EIS to reflect public input."[12] Indeed, the very purpose of a Draft EIS and the ensuing comment period is to elicit suggestions and criticisms to enhance the proposed project.[13]

As the forgoing discussion demonstrates, a primary measure of success under both CEQA and NEPA is when the environmental review process and public comments prompt the lead agencies to make changes that result in a project that is better than the original proposal. That is precisely what has occurred here. Because of the robust public response during the extended public comment period on the Draft EIR/EIS, as well as the data acquired during the environmental review process, the Lead Agencies have been able to better identify and understand the proposed project's potential adverse effects, and have been able to identify a solution that will reduce many of these impacts and ease the burden on the environment and Delta communities.

4.1.2 Description of Alternative 4A

This section provides description of the components and operation of water conveyance facilities, ESA and CESA compliance process, and environmental commitments that will implemented under Alternative 4A. Table 4.4-1 below, provides a brief summary comparison of these elements between Alternatives 4A and 4.

4.1.2.1 Water Conveyance Facility Construction and Maintenance

Under Alternative 4A, water conveyance facilities would be constructed and maintained identically to those proposed and analyzed under Alternative 4 (including the modifications described in Section 3, *Conveyance Facility Modifications to Alternative 4*, of this RDEIR/SDEIS). Water would primarily be conveyed from the north Delta to the south Delta through pipelines/tunnels. Water would be diverted from the Sacramento River through three fish-screened intakes on the east bank of the Sacramento River between Clarksburg and Courtland (Intakes 2, 3, and 5). Water would travel from the intakes to a sedimentation basin before reaching the tunnels. From the intakes water would flow into an initial single-bore tunnel, which would lead to an intermediate forebay on Glannvale Tract. From the southern end of this forebay, water would pass through an outlet structure into a dual-bore tunnel where it would flow by gravity to the south Delta. Water would then reach pumping plants northeast of the Clifton Court Forebay, where it would be pumped into the north cell of the expanded Clifton Court Forebay from the tunnels. The forebay would be dredged and redesigned to provide an area that would isolate water flowing from the new north Delta facilities from water diverted from south Delta channels.

[12] / *California v. Block* (9th Cir.1982) 690 F.2d 753, 771; *Russell Country Sportsmen v. U.S. Forest Service* (9th Cir. 2011) 668 F.3d 1037, 1045.)

[13] / *City of Carmel-By-The-Sea v. U.S. Dept. of Transp.* (9th Cir 1997) 123 F.3d 1142, 1156; see also *National Committee for the New River v. FERC* (D.C. Cir. 2004) 373 F.3d 1323, 1329 ["By its very name, the [Draft] EIS is a draft of the agency's proposed [Final] EIS, and as such the purpose of a [Draft] EIS 'is to elicit suggestions for change'"], quoting *City of Grapevine, Tex. v. Dept. of Transp.* (D.C. Cir. 1994) 17 F.3d 1502, 1507.

Table 4.1-1. Comparison of Alternative 4 and Alternative 4A

Element of Project Description	Alternative 4 (BDCP)	Alternative 4A
ESA Compliance	Section 10 (DWR)/Section 7 (Reclamation)	Section 7
California Endangered Species law Compliance	NCCPA	2081(b) permit
Facilities	Modified Pipeline/Tunnel Alignment: 3 intakes, 9,000 cfs	Modified Pipeline/Tunnel Alignment: 3 intakes, 9,000 cfs
Operations	Dual Conveyance; Operational Scenarios H1–H4 with Decision Tree (see Chapter 3, Section 3.6.4.2 of the Draft EIR/EIS); evaluated at LLT	Dual Conveyance; Operational Scenario H3+ (a new operational scenario which includes a criterion for spring outflow bounded by the criteria associated with Scenarios H3 and Scenario H4, as described in Chapter 3, Section 3.6.4.2 of the Draft EIR/EIS); evaluated as Scenarios H3–H4 at early long-term (ELT, which is associated with conditions around 2025)
Conservation Measures/ Environmental Commitments	Conservation Measures 2–21; includes Yolo Bypass Improvements and 65,000 acres of tidal wetland restoration	Environmental Commitments 3, 4, 6, 7, 8, 9, 10, 11, 12, 15, 16; includes up to 59 acres of tidal wetland restoration
CEQA Baseline	Existing Conditions	Existing Conditions
NEPA Baseline	No Action Alternative at LLT	No Action Alternative at ELT

A map and a schematic diagram depicting the conveyance facilities associated with Alternative 4A are provided in Mapbook Figure M3-4 in the Mapbook Volume and Figure 3-10 in Appendix A of this RDEIR/SDEIS. A new pumping facility would be constructed northeast of the north cell of the expanded Clifton Court Forebay, along with control structures to regulate the relative quantities of water flowing from the north Delta and the south Delta to the Banks and Jones Pumping Plants. Alternative 4A would entail the continued use of the SWP/CVP south Delta export facilities.

All aspects of water conveyance facility design, construction, and maintenance would be identical to those described for Alternative 4 in the revised text in Chapter 3, Sections 3.4, 3.5.9, and 3.6.1 and Appendix 3C, as provided in Appendix A, *Revisions to the Draft EIR/EIS*, of this RDEIR/SDEIS.

4.1.2.2 Water Conveyance Facility Operations

Operational components of the water conveyance facilities under Alternative 4A would be similar, but not identical, to those described under Scenario H in Chapter 3, Section 3.6.4.2 of the Draft EIR/EIS. Alternative 4A starting operations will be determined through the continued coordination process as outlined in the Section 7 consultation process and 2081(b) permit prior to the start of construction. An adaptive management and monitoring program, as described below, will be implemented to develop additional science during the course of project construction and operation to inform and improve conveyance facility operational limits and criteria. Additionally, operational elements associated with Fremont Weir modifications would not be incorporated as part of this alternative, because Yolo Bypass improvements contemplated in the BDCP (under CM2) would not

be implemented as part of Alternative 4A; instead, they would be assumed to occur as part of the No Action Alternative because they are required by the existing BiOps (see below). For a detailed characterization of operational criteria, please refer to Table 4.1-2.[14]

