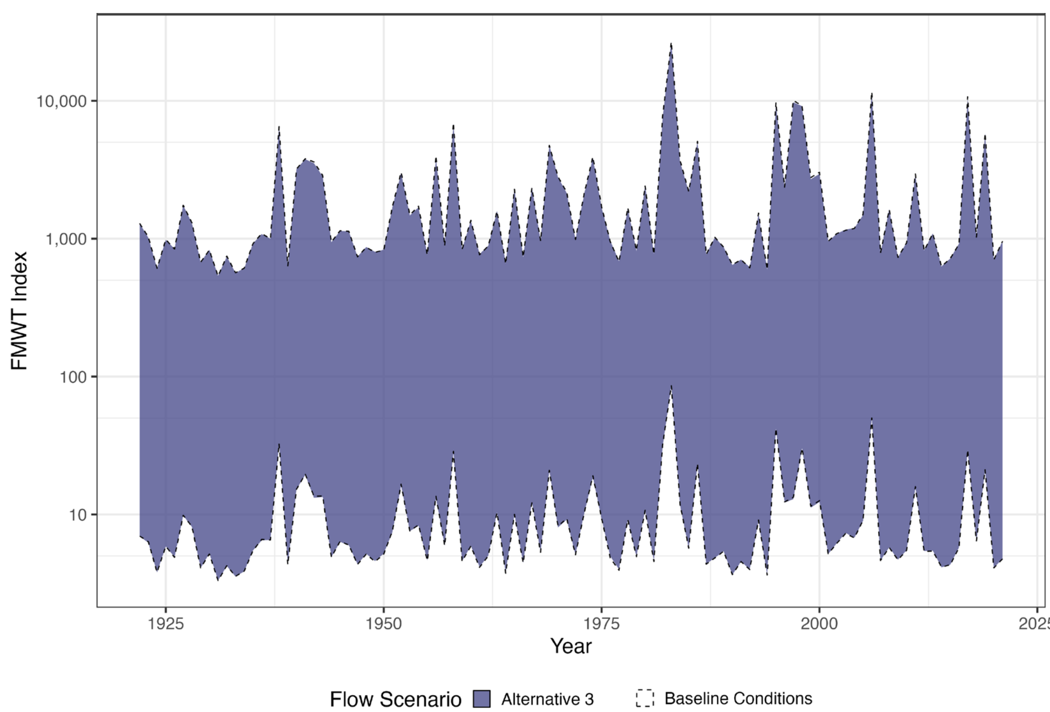


Figure 11-67. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Fall Midwater Trawl Index from Application of the Delta Outflow-Abundance Index Method for Alternative 3 and Baseline Conditions (BC) Scenarios

