Appendix 3A

Identification of Water Conveyance Alternatives, Conservation Measure 1

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3A.1 Introduction and Purpose of this Appendix

The original purpose of this appendix, as published in the Draft EIR/EIS in December 2013, was to define the range of conveyance alternatives for Conservation Measure 1 (CM1) to be evaluated in detail in the EIR/EIS. Conservation Measure 1 was part of the draft Bay Delta Conservation Plan, which at that time was DWR's "proposed project" for purposes of CEQA (also described as Alternative 4 in the Draft EIR/EIS). CM1 or variations thereof appeared in all of the other action alternatives in the Draft EIR/EIS except for Alternative 9 (the Through Delta Alternative), which would not involve any new water intake facilities. Other Draft EIR/EIS appendices—3F (*Intake Location Analysis*), 3G (*Background on the Process of Developing the BDCP Conservation Measures*), and 3H (*Intermediate Forebay Location Analysis*)—described how other components of conveyance overall alternatives were developed. As modified for publication of the Final EIR/EIS, however, this appendix serves an additional purpose: to describe the basis for selecting Alternatives 4A, 2D, and 5A (all "sub-alternatives") for inclusion in the Partially Recirculated Draft EIR/Supplement to Draft EIS, as published in July 2015. This new subject is now addressed in a new section 3A.12.

The process for developing the Bay Delta Conservation Plan (BDCP) was initiated in 2006. Its purpose and primary objective is to achieve long-term compliance with the federal Endangered Species Act (ESA) and the California Natural Community Conservation Planning Act (NCCPA) (the parallel state species protection) with respect to (1) the operation of existing State Water Project (SWP) facilities in the Sacramento–San Joaquin Delta (Delta) and (2) the construction and operation of new conveyance facilities for the movement of water entering the Delta from the Sacramento Valley watershed to the existing SWP and federal Central Valley Project (CVP) pumping plants in the southern Delta. The proposed BDCP will achieve its purpose and objectives by providing for the conservation and management of covered species through actions—called conservation measures—within the BDCP Plan Area that will contribute to the recovery of species within the BDCP Plan Area. Despite its very substantial scope, its significant habitat benefits, and the large geographic areas it covers and affects, the proposed BDCP is not intended to function as the equivalent of a statewide plan for dealing with water supply or a comprehensive plan for addressing the numerous challenges facing the Delta.

Statewide water issues are comprehensively addressed by the California Department of Water Resources (DWR) every 5 years through updating the California Water Plan.[1] Many of the alternatives proposed for inclusion in the BDCP EIS/EIR but ultimately rejected because they address issues or apply to regions outside the Bay Delta, are nevertheless pertinent to stewardship of California's water resources and thus are appropriate for consideration or inclusion in the Water Plan. Like planning for the statewide management of water resources, flood preparedness is addressed in a comprehensive process by which DWR and the Central Valley Flood Protection Board prepare the Central Valley Flood Protection Plan[2]. Finally, the Legislature created the Delta Stewardship Council (DSC) in 2009. The DSC is charged with the preparation of a "Delta Plan," the goal of which is to provide a guiding hand to ensure that as the Delta continues to evolve, it does so in a manner that encourages a healthy ecosystem, a reliable water supply, and the continuation of the Delta's agricultural heritage (see Cal. Water Code, section 85211). The Central Valley Flood Protection Plan and the DSC's Delta Plan are more appropriate venues than the BDCP for policies relating to flood control.

Consistent with both the ESA and the NCCPA, the proposed BDCP has been prepared as a combined Habitat Conservation Plan (HCP) and Natural Community Conservation Plan (NCCP). As such, the proposed BDCP would allow for the incidental take of endangered and threatened species in connection with the operation of the SWP, while at the same time mitigating effects of the proposed actions and providing for the conservation of listed species in the plan area. The primary purpose of the BDCP, then, is to gain new long-term authorization for the incidental take of listed species resulting from construction and operation of new facilities and the operation of existing facilities in the Delta (once existing facilities are operated in coordination with the new facilities).

The proposed BDCP consists of a set of 21 conservation measures (CMs). Conservation Measure 1 (CM1) consists of water conveyance facilities components combined with water conveyance operational components. The BDCP also includes CMs that address protection, restoration, enhancement and management of aquatic and terrestrial habitat (CM2–CM11), and other proposed CMs (CM12–CM21).

The BDCP Environmental Impact Report/Environmental Impact Statement (EIR/EIS) is being prepared to evaluate the potential impacts of implementing a range of reasonable alternatives (all involving the creation of an HCP/NCCP with a Planning Area largely limited to the legal Delta).

[1] The *California Water Plan* provides a collaborative planning framework for elected officials, agencies, tribes, water and resource managers, businesses, academia, stakeholders, and the public to develop findings and recommendations and make informed decisions for California's water future. The plan, updated every 5 years, presents the status and trends of California's water-dependent natural resources; water supplies; and agricultural, urban, and environmental water demands for a range of plausible future scenarios. The *California Water Plan* also evaluates different combinations of regional and statewide resource management strategies to reduce water demand, increase water supply, reduce flood risk, improve water quality, and enhance environmental and resource stewardship. The evaluations and assessments performed for the plan help identify effective actions and policies for meeting California's resource management objectives in the near term and for several decades to come.
DWR and others support local reclamation districts though funding levee improvements in the Delta. In addition, the Delta Stewardship Council, through the Delta Plan, and DWR, through the Central Valley Flood Protection Program, are evaluating and supporting overall levee improvements in the Delta.