Implementation of the proposed project will include operations of both new and existing water conveyance facilities once the new north Delta facilities are completed and become operational, thereby enabling joint management of north and south Delta diversions. Operational limits included in this proposed project for south Delta export facilities would supplement the south Delta operational limits currently implemented in compliance with the USFWS (2008) and NMFS (2009) BiOps. The proposed project also incorporates existing criteria from the 2008 and 2009 BiOps (including Fall X2), and adds additional criteria for spring outflow and new minimum flow criteria at Rio Vista from January through August. The North Delta Diversions and the head of Old River barrier are new facilities for the CVP and SWP and will be operated consistent with the proposed operating criteria for each of these facilities. All other criteria included in the USFWS (2008) and NMFS (2009) BiOps and D-1641will continue to be complied with, subject to adjustments made pursuant to the adaptive management process as already described in the 2008 and 2009 BiOps, as part of the continued operations of the CVP and SWP. The proposed project includes modified or new operations of only the following:

- North Delta bypass flows
- South Delta export operations (including export rates and OMR flows)
- Head of Old River barrier operations
- Spring Delta outflow
- Rio Vista minimum flow standard in January through August

The proposed criteria are further described in the following subsections and in Table 4.1-2. The proposed project operations include a preference for south Delta pumping in July through September to provide limited flushing for improving general water quality conditions and reduced residence times.

The Longfin Smelt is a species listed under the California Endangered Species Act (CESA). Therefore, it will be necessary to meet CESA permit issuance criteria for this species. To avoid a reduction in overall abundance for this species, the proposed project includes spring outflow criteria, which are intended to be provided through the acquisition of water from willing sellers. If sufficient water cannot be acquired for this purpose, the spring outflow criteria will be accomplished through operations of the SWP and CVP to the extent an obligation is imposed on either the SWP or CVP under federal or applicable state law. Best available science, including that developed through a collaborative science program, will be used to analyze and make recommendations on the role of such flow in supporting Longfin Smelt abundance to DFW, who will determine if it is necessary to meet CESA permitting criteria.

As described in Section 4.1.2.4, *Collaborative Science and Adaptive Management Program*, for Alternative 4A will be used to consider and address scientific uncertainty regarding the Delta ecosystem and to inform implementation of the operational criteria in the existing BiOps for the

[14] Note that these proposed operational criteria would only take effect after the proposed conveyance facilities are operational. Until that time, operations would occur as described in the USFWS 2008 and NMFS 2009 BiOps or as modified by the outcome of ongoing ESA compliance processes pertaining to operation of the existing facilities.

coordinated operations of the SWP and CVP and the 2081b permit for the SWP facilities and operations, as well as for the new biological opinion and 2081b for this proposed project. Hypotheses will be tested using the following steps:

1. Clearly articulate the management objectives of the actions, along with the criteria that will be used to assess the efficacy of the actions.
2. Clearly articulate the scientific uncertainties and specific hypotheses designed to reduce that uncertainties regarding questions of management importance.
3. Develop and implement a science plan and data collection program to test the hypotheses and reduce the relevant uncertainties.
4. Based on the data collected and analysis of the data, the Collaborative Science process will prepare a written report that presents findings and synthesis of the analyses for submittal to an independent panel review process.

Table 4.1-2. New and Existing Water Operations Flow Criteria and Relationship to Assumptions in CALSIM Modeling

Parameter	Criteria	Summary of CALSIM Modeling[a]
	New Criteria Included in Alternative 4A	
North Delta bypass flows	• Initial Pulse Protection: ○ Low-level pumping of up to 6% of total Sacramento River flow such that bypass flow never falls below 5,000 cfs. No more than 300 cfs can be diverted at any one intake. ○ If the initial pulse begins and ends before Dec 1, post-pulse criteria for May go into effect after the pulse until Dec 1. On Dec 1, the Level 1 rules defined in Table 3-16 in the Draft EIR/EIS apply unless a second pulse occurs. If a second pulse occurs, the second pulse will have the same protective operation as the first pulse. • Post-pulse Criteria (specifies bypass flow required to remain downstream of the North Delta intakes): ○ October, November: bypass flows of 7,000 cfs before diverting at the North Delta intakes. ○ July, August, September: bypass flows of 5,000 cfs before diverting at the North Delta intakes. • December through June: post-pulse bypass flow operations will not exceed Level 1 pumping unless specific criteria have been met to increase to Level 2 or Level 3 as defined in the Section 3.6.4 of the Draft EIR/EIS. If those criteria are met, operations can proceed as defined in Table 3.4.1-2 in the BDCP Public draft. The specific criteria for transitioning between and among pulse protection, Level 1, Level 2, and/or Level 3 operations, will be developed and based on real-time fish monitoring and hydrologic/behavioral cues upstream of and in the Delta. During operations, adjustments are expected to be made to improve water supply and/or migratory conditions for fish by making real-time adjustments to the pumping levels at the north Delta diversions. These adjustments would be managed under Real Time Operations (RTO).	• Same as CM1 criteria, as proposed in the Draft BDCP (hereafter "CM1 criteria").