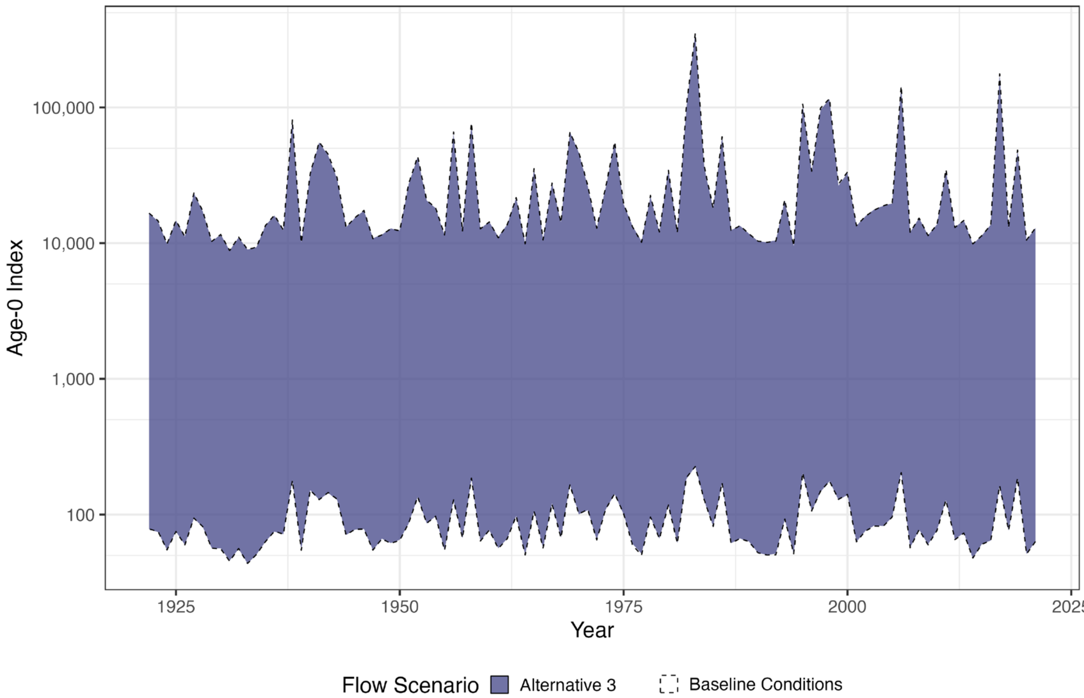


Figure 11-68. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Midwater Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 3 and Baseline Conditions (BC) Scenarios