[2] DWR supports local reclamation districts though funding levee improvements in the Delta. In addition, the Delta Stewardship Council, through the Delta Plan, and DWR, through the Central Valley Flood Protection Program, are evaluating and supporting overall levee improvements in the Delta.

This Appendix 3A focuses on the following.

- A range of conveyance alignment alternatives to convey water from the Sacramento River to existing SWP and CVP pumping plants located in the south Delta.
- A range of conveyance water supply operations alternatives related to the timing and capacity of water diversions from the Sacramento River and/or from existing SWP and CVP pumping plants in the south Delta.

Separate analyses have been prepared to describe the development of specific locations and design criteria of intakes along the various conveyance alignment alternatives and the development of alternatives for other conservation measures. Separate analyses also have been prepared to evaluate alternatives for water demand management, such as water conservation and water recycling.[3]

Interested readers will find other appendices that describe water demand management programs independent of BDCP, as well as potential long-term water supply augmentation measures that the state and others are pursuing or could pursue independent of the BDCP. Of particular note are Appendix 1B, *Water Storage*, which identifies numerous opportunities around the state for increased water storage, both north and south of the Delta,[4] and Appendix 1C, *Water Demand Management*, which addresses, among other topics, the benefits of long-term integrated regional water management (IRMA).[5]

3A.1.1 Organization of this Appendix

This appendix provides the following: (1) a brief description of the background of the development the BDCP and the Draft EIR/EIS; (2) descriptions of the screening criteria to be used to identify *potentially feasible alternatives* (a term of art under the California Environmental Quality Act [CEQA]) and *reasonable alternatives* (a term of art under the National Environmental Policy Act [NEPA]), to be fully evaluated in the EIR/EIS; and (3) a chronological description of identification of the range of alternative components related to CM1 to be evaluated in the EIR/EIS. The chronological development of the range of water conveyance alternative components related to CM1 occurred in the following manner.

- Initially, state and federal agencies participating in BDCP identified Delta conveyance alignment alternatives described in previous reports as potential means for maintaining water quality in the Delta and water supply availability to Delta water users. These reports included DWR's evaluation of conveyance as part of the original peripheral canal, preliminary studies, and reports prepared for the Governor's office and Legislative oversight committees. A complete list of reports evaluated can be reviewed at the reference section of this document.

[3] Throughout this appendix, the broad generic term "alternatives" will be used to describe not only those alternative conveyance proposals that are being carried forward in the Draft EIR/EIS, but also those other proposals that, for reasons described herein, have been carefully considered but are not being carried forward.

[4] Updates regarding water storage projects can also be found on websites maintained by DWR and the United States Bureau of Reclamation (Reclamation).

[5] IRMA is the collaborative effort to manage all aspects of water resources in a region. It is a consensus-based, cross- jurisdictional watershed approach that can help purveyors, planners, landowners, stakeholders, and others develop plans to better manage their water resources. (See *Layperson's Guide to Integrated Regional Water Management* [http://www.watereducation.org/doc.asp?id=2972] and *California Water Plan* [DWR 2009j]). (The 2013 Update to the 2009 California Water Plan is underway.)

- The BDCP Steering Committee conducted a preliminary analysis of broadly defined conveyance alignment alternatives to consider benefits and constraints of different conveyance alignment approaches and completed a *Conservation Strategy Options Evaluation Report* in September 2007 (BDCP 2007a) (also known as the Options Report).
- The EIR/EIS process initiated scoping in early 2008 and re-opened the process in early 2009. The Lead Agencies decided to expand the comment review time and provide additional opportunities for public review of developed materials, including conveyance and habitat restoration. The majority of the comments related to BDCP water supply components referred to conveyance alignment approaches. The comments are available for review online at the BDCP EIR/S website (http://baydeltaconservationplan.com/Home.aspx).
- An initial screening process was completed for the EIR/EIS process to identify a broad range of conveyance alignment alternatives to be used in the development of a range of conveyance operations concepts.
- During 2008 through 2010, the BDCP Steering Committee conducted analyses of preliminary conveyance operations alternatives, and in early 2010 developed a set of conveyance operations criteria to be evaluated for the initial BDCP Effects Analysis.
- In late 2009, the California Legislature enacted a package of related water bills that included the Sacramento–San Joaquin Delta Reform Act of 2009 (Delta Reform Act), which addressed issues that should be considered in the development of the EIR/EIS alternatives if the BDCP were to be included via a new statutory process within the Delta Plan to be prepared by the newly constituted DSC.
- In 2011, state and federal agencies involved in the BDCP process continued to receive comments related to conveyance alternatives.
- The Lead Agency staff and consultants involved in the EIR/EIS process considered (1) the set of conveyance operations criteria developed through the BDCP Steering Committee process, (2) 2008 and 2009 scoping comments related to conveyance operations, (3) issues included in the Delta Reform Act to develop a range of conveyance operations alternatives, and (4) comments received in 2011 by other state and federal agencies involved in the BDCP process. All of this information was used to develop a range of conveyance operations alternatives to be considered with the previously screened conveyance alignment alternatives.
- Lead Agency staff and consultants completed a second screening process for the conveyance alternatives to identify the final range of alternatives to be fully considered for CM1 in the EIR/EIS.

This appendix describes both the information used at each point in this overall process and the results of the first and second screening processes to define the final range of alternatives to be considered for CM1 in the EIR/EIS.