Parameter	Criteria	Summary of CALSIM Modeling[a]
South Delta operations	• October, November: No south Delta exports during the D-1641 San Joaquin River 2-week pulse, no Old and Middle River (OMR) flow restriction during 2 weeks prior to pulse, and a monthly average of −5,000 cfs in November after pulse. • December: OMR flows will not be more negative than an average of −5,000 cfs when the Sacramento River at Wilkins Slough pulse triggers, and no more negative than an average of −2,000 cfs when the delta smelt action 1 triggers. No OMR flow restriction prior to the Sacramento River pulse, or delta smelt action 1 triggers. • January, February[15]: OMR flows will not be more negative than an average of 0 cfs during wet years, −3,500 cfs during above-normal years, or −4,000 cfs during below-normal to critical years, except −5,000 in January of dry and critical years. • March[16]: OMR flows will not be more negative than an average of 0 cfs during wet or above- normal years or −3,500 cfs during below-normal and dry year and −3,000 cfs during critical years. • April, May: Allowable OMR flows depend on gaged flow measured at Vernalis, and will be determined by a linear relationship. If Vernalis flow is below 5,000 cfs, OMR flows will not be more negative than−2,000 cfs. If Vernalis is 6,000 cfs, OMR flows will not be less than +1,000 cfs. If Vernalis is 10,000 cfs, OMR flows will be at least 1,000 cfs. If Vernalis exceeds 10,000 cfs, OMR flows will be at least +2,000 cfs. If Vernalis is 15,000 cfs, OMR flows will be at least +3,000 cfs. If Vernalis is at or exceeds 30,000 cfs, OMR flows will be at least 6,000 cfs. • June: Similar to April, allowable flows depend on gaged flow measured at Vernalis. However, if Vernalis is less than 3,500 cfs, OMR flows will not be more negative than −3,500 cfs. If Vernalis exceeds 3,500 cfs and up to 10,000 cfs, OMR flows will be at least 0 cfs. If Vernalis exceeds 10,000 cfs and up to 15,000 cfs, OMR flows will be at least +1,000 cfs. If Vernalis exceeds 15,000 cfs, OMR flows will be at least +2,000 cfs. • July, August, September: No OMR flow constraints.	• October, November: Assumed no south Delta exports during the D-1641 San Joaquin River 2-week pulse, no OMR restriction during 2 weeks prior to pulse, and −5,000 cfs in November after pulse. • December: −5,000 cfs only when the Sacramento River pulse based on the Wilkins Slough flow (same as the pulse for the north Delta diversion) occurs, if no OMR requirement was applied. If the USFWS (2008) BiOp Action 1 is triggered, after which −2,000 cfs requirement is assumed. • April, May: OMR requirement for the Vernalis flows falling between the specified flows were determined by linear interpolation. When Vernalis flow is between 5,000 cfs and 6,000 cfs, OMR requirement is determined by linearly interpolating between −2,000 cfs and +1,000 cfs. • January–March and July–September: Same as CM1 criteria

[15] Sacramento River 40-30-30 index based water year types. For January and February, anticipated water year type based on the forecasted hydrology will be used. The frequency of exceedance of the forecasted hydrology will be consistent with current practices. CALSIM II modeling uses previous water year type for October through January, and the current water year type from February onwards.

[16] Sacramento River 40-30-30 index based water year types. For March, anticipated water year type based on the forecasted hydrology will be used. The frequency of exceedance of the forecasted hydrology will be consistent with current practices. CALSIM II modeling uses previous water year type for October through January, and the current water year type from February onwards.

Parameter	Criteria	Summary of CALSIM Modeling[a]
Head of Old River gate operations	• October 1–November 30th: RTO management in order to protect the D-1641 pulse flow designed to attract upstream migrating adult Fall-Run Chinook Salmon. HORB will be closed approximately 50% during the time immediately before and after the SJR pulse and that it will be fully closed during the pulse unless new information suggests alternative operations are better for fish. • January: When salmon fry are migrating, (determined based on real time monitoring), initial operating criterion will be to close the gate subject to RTO for purposes of water quality, stage, and flood control considerations. • February–June 15th: Initial operating criterion will be to close the gate subject to RTO for purposes of water quality, stage, and flood control considerations. The agencies will actively explore the implementation of reliable juvenile salmonid tracking technology which may enable shifting to a more flexible real time operating criterion based on the presence/absence of covered fishes. • June 16 to September 30, December: Operable gates will be open.	• Assumed 50% open from January 1 to June 15, and during days in October prior to the D-1641 San Joaquin River pulse. Closed during the pulse. 100% open in the remaining months.
Spring outflow	• March, April, May: To ensure maintenance of longfin smelt abundance, initial operations will provide a March–May average Delta outflow bounded by the requirements of Scenario H3, which are consistent with D-1641 standards, and Scenario H4, which would be scaled to Table 3-24 in Chapter 3, Section 3.6.4.2 of the Draft EIR/EIS. Over the course of the 2081(b) permit term the longfin smelt indices of annual recruitment based upon the 1980–2011 trend in recruitment relative to winter-spring flow conditions will be used to evaluate the effect of operations on longfin smelt (i.e., evaluate positive cohort over cohort population growth). Adjustments to the criteria above and these outflow targets may be made using the Adaptive Management Process and the best available scientific information available regarding all factors affecting longfin smelt abundance.[17]	• Same as CM1 criteria, assuming outflow from export reductions first, then Oroville releases
Rio Vista minimum flow standard	• January through August: flows will exceed 3,000 cfs • September through December: flows per D-1641	• Same as CM1 criteria
Key Existing Criteria Included in Modeling		
Fall outflow	• September, October, November implement the USFWS (2008) BiOp Fall X2 requirements. However, similar to spring Delta outflow and consistent with the existing RPA adaptive management process, adjustments to these outflow targets may be made using the Adaptive Management and Monitoring Program described below and the best available scientific information available regarding all factors affecting delta smelt abundance.	• Same as CM1 criteria.

[17] For example, if best available science resulting from collaborative scientific research program shows that Longfin Smelt abundance can be maintained in the absence of spring outflow, and DFW concurs, an alternative operation for spring outflow could be to follow flow constraints established under D-1641.

Parameter	Criteria	Summary of CALSIM Modeling[a]
Winter and summer outflow	• Flow constraints established under D-1641 will be followed if not superseded by criteria listed above.	• Same as CM1 criteria.
Delta Cross Channel Gates	• Operations as required by NMFS (2009) BiOp Action 4.1 and D-1641.	• Delta Cross Channel gates are closed for a certain number of days during October 1 through December 14 based on the Wilkins Slough flow, and the gates may be opened if the D-1641 Rock Slough salinity standard is violated because of the gate closure. Delta Cross Channel gates are assumed to be closed during December 15 through January 31. February 1 through June 15, Delta Cross Channel gates are operated based on D-1641 requirements.
Suisun Marsh Salinity Control Gates	• Gates would continue to be closed up to 20 days per year from October through May.	Not modeled in CALSIM II; only in DSM2.
Export to inflow ratio	• Operation criteria are the same as defined under D-1641. • The D-1641 export/inflow (E/I) ratio calculation was designed to protect fish from south Delta entrainment. For Alternative 4A, Reclamation and DWR propose that the North Delta Diversion (NDD) does not affect either Delta inflows or exports as they relate to the E/I ratio calculation. In other words, Sacramento River inflow is defined as flows downstream of the NDD and only south Delta exports are included for the export component of the criteria.	• Combined export rate is defined as the diversion rate of the Banks Pumping Plant and Jones Pumping Plant from the south Delta channels. • Delta inflow is defined as the sum of the Sacramento River flow downstream of the proposed north Delta diversion intakes, Yolo Bypass flow, Mokelumne River flow, Cosumnes River flow, Calaveras River flow, San Joaquin River flow at Vernalis, and other miscellaneous in-Delta flows.