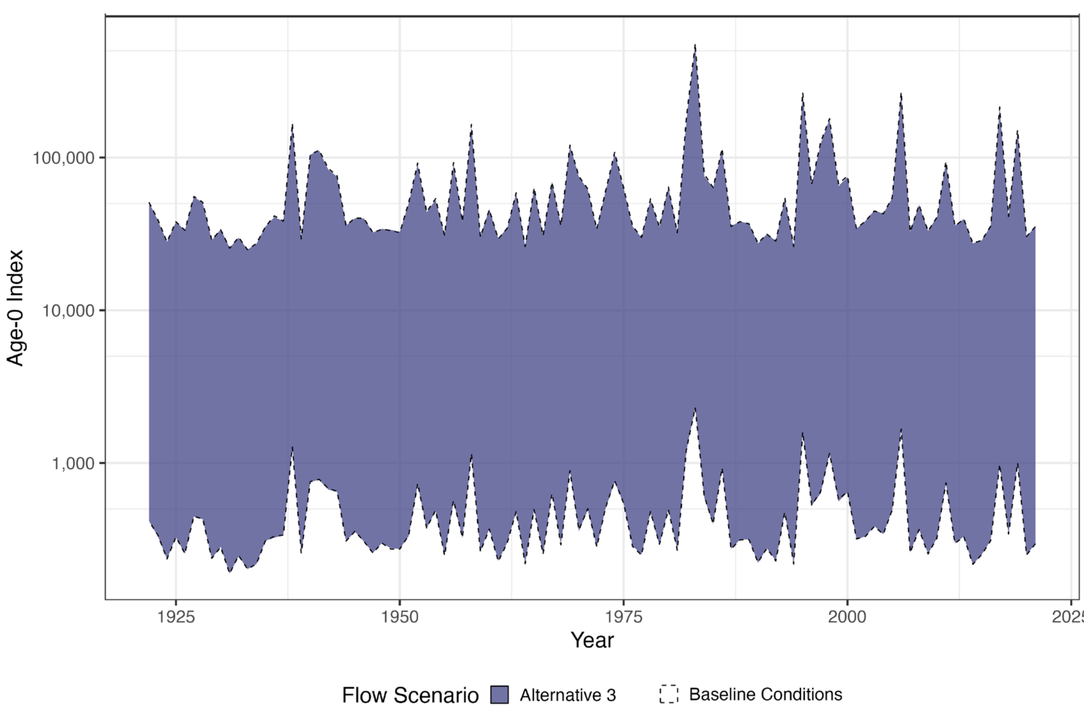
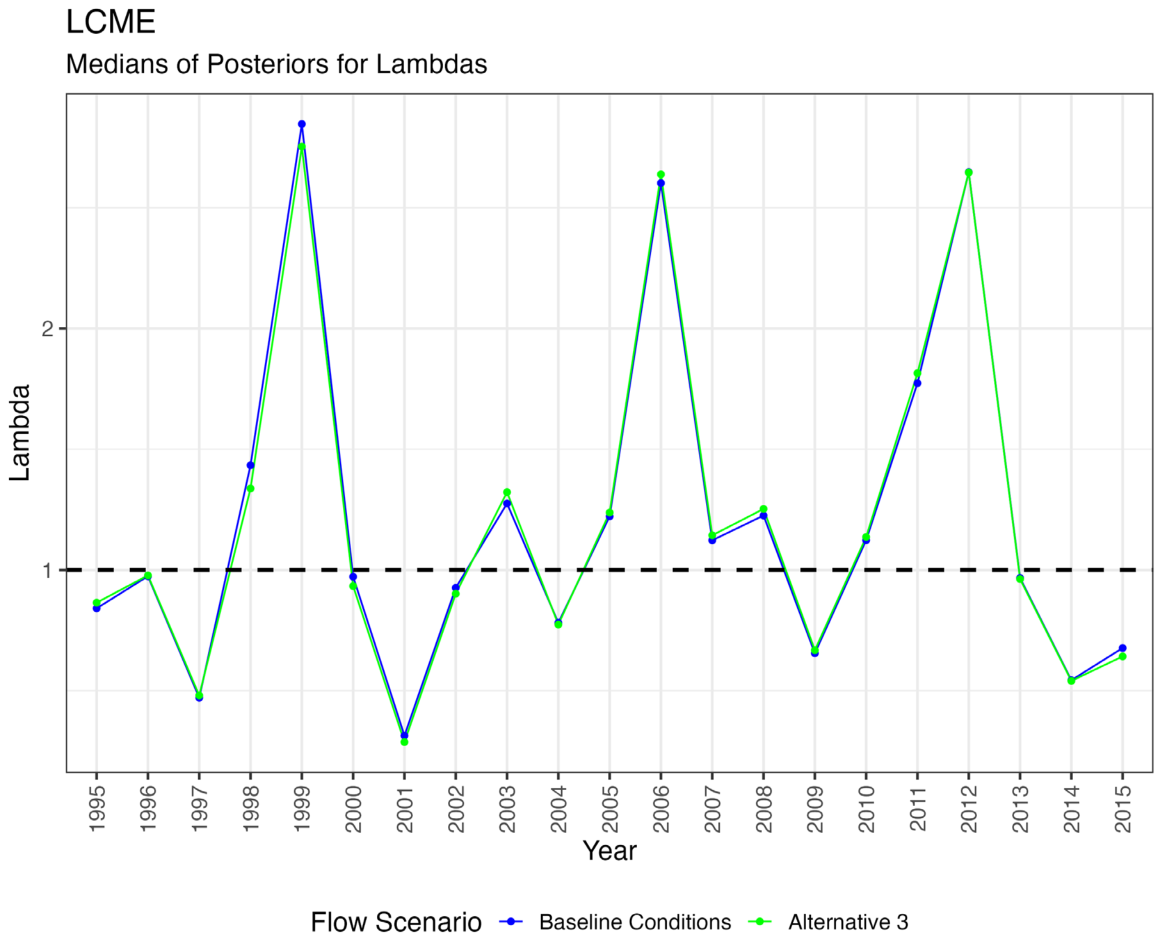


Figure 11-69. Time Series Plot of 95% Posterior Distribution of the Longfin Smelt Bay Otter Trawl Age-0 Index from Application of the Delta Outflow-Abundance Index Method for Alternative 3 and Baseline Conditions (BC) Scenarios



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, 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 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.