3A.2 Bay Delta Conservation Plan Background

For more than 100 years, the State of California and the federal government have worked to develop a long-term water supply program to protect the beneficial uses of the San Francisco Bay and the Sacramento–San Joaquin Delta. In the 1990s and early 2000s, state and federal agencies, including

the Department of Water Resources (DWR), U.S. Bureau of Reclamation (Reclamation), U.S. Fish and Wildlife Service (USFWS), and National Marine Fisheries Service (NMFS), jointly completed the CALFED Bay-Delta Program (CALFED). Subsequently, between 2006 and 2008, the state initiated the Delta Vision program to develop a Bay-Delta plan. The results of both of these efforts were critical in the development of BDCP. These programs and the initiation of the BDCP process are summarized in this section.

3A.2.1 CALFED Process to Develop a Bay-Delta Plan

In 1995, state and federal agencies, including DWR, Reclamation, USFWS, and NMFS, signed a Framework Agreement to establish a joint state/federal CALFED Bay-Delta Program (CALFED) to prepare a comprehensive plan to address resource problems of the Delta. The CALFED agencies completed a Phase I report through a six-step process to define problems in the Delta, identify actions to address the problems, evaluate a comprehensive set of alternatives, and develop a plan. In the fall of 1995, CALFED identified four main problem areas in the Bay-Delta (ecosystem quality, water quality, water supply, and system vulnerability), developed objectives for addressing these problems, and agreed upon solution principles to provide policy guidance on developing alternatives.

Based on these objectives, CALFED agencies publicly conducted a lengthy, multi-phased evaluation of potential alternatives in a far-reaching effort to develop possible alternatives to achieve their mission. CALFED's scoping process had resulted in the identification of nearly 50 categories of potential actions and 100 preliminary solution alternatives (CALFED Programmatic Record of Decision, Attachment 1, Aug. 28, 2000, pp. 124-125). In early 1996, CALFED identified "action categories" for alternatives and potential "core actions" to be included in any alternative, based upon a consensus among stakeholders, as actions critical to a Bay-Delta solution. In order to ensure maximum sensitivity to the policies and positions of the CALFED agencies and stakeholder groups, the Program involved technical experts, Program staff teams, and the public to refine the initial set of potential alternatives to 31, and then down to 20 (CALFED Bay-Delta Program Phase I Final Report, Sep. 1996, pp. 7–8). Further consolidation and refinement led to 10 alternatives, with their various components characterized at modest, moderate, and extensive levels of implementation (*Id.*). The 10 alternatives included Dual Delta Conveyance (with north Delta and south Delta intakes) and Through Delta Conveyance. The 10 alternatives that would be evaluated in more detail were as follows (CALFED Bay-Delta Program Progress Report, April 1996, p. 12).

- *Extensive Demand Management*, with the focus on diverting less water from the Delta.
- *New Storage To Improve Delta Flow*, with the focus on changing the timing of flows to benefit all use.
- *Dual Delta Conveyance*, with the focus on providing diversified storage and conveyance.
- *Through Delta Conveyance*, with the focus on modifying the timing of diversions.
- *Delta Channel Habitat and Conveyance*, with the focus on improving Delta channel habitat and conveyance.
- *Extensive Habitat Restoration with Storage*, with the focus on concentrating and improving Old and Middle River flows (OMR).

- *East-Side Foothills Conveyance*, with the focus on isolating conveyance and improving OMR flows.
- *Chain of Lakes Conveyance*, with the focus on isolating conveyance within the Delta.
- *West-Side Conveyance and River Restoration*, with the focus on isolating conveyance and removing diversions from the Sacramento River.
- *East-Side Conveyance*, with the focus on isolating conveyance around the Delta.

CALFED issued a Notice of Intent (NOI) and Notice of Preparation (NOP) for an EIS/EIR in March 1996, and a Phase I Progress Report in April 1996.

After additional technical analysis and the evaluation of comments received from the public and various agencies, the CALFED collaboration narrowed and reclassified the 10 potential alternatives into three generalized approaches, or alternatives, for conveying water across the Delta. These were carried forward into the alternatives that were studied in detail in the Program EIR/EIS (CALFED Programmatic Record of Decision, Attachment 1, Aug. 28, 2000, pp. 124-125; CALFED Final Programmatic EIR/EIS, Response to Comments Vol. 1, July 2000, p. CR-25 - 26). The three alternatives shared a set of common programs to address ecosystem quality, water quality, water use efficiency, and levee system integrity. The three alternatives represented different methods to address water storage and conveyance through or around the Delta. These alternatives became the CALFED Phase II alternatives that were considered in the CALFED EIS/EIR. In September 1997, CALFED issued a revised NOI and NOP to expand the project description to include a habitat conservation plan.

In March 1998, the CALFED lead agencies released a Draft Program EIS/EIR and a Draft Phase II Report that presented results of an evaluation of 12 conveyance alternatives based upon three broad options (existing system conveyance, modified Through Delta Conveyance, and Dual Delta Conveyance with an isolated facility and north Delta intakes). These documents did not identify a preferred alternative or proposed action. The initial technical analyses indicated that a Dual Delta Conveyance would provide the most water quality improvements (primarily related to salinity in the south Delta); however, comments from the public on the draft documents raised many concerns about the location, construction methods, and operations of the Dual Delta Conveyance facilities.

With respect to reducing Delta exports, CALFED carefully considered and rejected the alternative as unreasonable. In responding to comments concerning a potential reduced Delta exports alternative, the Program EIR/EIS stated the following.

> Among these [potential alternatives developed in Phase I] were alternatives that emphasized water use efficiency and de-emphasized or eliminated actions to improve export water supplies and improve the adequacy of Bay-Delta water to meet Delta outflow needs. Based on input from public workshops, scoping meetings, the [Bay Delta Advisory Council], and the CALFED agencies, CALFED concluded that these actions would not achieve the primary objective for water supply reliability . . . an alternative that would achieve water quality objectives by reducing or capping exports would prevent the CALFED Program from achieving its objectives regarding water supply reliability. (*Id*., p. CR-30.)