[a] See Table C.A-1, CALSIM II Modeling Assumptions for Existing Conditions (EBC1), No Action Alternative (EBC2) and BDCP Operational Scenarios, in Section B.3.4, *Alternative 4 Decision Tree Scenarios H1, H2, H3 and H4*, in Appendix 5A, *Modeling Technical Appendix*, of the Draft EIR/EIS.

Application of Flow Criteria

Flow criteria are applied seasonally (month by month) and according to the following five water-year types. Under the observed hydrologic conditions over the 82-year period (1922–2003), the number of years of each water-year type is included below. The water-year type classification for the majority of the criteria mentioned here, unless noted differently, is based on the Sacramento Valley 40-30-30 Water Year Index defined under D-1641.

- Wet water year: the wettest 26 years of the 82-year hydrologic data record, or 32% of years.
- Above-normal water year: 12 years of 82, or 15%.
- Below-normal water year: 14 years of 82, or 17%.
- Dry water year: 18 years of 82, or 22%.
- Critical water year: 12 years of 82, or 15%.

Water operations under Alternative 4A are then constrained as shown in Table 4.1-2.

Proposed New Flow Criteria for North Delta SWP and CVP Export Facilities

Diversions from the north would be greatest in wetter years and lowest in drier years, when south Delta diversions would provide the majority of the CVP and SWP south of Delta exports. In order to avoid impacts to listed species, north Delta bypass flow requirements were developed in coordination with the fisheries agencies, and are described below. Additionally, Alternative 4A operations include a preference for south Delta pumping in July through September to avoid water quality degradation in the south Delta.

The objectives of the north Delta diversion bypass flow criteria include regulation of flows to 1) maintain fish screen sweeping velocities; 2) reduce upstream transport from downstream channels in the channels downstream of the intakes; 3) support salmonid and pelagic fish transport and migration to regions of suitable habitat; 4) reduce losses to predation downstream of the diversions; and 5) maintain or improve rearing habitat conditions in the north Delta.

To ensure that these objectives are met, diversions must be restricted at certain times of the year (mostly from December through June) when juvenile covered fish species are present. This is achieved by restricting the diversion to low level pumping (diversion of 6% of Sacramento River flow measured upstream of the intakes up to 900 cfs [300 cfs per intake]) when the juvenile fish begin their outmigration, which generally coincides with seasonal high flows triggered by fall/winter rains (called *pulse flows*); followed by a ramping up of diversion rates, while ensuring flows are adequate to be protective of aquatic species, during the remainder of the outmigration (called *post-pulse operations*). The protections allowed during these pulses are intended to achieve safe juvenile passage past the intakes to well downstream of lower Delta channels that might otherwise lead them away from their primary migration route. Additional but less restrictive requirements apply for the late spring to late fall period.

The initial pulse of juvenile fish migration is a natural occurrence caused by the first substantial runoff event of the season. This can occur as early as October or as late as February, but usually happens in December or January. During the initial pulse, flows will be minimally diminished, with diversions limited to low-level pumping to the extent allowed. If the initial pulse occurs prior to Dec 1, then an assessment will be made to decide if equivalent protection is required in the event a

second pulse occurs. A flow condition will be categorized as an initial pulse based on real-time monitoring of flow at Wilkins Slough and juvenile fish movement.

At the end of the initial pulse phase, post-pulse operations will apply, with potential adjustments made based on real-time operations as described in Table 4.1-2. The conditions that trigger the transition from the initial pulse protection to post-pulse operations are described in Chapter 3 of the Draft EIR/EIS, along with bypass operating rules for the post-pulse phase, which provide maximum allowable levels of diversion for a given Sacramento River inflow measured upstream of the intakes. Additionally, as described in Table 4.1-2, there will be biologically-based triggers to allow for transitioning between and among the different diversion levels.

In July through September, the bypass rules are less restrictive, allowing for a greater proportion of the Sacramento River to be diverted, as described in Table 4.1-2. In October through November the bypass amount is increased from 5,000 cfs to 7,000 cfs, allowing a smaller proportion of the Sacramento River to be diverted.

Proposed New Flow Criteria for CVP and SWP South Delta Export Facilities

The objectives of the south Delta flow criteria are to minimize take at south Delta pumps by reducing incidence and magnitude of reverse flows during critical periods for fish species. The south Delta channel flow criteria are based on the parameters for Old and Middle River (OMR) flows as summarized below, and Head of Old River Barrier operations. Additionally, Alternative 4A operations include a preference for south Delta pumping in July through September to provide limited flushing flows to avoid water quality degradation in the south Delta.

OMR Flows

The OMR flow criteria chiefly serve to constrain the magnitude of reverse flows in the Old and Middle Rivers for entrainment protection and minimization of adverse indirect effects. The criteria are derived from fish protection triggers described in the USFWS (2008) and NMFS (2009) BiOps RPA Actions, and are described in Table 4.1-2. The proposed OMR flow criteria are used to constrain the south Delta exports, if the OMR flow requirements under current BiOps are not as constraining as the proposed criteria. These newly proposed OMR criteria (and associated Head of Old River Barrier operations) are in response to expected facility changes under the proposed project, and only applicable after the proposed north Delta diversion becomes operational.

In April, May, and June, OMR minimum allowable values would be based upon the San Joaquin River inflow relationship to OMR (Table 4.1-2). In October and November, OMR and south Delta export restrictions are based upon State Water Board D-1641 pulse trigger, as follows.[18]

- Two weeks before State Water Board D-1641 pulse trigger: no OMR restrictions.
- During State Water Board D-1641 pulse trigger: no south Delta exports.
- Two weeks following State Water Board D-1641 pulse trigger: OMR operated to be no more negative than -5,000 cfs through November.

[18] For the purposes of modeling, it was assumed that the D-1641 pulse in San Joaquin River occurs in the last 2 weeks of October.

Additionally, new criteria based on the water year type in December through March would be implemented as described in detail in Table 4.1-2. The new criteria generally provide more positive OMR flows under the wetter years compared to the requirements under the current BiOps.

Operations of the New Head of Old River Operable Barrier

Operations for the Head of Old River gate would be managed as follows.

- **October 1 – November 30**: Real Time Operation (RTO) management and HORB will be closed in order to protect the D-1641 pulse flow designed to attract upstream migrating adults.
- **January**: When salmon fry are migrating (determined based on real time monitoring), initial operating criterion will be to close the gate subject to RTO for purposes of water quality, stage, and flood control considerations.
- **February – June 15**: The gate will be closed, but subject to RTO for purposes of water quality, stage, and flood control considerations. The agencies will actively explore the implementation of reliable juvenile salmonid tracking technology which may enable shifting to a more flexible real time operating criterion based on the presence/absence of covered fishes.
- **June 16 to September 30, December**: Operable gates will be open.

Real-Time Operational Decision-Making Process

RTO Team decisions are expected to be needed during at least some part of the year at the Head of Old River gate and the north and south Delta diversion facilities. The RTO Team in making operational decisions that depart from the criteria used in the modeling will take into account upstream operational constraints, such as coldwater pool management, instream flow, and temperature requirements. The extent to which real time adjustments that may be made to each parameter related to these facilities shall be limited by the criteria and/or ranges is set out in Table 4.1-2. Any modifications to the parameters subject to real time operational adjustments or to the criteria and/or ranges set out in Table 4.1-2 shall occur only through the adaptive management, as discussed below.

Head of Old River gate. Operations for the Head of Old River gate would be managed under RTOs as set forth in Table 4.1-2.

North Delta diversions. North Delta bypass flows will be managed according to the criteria described in Table 4.1-2. Additional biologically-based triggers for adjustments between and among Levels I, II, and III, are under development through the ESA consultation process.

South Delta diversions. The south Delta diversions will be managed under RTO to achieve OMR criteria, throughout the year based on fish protection triggers (e.g., salvage density, calendar, species distribution, entrainment risk, turbidity, and flow based triggers). Increased restrictions as well as relaxations of the OMR criteria may occur as a result of observed physical and biological information. Additionally, as described above for the north Delta diversions, RTO would also be managed to distribute pumping activities amongst the three north Delta and two south Delta intake facilities to maximize both survival of covered fish species in the Delta and water supply.

Timing for Implementation of Operations

Implementation of Alternative 4A will include operations of both new and existing water conveyance facilities as described above and in Table 4.1-2, once the new north Delta facilities are constructed and become operational, thereby enabling joint operations of north and south Delta diversions. Until that time, operations will be governed by existing and applicable requirements and standards included in the NMFS (2009) and USFWS (2008) BiOps and D-1641, as may be amended, and any other regulatory and contractual obligations.

4.1.2.3 Environmental Commitments

To achieve the applicable regulatory standards under ESA Section 7 and CESA Section 2081(b) while also complying with NEPA and CEQA, a subset of those activities proposed in the conservation strategy for the Draft BDCP would be implemented under Alternative 4A. Specifically, portions of the actions proposed under CM3, CM4, CM6, CM7, CM8, CM9, CM10, CM11, CM12, CM15, and CM16 would be included in Alternative 4A. As preserved within Alternative 4A, however, these activities are no longer "conservation measures." The reason for not using this familiar term is to avoid creating confusion regarding the rationale for retaining these activities within Alternative 4A. The term "conservation measure" is often used in the context of Habitat Conservation Plans under Section 10(a)(2) of the ESA and Natural Community Conservation Plans under the NCCPA.

Alternative 4A contemplates ESA compliance through Section 7 of the ESA and Section 2081 of CESA, rather than through ESA Section 10 and NCCPA Section 2835. As such, different terminology has been adopted to reflect the difference in permitting strategies under state and federal endangered species laws. These repackaged and limited elements of the original BDCP Conservation Measures are instead referred to as "Environmental Commitments" (ECs). As noted, these Environmental Commitments are actions primarily intended to satisfy CEQA, CESA Section 2081, and ESA Section 7. To minimize confusion, they are numbered to track the parallel BDCP Conservation Measures: Environmental Commitments 3, 4, 6, 7, 8, 9, 10, 11, 12, 15, and 16, as summarized in Table 4.1-3. A summary of these commitments is presented below and consists primarily of habitat restoration, protection, enhancement, and management activities necessary to mitigate for adverse effects from construction of the proposed water conveyance facilities, along with species-specific resource restoration and protection principles to ensure that implementation of these commitments would achieve the intended mitigation of impacts (for a list of these standards, along with species-specific mitigation needs, see Table 4.1-8).[19] Where impact statements or mitigation measures refer to Conservation Measures, these statements have been changed in the analysis for Alternative 4A to refer instead to the parallel Environmental Commitments. Additionally, pertinent elements included as Avoidance and Minimization Measures (AMMs) and the proposed Adaptive Management and Monitoring Program would be implemented as applicable to the activities proposed under Alternative 4A.[20] These, too, would serve a mitigation function under CEQA. All of these components would function as *de facto* CEQA and NEPA mitigation measures for the construction and operations-related impacts of Alternative 4A. Details regarding the implementation of these activities under Alternative 4A are provided below and in Table 4.1-3.

[19] While these are distinct from the environmental commitments described in Appendix 3B, *Environmental Commitments*, of the Draft EIR/EIS (as modified in this RDEIR/SDEIS, as shown in Appendix A hereto), both sets of commitments would apply to implementation of Alternative 4A.

[20] Specifically, AMMs 1–7, 10, 12–15, 18, 20–25, 30, and 37 would be carried forward under implementation of this alternative.