Based upon input from the public and agencies, CALFED initiated a series of scientific expert panels and interagency/stakeholder groups to address water quality and aquatic resources concerns. In December 1998, CALFED issued a Revised Phase II Report, which described a draft preferred

program alternative that included a Through Delta Conveyance. In June 1999, a revised Phase II Report and a revised Draft Program EIS/EIR were released. The Draft Program EIS/EIR included an analysis of the draft preferred program alternative, two other alternatives, and a No Action Alternative/No Project Alternative. In June 2000, CALFED issued a report entitled *California's Water Future, A Framework for Action*. A Final Program EIS/EIR was issued in July 2000.

In August of 2000, a broad array of state and federal agencies, including DWR, adopted the CALFED EIS/EIR Programmatic Record of Decision (ROD) as a 30-year planning roadmap for restoring the Delta's ecology and improving water management. The CALFED ROD states that "Alternative 3 – Dual Conveyance Alternative" would provide the greatest technical performance; however, it would present "the most serious challenges in terms of cost, scientific uncertainty, assurances and implementation." The CALFED ROD offered the potential for a Dual Conveyance plan in the future following completion of future studies and environmental review.

As reflected in the CALFED ROD, the CALFED Preferred Program for water deliveries from the Delta continued use of the existing Through Delta Conveyance with the following improvements (CALFED 2000a).[6]

- New screened intakes at Clifton Court and Tracy (south Delta intakes for SWP and CVP pumping plants).
- Joint point of diversion and construction of an intertie to allow for joint use of both pumping plants by SWP and CVP (estimated completion of construction in 2012). Increase pumping criteria to fully use the capacity of the SWP pumping plant.
- New permanent operable barrier at the head of Old River on the San Joaquin River.
- New operable barriers and floodway improvements in the south Delta to improve quantities and quality of water available for south Delta agricultural diverters.
- Evaluation of a new screened diversion facility on the Sacramento River near Hood or Georgiana Slough and a channel to convey water between the Sacramento and Mokelumne rivers.
- New setback levees and dredged or improved channels and levees along the lower Mokelumne River between Interstate 5 and San Joaquin River.

The CALFED ROD also recommended continued evaluation of a screened diversion facility on the Sacramento River in coordination with modifications of Delta Cross Channel operations and a channel between the Sacramento and Mokelumne rivers to improve drinking water quality if the CALFED ROD recommendations for water quality programs did not improve drinking water quality.

3A.2.2 Post-CALFED Process to Develop a Bay-Delta Plan

The CALFED ROD allowed for the reassessment of the Through Delta Conveyance at the conclusion of the Stage I actions identified in the CALFED ROD (with an estimated completion time of 7 years). The CALFED ROD (August 2000, p. 29) stated:

[6] The California Supreme Court ultimately upheld the adequacy of the EIR component of the EIR/EIS for the CALFED ROD, rejecting an argument, among others, that the document should have included a "Reduced Export Alternative."(*In re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* (2008) 43 Cal.4th 1143, 1166.)

> "If the Program purposes cannot be fully achieved with the actions proposed in the Preferred Program Alternative, additional actions including an isolated conveyance facility will need to be considered in the future."

Since 2000, further studies and information have become available that have caused reconsideration of the Through Delta Conveyance component of the CALFED ROD. Factors evaluated after CALFED are summarized in this appendix and include evaluation of low-flow screens at south pumping facilities, through-delta levee improvements, and various fish screen/gate options. Pelagic organisms, including delta smelt, have experienced a precipitous decline in recent years. Revised biological opinions for the coordinated operation of the CVP and SWP issued by USFWS (2005 and 2008) and NMFS (2005 and 2009) and related judicial decisions arising from federal court litigation have resulted in current and potential future substantial reductions in water supply availability for both the SWP and the CVP. Recent DWR evaluations indicate a higher degree of risk to Delta levees from earthquakes and storms than was previously understood during preparation of the CALFED analysis. The higher potential for levee failure could result in substantial sea water intrusion in the Delta channels, which would increase the risk of loss of water supply availability for the SWP and CVP, as well as for Delta water users and the Delta ecosystem. There is also growing consensus among scientific experts suggesting that climate change over the next 50 to 100 years will cause considerable sea level rise, which would increase the risk of levee failure and degrade water quality due to salt water intrusion, thereby increasing the risks of a severe reduction or loss of water supply availability in and from the Delta (see Appendix 3E, *Seismic Risk and Climate Change*).

In April 2006, the CALFED Program issued a 10-year Action Plan to refocus the program based on new scientific and policy information. The scientific information indicated that the current physical configuration of the Delta did not lead to a sustainable condition due to increasing risk of seismic events and sea level rise; and that population levels for Delta pelagic organisms were at record low levels and were appearing to continue to decline. The policy information was informed by independent reviews by the Little Hoover Commission, the California Department of Finance, and CALFED consultants, and indicated that there were concerns regarding long-term financing of programs and governance.

The 10-year Action Plan also indicated that several water users were considering the development of habitat conservation plans. This effort was the initiation of BDCP.

The 10-year Action Plan also described the need for a "100-Year Delta Vision" process to become the strategic plan for CALFED. This recommendation led to the state initiating the Delta Vision process.

3A.2.3 Delta Vision as a Strategic Plan for the Delta

Based upon these predictions and other information collected by state and federal agencies, then-Governor Arnold Schwarzenegger issued Executive Order 2-17-06 on September 28, 2006, initiating the Delta Vision process to develop "a durable vision for sustainable management of the Delta." On February 28, 2008, Governor Schwarzenegger, in a letter to state Senators Perata, Machado and Steinberg, stated his intention to direct DWR to proceed with preparation of the BDCP environmental review and permitting activities, including the evaluation of at least four alternative Delta conveyance strategies developed in coordination with the BDCP efforts to better protect at-risk fish species. The four conveyance strategies were (1) continued use of existing Delta conveyance without improvements, (2) Dual Conveyance (including an Isolated Conveyance facility to convey water from the Sacramento River to the South Delta in conjunction with continued use of

existing Delta conveyance, as suggested by the Delta Vision process), (3) Isolated Conveyance (to convey water from the Sacramento River to the South Delta without continued use of the existing Delta conveyance), and (4) Through Delta Conveyance with substantial improvements and protections of the existing facilities ("armoring the Delta" or "Through Delta" plan). In response to this directive, the Dual Conveyance, Isolated Conveyance, and Through Delta Conveyance alternatives were evaluated further through the preparation of Conceptual Engineering Reports (CERs) in 2009. The Dual Conveyance and Isolated Conveyance alternatives were evaluated in separate CERs for alignments located along the eastern and western borders of the Delta and through the center of the Delta. The Dual Conveyance alternatives evaluated in the CERs are described in Section 3A.6 as First-Level Screening Conveyance Alternatives A1, A2, and A3. The Isolated Conveyance concepts evaluated in the CERs are described in Section 3A.6 as First-Level Screening Conveyance Alternatives B1, B2, and B3. The Through Delta Conveyance concept evaluated in the CERs is described in Section 3A.6 as First-Level Screening Conveyance Alternative C2. The BDCP EIR/EIS will evaluate the continued use of existing facilities as the No Project/No Action Alternative.

3A.2.4 Bay Delta Conservation Plan Process

The BDCP is being developed through a collaboration of the CEQA and NEPA Lead Agencies, DWR and Reclamation, and the project proponents—Metropolitan Water District of Southern California (MWD), Kern County Water Agency, Santa Clara Valley Water District, Zone 7 Water Agency (Alameda County Flood Control and Water Conservation District, Zone 7), San Luis and Delta-Mendota Water Authority, and Westlands Water District (BDCP 2010a). In July 2006, these entities executed a *Memorandum of Agreement for Supplemental Funding for Certain Ecosystem Actions and Support for Implementation of Near-Term Water Supply, Water Quality, Ecosystem, and Levee Actions* to provide funding assurances for specified actions under CALFED and further development of the BDCP process. In October 2006, these entities plus several interested parties entered into the BDCP Planning Agreement, which defined their commitment to the development of the BDCP objectives and scope and a process for coordination. The BDCP Planning Agreement stated that the BDCP planning goals are consistent with the CALFED ROD objectives, and that the BDCP data collection efforts are coordinated with CALFED Science Program and other ongoing efforts.[7]

Although the BDCP process began prior to enactment of the 2009 Delta Reform Act, the BDCP's original objectives, as steered by the CALFED and Delta Vision efforts, anticipated California's statutory coequal goals for Delta management—water supply reliability and ecosystem restoration—through the actions listed below.

- New and/or redesigned water conveyance and operation of the SWP and the federal CVP
- Habitat restoration within the Delta, including restoring native fish, wildlife, and plant habitats.
- Addressing other ecological stressors to covered aquatic species in the Delta.

[7] The signatories to the Planning Agreement include the following: the California Natural Resources Agency; the California Department of Fish and Wildlife; USFWS; NFMS; DWR; Reclamation; MWD; the Kern County Water Agency; the Santa Clara Valley Water District; Alameda County Flood Control and Water Conservation District, Zone 7; the San Luis and Delta-Mendota Water Authority; the Westlands Water District; American Rivers; the Bay Institute; the California Farm Bureau Federation; the Contra Costa Water District; Defenders of Wildlife; Environmental Defense; the Friant Water Authority; the Nature Conservancy; the Natural Heritage Institute; and the North Delta Water Agency.

The BDCP will result in the development of an HCP under the provisions of federal ESA (section 10(a)(1)(B)) and an NCCP under the NCCPA (Fish and Game Code sections 2800 et seq.). The BDCP also provides information for a biological assessment to support Reclamation's ESA Section 7 consultation with USFWS and NMFS. If the BDCP is to be integrated into the Delta Stewardship Council's Delta Plan via the statutory process laid out in Water Code section 85320 from the 2009 Delta Reform Act, the BDCP must take the form of an NCCP under California law and an HCP under federal law. The HCP and NCCP processes are conducted by the project proponents proposing to undertake *covered activities*. For the BDCP, the covered activities include continued operations and maintenance of existing, improved, and future facilities (including emergency preparedness or response actions) for the SWP, as well as other conservation measures included in the BDCP to improve the Delta ecosystem.

The BDCP Steering Committee, established to provide a public forum where key policies and strategy issues could be publicly discussed, met over 120 times between 2006 and 2010. The BDCP Steering Committee established several working groups and technical teams to develop and evaluate potential alternatives. The BDCP Steering Committee identified an initial set of conservation measures and conducted a preliminary effects analysis in 2010 in accordance with the requirements for an HCP and an NCCP. The state and federal agencies and the project proponents have continued to work with stakeholders and the public. Administrative drafts of the HCP/NCCP and the accompanying EIR/S were issued in early 2013.