The RDEIR/SDEIS describes and analyzes Environmental Commitments 3, 4, 6–12, 15, and 16 at a level of detail consistent with that applied to these activities under other alternatives in the Draft EIR/EIS. (See CEQA Guidelines, § 15126.4[a][1][D] [EIRs must discuss significant effects of mitigation measures, "but in less detail than the significant effects of the project as proposed"]; see also *California Native Plant Society v. City of Rancho Cordova* (2009) 172 Cal.App.4th 603, 621-625 [lead agency did not violate CEQA by failing to identify the off-site location at which mitigation for impacts to on-site wetlands would be carried out].) Specific locations for implementing many of the activities associated with these commitments have not been identified at this time. Therefore, the analyses consider typical construction, operation, and maintenance activities that would be undertaken for implementation of the habitat restoration and enhancement and stressor reduction efforts. Where appropriate and necessary, implementation of individual projects associated with an environmental commitment would be subject to additional environmental review. (See CEQA Guidelines, §§ 15162–15164; 40 C.F.R. § 1502.9[c].)

Note that many of the actions that are part of the BDCP conservation strategy but not proposed to be implemented under Alternative 4A would continue to be pursued as part of existing but separate projects and programs associated with (1) the 2008 and 2009 USFWS and NMFS BiOps (e.g., Yolo Bypass improvements and habitat enhancements, 8,000 acres of tidal habitat restoration), (2) California EcoRestore, and (3) the 2014 California Water Action Plan. Those actions are separate from, and independent of, Alternative 4A. Therefore, for the purposes of Alternative 4A, these elements (and their associated environmental effects) are considered either as part of the No Action Alternative, as described in Section 4.2, *Impacts of No Action Alternative Early Long-Term*, or as part of the cumulative impact analysis, as described in Section 5, *Revisions to Cumulative Impact Analyses*, of this RDEIR/SDEIS.

Table 4.1-3. Environmental Commitments under Alternative 4A

Environmental Commitment 3: Natural Communities Protection and Restoration	
Valley/Foothill Riparian	103 acres
Grassland	1,060 acres
Vernal Pool Complex and Alkali Seasonal Wetland Complex	150 acres
Nontidal Marsh	119 acres
Cultivated Lands	11,870 acres
Total:	**Up to 13,302 acres**
Environmental Commitment 4: Tidal Natural Communities Restoration	Up to 59 acres
Environmental Commitment 6: Channel Margin Enhancement	Up to 4.6 levee miles
Environmental Commitment 7: Riparian Natural Community Restoration	Up to 251 acres
Environmental Commitment 8: Grassland Natural Community	Up to 1,070 acres
Environmental Commitment 9: Vernal Pool and Alkali Seasonal Wetland Complex Restoration	Up to 34 acres
Environmental Commitment 10: Nontidal Marsh Restoration	Up to 832 acres
Environmental Commitment 11: Natural Communities Enhancement and Management	At sites protected or restored under Environmental Commitments 3–10
Environmental Commitment 12: Methylmercury Management	At sites restored under Environmental Commitment 4
Environmental Commitment 15: Localized Reduction of Predatory Fishes	At north Delta intakes and at Clifton Court Forebay
Environmental Commitment 16: Nonphysical Fish Barrier	At Georgiana Slough

Environmental Commitment 3: Natural Communities Protection and Restoration

This action would consist of the acquisition of lands for protection and restoration of listed species habitat in perpetuity and would be implemented in the same way as described in Conservation Measure 3 in the Draft BDCP but over less area. For the purposes of Alternative 4A, this action would entail protection of approximately 13,302 acres, of natural communities and cultivated land, as shown in Table 4.1-3. This protection and restoration would mitigate for the loss of terrestrial species habitat associated with construction of the water conveyance facilities.

Environmental Commitment 4: Tidal Natural Communities Restoration

This action would consist of the restoration of tidal natural communities and transitional uplands and would be implemented in the same way as described in Conservation Measure 4 in Appendix D, *Substantive BDCP Revisions*, of this RDEIR/SDEIS, but over less area. For the purposes of analysis of Alternative 4A, this action would entail restoration of up to 59 acres (including transitional uplands), as shown in Table 4.1-3. This analysis assumes that none of these 59 acres of tidal restoration will be done in the Suisun Marsh area. Tidal habitat restoration would mitigate for the physical loss of aquatic habitat associated with construction of the north Delta intake facilities. The current proposed mitigation acreage is anticipated to be 59 acres. However, actual acreage may change based on further discussions with NMFS, USFWS, and DFW pertaining to the actual value of the current habitat and/or the appropriate ratio of mitigation or based on footprint changes. Based on initial discussions, the maximum ratio applied to tidal wetland mitigation is 3:1, and therefore would not exceed 177 acres for this alternative.

Environmental Commitment 6: Channel Margin Enhancement

This action would consist of the enhancement of channel margin habitat and would be implemented in the same way as described in Conservation Measure 6 in the Draft BDCP but over less linear distance. For the purposes of Alternative 4A, this action would entail enhancement of approximately 4.6 levee miles, as shown in Table 4.1-3. This would mitigate for the loss of salmonid habitat associated with construction and operations of the north Delta intake facilities.

Environmental Commitment 7: Riparian Natural Community Restoration

This action would consist of the restoration of riparian natural communities and would be implemented in the same way as described in Conservation Measure 7 in the Draft BDCP but over less area. For the purposes of Alternative 4A, this action would entail restoration of approximately 251 acres, as shown in Table 4.1-3. This would mitigate for the loss of terrestrial species habitat associated with construction of the water conveyance facilities.

Environmental Commitment 8: Grassland Natural Community

This action would consist of the restoration of grassland habitat and would be implemented in the same way as described in Conservation Measure 8 in the Draft BDCP but over less area. For the purposes of Alternative 4A, this action would entail restoration of approximately 1,070 acres as shown in Table 4.1-3. This would mitigate for the loss of terrestrial species habitat associated with construction of the water conveyance facilities.

Environmental Commitment 9: Vernal Pool and Alkali Seasonal Wetland Complex Restoration

This action would consist of the restoration of vernal pool and alkali seasonal wetland complex and would be implemented in the same way as described in Conservation Measure 9 in the Draft BDCP but over less area. For the purposes of Alternative 4A, this action would entail restoration of approximately 34 total acres of vernal pool complex and/or alkali seasonal wetland complex, as shown in Table 4.1-3. This would mitigate for the loss of species habitat associated with construction of the water conveyance facilities.