3A.2.5 Bay-Delta Conservation Plan Environmental Impact Report/Environmental Impact Statement Process

An EIR/EIS is being prepared for the BDCP by DWR as the CEQA state Lead Agency, and Reclamation, USFWS, and NMFS as the NEPA federal Co-lead Agencies. DWR is participating as the CEQA Lead Agency to evaluate potential impacts of approving BDCP with respect to improved SWP water conveyance infrastructure and other habitat conservation measures and to meet its CEQA obligations. This improved infrastructure and these measures are intended to help DWR and its water contractors meet their common goal of restoring and protecting the SWP water supply reliability, water quality, and the health of the Delta ecosystem. USFWS and NMFS are participating as NEPA Co-lead Agencies to provide analysis of a reasonable range of alternatives, evaluate potential impacts of approving the HCP and issuing incidental take permits to DWR, and provide information for the Biological Assessment and Section 7 process. Reclamation is participating as a NEPA Co-lead Agency to evaluate implementation of one or more components of the BDCP. Although state and federal water contractors are not Lead Agencies, they are "potential authorized entities" with respect to BDCP, and intend to use the certified Final EIR/EIS in making discretionary decisions associated with implementation of BDCP. The California Department of Fish and Wildlife (CDFW) (formerly the Department of Fish and Game or "DFG"), acting as a responsible agency under CEQA, will rely on the certified Final EIR/EIS to support its decision of whether to provide authorization of the BDCP under the NCCPA.

The CEQA and NEPA Lead Agencies initiated the EIR/EIS in 2008 with the publication of notices of the scoping process. More specifically, on January 24, 2008, USFWS and NMFS issued a NOI under NEPA to prepare an EIS. The NOI was re-issued on April 15, 2008 to include Reclamation as a co-lead federal agency, to update the status of the planning process, and to provide updated information related to scoping meetings (USFWS, NMFS, and Reclamation 2008). On March 17, 2008, DWR issued a NOP under CEQA to prepare an EIR (DWR 2008). At the time of the publication

of the NOP and NOI in 2008, the proposed description of the BDCP was in development and information related to the potential EIR/EIS alternatives was preliminary.

Following development of additional information to describe the proposed BDCP, the Lead Agencies published a revised NOP and a revised NOI on February 13, 2009 (DWR 2009a, and USFWS, NMFS, and Reclamation 2009).The two documents described potential alternatives that would likely be considered in the EIR/EIS. The potential alternatives included potential elements for conservation measures to improve ecological productivity and sustainability in the Delta, including the creation and/or restoration of floodplains, tidal marsh, channel margin, and riparian habitats, and the reduction of threats to listed species by minimization of other stressors. Potential water conveyance alternatives identified in the NOP and NOI were described as follows.

- **Dual Conveyance** – May include potential new points of diversion at various locations in the north Delta, facilities to move water from new points of diversion to the existing SWP and CVP pumping facilities in the south Delta, and continued use of the existing diversions (intakes) in the south Delta.
- **Fully Isolated Conveyance** – May include potential new points of diversion at various locations in the north Delta and facilities to move water from new points of diversion to the existing SWP and CVP pumping facilities in the south Delta.
- **Improved Through Delta Conveyance** – May include new temporary or permanent barriers to modify existing hydraulics or fish movement within the Delta, armoring of levees along Delta waterways to ensure continued conveyance capacity, and/or actions to improve conveyance capacity in existing Delta waterways.

The 2009 NOP and NOI stated that the new points of diversion could be located along the Sacramento River between south Sacramento and Walnut Grove. The new conveyance facility could extend from the new points of diversion to the existing SWP and CVP pumping facilities in the South Delta and be located either to the west or east of the Sacramento River. The NOP and NOI also stated that the alternatives could include potential changes to SWP and CVP water diversion operations, including seasonal, daily, and real time diversion amounts, rates, and timing of water diverted through and/or around the Delta.

During the EIR/EIS scoping process, 2,950 separate comments were submitted in 305 letters, emails, and comments cards; and verbal comments from 178 individuals were transcribed. There were 1,051 comments related to the development of alternatives. Some comments described specific potential alternatives related to conveyance, such as pipelines/tunnels or unlined and lined canals. Many comments about alternatives were related to specific measures for protection and restoration of the Delta ecosystem and/or water supplies currently conveyed through the Delta. Some comments described methods to reduce reliance upon Delta water supplies, including water conservation, recycling, and use of other water supplies such as conjunctive use programs to ensure adequate groundwater recharge operations. As described in Section 3A.6 of this appendix, several of the alternatives considered in the initial screening of conveyance alternatives were specifically identified through the scoping process, including the following alternatives.

- **Initial Screening Conveyance Alternative A1.** Dual Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes.

- **Initial Screening Conveyance Alternative A2.** Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes.
- **Initial Screening Conveyance Alternative A3.** Dual Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes.
- **Initial Screening Conveyance Alternative A4.** Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the Lower San Joaquin River, and Continued Use of Existing South Delta Intakes.
- **Initial Screening Conveyance Alternatives B1.** Isolated Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes.
- **Initial Screening Conveyance Alternatives B2.** Isolated Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes.
- **Initial Screening Conveyance Alternatives B3.** Isolated Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes.
- **Initial Screening Conveyance Alternative B4.** Isolated Conveyance with a Lined or Unlined East Canal between the Sacramento River near the Confluence with the Feather River and the Lower San Joaquin River, and Abandonment of Existing South Delta Intakes.
- **Initial Screening Conveyance Alternative B5.** Isolated Conveyance with Diversions from the Sacramento River near West Sacramento into the Sacramento Deep Water Ship Channel.
- **Initial Screening Conveyance Alternative B6.** Isolated Conveyance with a Tunnel between the Sacramento River near Fremont Weir and the SWP and CVP Pumping Plants, Isolated Conveyance with a Tunnel between the Sacramento River near Decker Island to Clifton Court Forebay and Bethany Reservoir, and Continued Use of the South Delta Intakes.
- **Initial Screening Conveyance Alternative B7.** Isolated Conveyance with Diversion from the San Joaquin River near Antioch and Desalination Facilities, a Tunnel between the Desalination Facilities and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes.
- **Initial Screening Conveyance Alternative C1.** Separate Corridors
- **Initial Screening Conveyance Alternative C2.** Through Delta Conveyance with Armored Corridors.
- **Initial Screening Conveyance Alternative C3.** Through Delta Conveyance with West Delta Salinity Barrier.
- **Initial Screening Conveyance Alternative C4.** Through Delta Conveyance with Fish Screens at Clifton Court Forebay.