Environmental Commitment 10: Nontidal Marsh Restoration

This action would consist of the restoration of nontidal marsh and would be implemented in the same way as described in Conservation Measure 10 in the Draft BDCP but over less area. For the purposes of Alternative 4A, this action would entail restoration of approximately 832 acres of nontidal marsh, as shown in Table 4.1-3. This would mitigate for the loss of species habitat associated with construction of the water conveyance facilities.

Environmental Commitment 11: Natural Communities Enhancement and Management

This action would apply to all protected and restored habitats under Alternative 4A and would be implemented, where applicable, to manage and enhance these lands consistent with the approach described under Conservation Measure 11 in the Draft BDCP. These actions would support mitigation for the loss of terrestrial species habitat associated with construction of the water conveyance facilities.

Environmental Commitment 12: Methylmercury Management

This action would minimize conditions that promote production of methylmercury in restored tidal wetland areas and its subsequent introduction to the foodweb, and to listed species in particular. Implementation of this action would be consistent with the revised description of Conservation Measure 12 (see Appendix D, *Substantive BDCP Revisions*, of this RDEIR/SDEIS). The portions of the measure applicable to effects in the Yolo Bypass would not apply because Yolo Bypass improvements would not be implemented as part of this alternative.

Environmental Commitment 15: Localized Reduction of Predatory Fishes (Predator Control)

This action would reduce populations of predatory fishes at locations of high predation risk (i.e., predation hotspots) associated with construction and operation of the proposed water conveyance facilities. Implementation of this action would be consistent with the revised description of Conservation Measure 15 (see Appendix D, *Substantive BDCP Revisions*, of this RDEIR/SDEIS); however, for the purposes of Alternative 4A, this action would be applied only to the reach of the Sacramento River adjacent to the north Delta intakes and to Clifton Court Forebay. EC15 would remove predator refuge habitat and reduce predator abundance in the construction areas. At a minimum, EC15 will target the removal of an amount of predator refuge commensurate with the amount that may be created by construction of water conveyance facilities. These measures are expected to fully mitigate any indirect effect on predation rates associated with construction and operations.

Environmental Commitment 16: Nonphysical Fish Barrier

This action would be implemented to address effects related to survival of outmigrating juvenile salmonids by installing a nonphysical barrier at Georgiana Slough to redirect fish away from channels and river reaches in which survival is lower than in alternate routes. Implementation of this action would be consistent with the revised description of Conservation Measure 16 (see Appendix D, *Substantive BDCP Revisions*, of this RDEIR/SDEIS); however, for the purposes of Alternative 4A, this action would be applied only to Georgiana Slough. This commitment would mitigate for effects on salmonid survival associated with operation of north Delta intakes and associated flows.

Avoidance and Minimization Measures

AMMs 1–7, 10–18, 20–25, 27, 30, and 37–39 would apply to all construction activities under Alternative 4A and would be implemented, where applicable, to avoid and minimize impacts on listed species, consistent with the approach described in Appendix 3.C, *Avoidance and Minimization Measures*, of the Draft BDCP, and in Appendix D, *Substantive BDCP Revisions,* of this RDEIR/SDEIS. These actions would minimize the risk of impacts on species resulting from construction activities.

4.1.2.4 Collaborative Science and Adaptive Management Program

Considerable scientific uncertainty exists regarding the Delta ecosystem, including the effects of CVP and SWP operations and the related operational criteria. To address this uncertainty, DWR, Reclamation, DFW, USFWS, NMFS, and the public water agencies will establish a robust program of collaborative science, monitoring, and adaptive management. For the purposes of analysis, it is assumed that the Collaborative Science and Adaptive Management Program (AMMP) developed for Alternative 4A would not, by itself, create nor contribute to any new significant environmental effects; instead, the AMMP would influence the operation and management of facilities and protected or restored habitat associated with Alternative 4A.

Collaborative science and adaptive management will support the proposed project by helping to address scientific uncertainty where it exists, and as it relates to the benefits and impacts of the construction and operations of the new water conveyance facility and existing CVP and SWP facilities. Specifically, collaborative science and adaptive management will, as appropriate, develop and use new information and insight gained during the course of project construction and operation to inform and improve:

- the design of fish facilities including the intake fish screens;
- the operation of the water conveyance facilities under the Section 7 biological opinion and 2081b permit; and
- habitat restoration and other mitigation measures conducted under the biological opinions and 2081b permits.

In summary, the broad purposes of the program will be to: 1) undertake collaborative science, 2) guide the development and implementation of scientific investigations and monitoring for both permit compliance and adaptive management, and 3) apply new information and insights to management decisions and actions. Each purpose is further described below.

Collaborative Science

The program will provide guidance and recommendations on relevant science related to the operations of the CVP and SWP within the Delta to inform implementation of the existing BiOps for the coordinated operations of the SWP and CVP and the 2081b permit for the SWP facilities and operations, as well as for the new biological opinion and 2081b for this proposed project. The collaborative science effort will build on the progress being made by the existing Collaborative Science and Adaptive Management Program (CSAMP) that was established to make recommendations on the science needed to inform implementation of or potential changes to the existing BiOps for the SWP and CVP operations, and proposed alternative management actions. The CSAMP process and its Collaborative Adaptive Management Team (CAMT) rely on the Delta Science Program to provide independent peer review of both science proposals and products.

Results from the collaborative science produced under the program would inform policy makers from the agencies implementing or overseeing the proposed project. These policy makers would determine whether and how to act on the information within the regulatory contexts of the biological opinions, 2081b permits, and other relevant authorizations (e.g., Corps permits, State Board authorizations).

Monitoring

Monitoring is a critical element of the adaptive management program and a required component of ESA Section 7 biological opinions and CESA 2081b permits. In addition, monitoring is a critical element of the collaborative science process that informs adaptive management decision-making. The proposed compliance and effectiveness monitoring program for the CESA 2081b permit is described in Chapter 6 of that permit application. These monitoring programs overlap but have distinct elements owing to their overlapping but distinct species lists. Collaborative science for the proposed project will have the following primary functions:

- lead active evaluation through studies, monitoring, and testing of current and new hypotheses associated with key water operating parameters, habitat restoration, and other mitigation;
- gather and synthesize relevant scientific information;
- develop new modeling or predictive tools to improve water management in the Delta; and
- inform the testing and evaluation of alternative operational strategies and other management actions to improve performance from both biological and water supply perspectives.