3A.3 Development of EIR/EIS Screening Criteria

The alternative development process for the EIR/EIS is based upon a number of legal considerations including the following.

- The legal requirements for adequate discussions of alternatives in an EIR and EIS, as set forth in CEQA and NEPA respectively, and the regulations and case law interpreting those statutory schemes.
- The concepts of "potential feasibility" under CEQA and "reasonableness" under NEPA.
- The requirements of the Water Code Section 85320 from the 2009 Delta Reform Act.

The results of a multi-level screening process reflecting these considerations were compared to the requirements of the Sacramento–San Joaquin Delta Reform Act, and scoping comments related to the definition of potential EIR/EIS alternatives as identified by responsible and cooperating agencies under CEQA and NEPA, respectively.

Finally, the potential alternatives were evaluated to determine if they would require changes in legal rights, including water rights, of entities that are not participants in the BDCP in a way that could not lawfully or practically be accomplished through the mechanism of an HCP/NCCP.

3A.3.1 Identification of Potential Alternatives under CEQA and NEPA (First and Second Level Screening)

3A.3.1.1 Process for Identification of Potential Alternatives under CEQA

Under CEQA, alternatives to be included in an EIR, in addition to the No Project Alternative, must be: 1) potentially feasible, 2) attain most of the basic objectives of the project,[8] and 3) avoid or substantially lessen any of the significant effects of the project even if the alternative would impede to some degree the attainment of project objectives, or would be more costly. DWR, as the CEQA Lead Agency, may structure its alternatives analysis around a reasonable definition of a fundamental underlying purpose, and need not study alternatives that cannot achieve that basic goal.

The range of alternatives required in an EIR is governed by a "rule of reason" that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice. 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.

According to CEQA case law, where the alternatives analyzed in the EIR allow for a wide range of choices with varying degrees of environmental impact, the document may support the ultimate approval not only of the fully developed alternatives, but also what might be called "hybrid"

[8] According to the California Supreme Court, CEQA lead agencies have the discretion to eliminate from further consideration an alternative that cannot achieve a project's "underlying fundamental purpose." (*In re Bay-Delta Programmatic Environmental Impact Report Coordinated Proceedings* (2008) 43 Cal.4th 1143, 1165.) The requirement that a CEQA alternative must meet "most" project objectives should be understood with this qualification in mind.

alternatives whose features and impacts occur within the analytical continuum between the "bookends" created by the least-impacting and most-impacting alternatives, respectively.[9] With respect to such hybrid options, agency staff should prepare a written analysis that addresses the adequacy of the draft document to support approval of the hybrid, citing substantial evidence as appropriate.

For BDCP, the CEQA project objectives, as they were characterized at the time, were identified in the February 13, 2009 NOP to achieve the following purposes.

- To be granted incidental take permits for the covered species that authorize take related to:
  - The operation of existing State Water Project Delta facilities and construction and operation of facilities for the movement of water entering the Delta from the Sacramento Valley watershed to the existing SWP and federal CVP pumping plants located in the southern Delta.
  - The implementation of any conservation actions that have the potential to result in take of species that are or may become listed under the federal ESA, pursuant to the ESA at §10(a)(1)(B) and its implementing regulations and policies.
  - The diversion and discharge of water by Mirant LLC for power generation in the western Delta.[10]
- To improve the ecosystem of the Delta by:
  - Providing for the conservation and management of covered species through actions within the BDCP Planning Area that will contribute to the recovery of the species.
  - Protecting, restoring, and enhancing certain aquatic, riparian, and associated terrestrial natural communities and ecosystems.
  - Reducing the adverse effects on certain listed species of diverting water by relocating the intakes of the SWP and CVP.[11]
- Restore and protect the ability of the SWP and CVP to deliver up to full contract amounts, when hydrologic conditions result in the availability of sufficient water, consistent with the requirements of state and federal law and the terms and conditions of water delivery contracts and other existing applicable agreements.

3A.3.1.2 Process for Identification of Alternatives under NEPA

Both the Department of the Interior (DOI) (including Reclamation and USFWS) and the Department of Commerce (including NMFS) obtain NEPA guidance from a document issued by the Council on Environmental Quality (CEQ) entitled *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*.[12] The CEQ guidance indicates that the "range of alternatives"

[9] See, e.g., *Village Laguna of Laguna Beach, Inc. v. Board of Supervisors* (1982) 134 Cal.App.3d 1022, 1028–1029; *California Oak Foundation v. Regents of University of California* (2010) 188 Cal. App. 4th 227, 274–277; and *Cherry Valley Pass Acres and Neighbors et al. v. City of Beaumont* (2010) 190 Cal.App. 4th 316, 353–356.

[10] Since publication of the NOP, Mirant LLC is no longer an active participant in the BDCP. This reference is therefore no longer operative.

[11] Subsequent to publication of the NOP, this was revised to refer to adding additional intakes, instead of relocating intakes.

[12] 46 Fed. Reg. 18026 (March 23, 1981).