Monitoring is essential to carry out this collaborative science process.

Management Recommendations, Decisions, and Actions

The collaborative science effort is expected to inform operational decisions within the ranges established by the biological opinion and 2081b permit for the proposed project. However, if new science suggests that operational changes may be appropriate that fall outside of the operational ranges evaluated in the biological opinion and authorized by the 2081b permit, the appropriate agencies will determine, within their respective authorities, whether those changes should be implemented. An analysis of the biological effects of any such changes will be conducted to determine if those effects fall within the range of effects analyzed and authorized under the biological opinion and 2081b permit. If NMFS, USFWS, or DFW determine that impacts to listed species are greater than those analyzed and authorized under the biological opinion and 2081b permit, consultation may need to be reinitiated and/or the permittees may need to seek a 2081b

permit amendment. Likewise, if an analysis shows that impacts to water supply are greater than those analyzed in the EIR/EIS, it may be necessary to complete additional environmental review to comply with CEQA or NEPA.

The collaborative science process will also inform the design and construction of the fish screens on the new intakes. This requires active study to maximize water supply, ensure flexibility in their design and operation, and minimize effects to covered species. The collaborative science process will similarly inform adaptive management of habitat restoration and other mitigation measures required by the existing and new biological opinions and 2081b permit.

Structure of Collaborative Science

As mentioned above, the collaborative science elements of the program will build on the experience gained in the CSAMP process. CSAMP employs a two-tiered organizational structure comprised of: 1) a Policy Group made up of agency directors and top-level executives from participating entities, and 2) the CAMT, including designated managers and scientists to serve as a working group functioning under the direction of the Policy Group. Collaborative science for the proposed project is expected to follow a similar model in which management decisions are made by the appropriate agencies within their authorities (see *Management Recommendations, Decisions, and Actions* section above) and collaborative science is undertaken by managers and scientists from participating entities, and other stakeholders as will be described in the Memorandum of Agreement (MOA, see below). In keeping with the existing CSAMP model, future members of the collaborative science process will have expertise or technical skills that would enable them to contribute to the tasks outlined above. Membership from each group will be limited to maintain the effectiveness of the group. Other senior scientists may be invited to participate by mutual consent. If useful, the group could form technical subgroups or use existing subgroups to inform its work. Decisions about what science to pursue would be made by consensus. The group will integrate the work of relevant existing groups and processes (e.g., Delta Science Program and Interagency Ecological Program) to avoid duplicating work.

Funding for Collaborative Science

Collaborative science and monitoring conducted to support the proposed project will be implemented, when feasible, using existing resources from state, federal, and other programs, and the mitigation program of the water conveyance facility. The mitigation program of the water conveyance facility has money dedicated to the monitoring necessary to support effective implementation of mitigation actions.

Proponents of the collaborative science and monitoring program will agree to provide or seek additional funding when existing resources are insufficient to complete the goals and tasks outlined above. The budget for collaborative science will be based on annual workplans that establish approved costs, identify funding sources, and serve as the basis for tracking actual performance. Contracting mechanisms would be developed to facilitate delivery of funding to meet short-term and long-term needs of the collaborative science program to the maximum extent possible while maintaining compliance with applicable contracting laws and regulations. In addition, the parties above will ensure the availability of funding for monitoring and other requirements defined in the biological opinion and 2081b permit.

Memorandum of Agreement

Commitments to adaptive management and collaborative science will be secured through a MOA between DWR, Reclamation, the public water agencies, DFW, NMFS, and USFWS. Details of the collaborative science and adaptive management process, including adaptive management decision-making, an organizational structure for adaptive management decisions, and funding for collaborative science will be developed through the MOA, as needed.

Scientific Basis for Adaptive Management

Adaptive management is a systematic process to continually improve management policies and practices by learning from our actions (Holling 1978; Walters 1986). It requires well-articulated management objectives to guide decisions about what science to try, and explicit assumptions about expected outcomes to compare against actual outcomes (Williams et al. 2009). Adaptive management uses a process to clearly articulate objectives, identify management alternatives, predict management consequences, recognize key uncertainties in advance, and monitor and evaluate outcomes. This structured and systematic process is what differentiates adaptive management from a trial and error approach (National Research Council 2004a; Williams 2011a). Learning, facilitated through deliberate design and testing, is an integral component of adaptive management (Williams et al. 2009; Allen et al. 2011; Williams 2011a).

Adaptive management is a particularly useful framework in the face of scientific uncertainty. The principles of adaptive management lend themselves to water management and ecological restoration in the Bay-Delta (CALFED Bay-Delta Program 2000; Reed et al. 2007, 2010; Healey 2008; Dahm et al. 2009; National Research Council 2011; Parker et al. 2011, 2012; Delta Stewardship Council 2013). In particular, a National Research Council (2011) panel found that despite the challenges, there often is no better option for implementing water management regimes. The adaptive management program for the proposed project will be designed and implemented with these principals and scientific guidance in mind.

4.1.3 Description of Alternative 2D

This section provides description of the components and operation of water conveyance facilities, ESA and CESA compliance process, and environmental commitments that will be implemented under Alternative 2D. Table 4.4-4 below, provides a brief summary comparison of these elements between Alternatives 4A, 2A, and 2D.

4.1.3.1 Water Conveyance Facility Construction and Maintenance

Under Alternative 2D, water conveyance facilities would be constructed and maintained similarly to those proposed and analyzed under Alternative 4 (including the modifications described in Section 3, *Conveyance Facility Modifications to Alternative 4,* of this RDEIS/SDEIS); however, this alternative would entail five intakes in the same locations as those under Alternative 2A (as shown in Figure 3-2 of the Draft EIR/EIS), rather than three. Water would primarily be conveyed from the north Delta to the south Delta through pipelines and tunnels. Water would be diverted from the Sacramento River through five fish-screened intakes on the east bank of the Sacramento River between Freeport and Courtland (Intakes 1–5) and would be conveyed to a sedimentation basin before reaching the tunnels. From the intakes, water would flow into an initial single-bore tunnel, which would lead to an intermediate forebay on Glannvale Tract. From the southern end of this forebay, water would