(addressed in Question 1b and referred to in 40 CFR 1502.14) includes all *reasonable* alternatives, which must be rigorously explored and objectively evaluated. In addition, there must be a discussion of other alternatives, eliminated from detailed study, with a brief discussion of the reasons for eliminating them. The reasonable range of alternatives can also include alternatives not within the jurisdiction of the lead agencies. The CEQ guidance also states that what constitutes a reasonable range of alternatives may depend on the nature of a proposed federal action and the facts of a particular case.

When there are a very large number of potential alternatives, a reasonable number of alternatives covering the full spectrum of reasonable alternatives can be identified for detailed analyses in the NEPA document. As noted earlier in discussing CEQA requirements, such an approach creates what in common practice are known as analytical "bookends," referring to a range of decision-making options (alternatives) consisting of a continuum of choices. In general, alternatives with comparatively low levels of environmental impact occupy one end of the continuum or range, while alternatives with comparatively higher levels of impact occupy the other end, though in practice even alternatives with minimal impacts in one environmental category might have relatively severe impacts in other categories, while the alternatives ostensibly on the high impact end of the continuum might be comparatively benign with respect to certain environmental categories. Where specific policy options within the continuum consist of reasonable mid-points between the low bookend and the high bookend, agency decision makers retain discretion to ultimately choose to approve an alternative anywhere within the continuum, provided that the information developed for the various bookends and the mid-points suffices to address the actual projected impacts of the precise option chosen. As with CEQA, the creation of "hybrid" options similar, if not identical, to fully developed alternatives is also permissible.

DOI has adopted additional regulations (43 CFR 46.415(b)) that state that alternatives to be included in an EIS, in addition to the No Action Alternative, must be: 1) reasonable, 2) meet the purpose and need of the proposed action, and 3) address one or more significant issues related to the proposed action. The statement of purpose and need, in this context, must be related to the underlying statutes that govern the federal action agencies' activities and duties with respect to the proposed action or project, with application of a "reasonableness" standard to the federal agencies' interpretation and application of the relevant statutes.

The DOI NEPA regulations further provide that "when there are potentially a very large number of alternatives then a reasonable number of *examples* covering the full spectrum of reasonable alternatives" will suffice. This approach would allow a lead agency to not evaluate a whole series of alternatives that differ from each other in only comparatively minor respects. The range of reasonable alternatives should represent a wide range of alternatives that the NEPA lead agency would consider. This range could be considered to be similar to a range of alternatives that could be evaluated by a CEQA lead agency, and which could be bounded by *bookends* representing comparatively lower and higher levels of environmental impacts.

In its 1981 publication entitled, *Forty Most Asked Questions Concerning CEQ's National Environmental Policy Act Regulations*, CEQ addressed these same issues in responding to the following question: "How many alternatives have to be discussed when there is an infinite number of possible alternatives?" CEQ explained that for some proposals there may exist a very large or even an infinite number of possible reasonable alternatives. For example, a proposal to designate wilderness areas within a National Forest could be said to involve an infinite number of alternatives from 0 to 100% of the forest. When there are potentially a very large number of alternatives, only a reasonable

number of examples, covering the full spectrum of alternatives, must be analyzed and compared in the EIS. An appropriate series of alternatives might include dedicating 0, 10, 30, 50, 70, 90, or 100% of the Forest to wilderness. What constitutes a reasonable range of alternatives depends on the nature of the proposal and the facts in each case.

The DOI NEPA regulations also state that the lead agencies should also include consensus-based alternatives consistent with the purpose and need of the proposed project that are proposed by participating persons, organizations, or communities who may be interested in or affected by the proposed project. Any consensus-based alternative must be consistent with the requirements of NEPA, the CEQ regulations, and all applicable statutory and regulatory provisions, as well as DOI written policies and guidance. Any consensus-based alternative, like any other reasonable alternative, must meet the purpose and need of the proposed project to be properly considered for detailed analysis in the EIR/EIS. The DOI NEPA regulations do not define the term "consensus-based alternative" but do state that "consensus-based management" incorporates direct community involvement in consideration of DOI activities subject to NEPA analyses, from initial scoping to implementation of the decision.[13]

For BDCP, the NEPA purpose and need for the action were identified in the February 13, 2009 NOI as seeking to achieve the following purposes.

- Consider the applications for incidental take permits for the covered species that authorize take related to the actions listed below.
    - The operation of existing SWP Delta facilities.
    - The construction and operation of facilities and/or improvements for the movement of water entering the Delta from the Sacramento Valley watershed to the existing SWP and CVP pumping plants located in the southern Delta.
    - The implementation of any conservation actions that have the potential to result in take of species that are or may become listed under the ESA, pursuant to the ESA at Section 10(a)(1)(B) and its implementing regulations and policies.[14]
- Improve the ecosystem of the Delta by implementing the actions listed below.
    - Providing for the conservation and management of covered species through actions within the BDCP Planning Area that will contribute to the recovery of the species.
    - Protecting, restoring, and enhancing certain aquatic, riparian, and associated terrestrial natural communities and ecosystems.
    - Reducing the adverse effects on certain listed species of diverting water.

[13] 43 CFR 46.110.

[14] As noted earlier, Mirant is no longer seeking incidental take authorization for its existing power generation facility in the West Delta.

- Restore and protect the ability of the SWP and CVP to deliver up to full contract amounts,[15] when hydrologic conditions result in the availability of sufficient water, consistent with the requirements of state and federal law and the terms and conditions of water delivery contracts held by SWP contractors and certain members of San Luis Delta Mendota Water Authority, and other existing applicable agreements.

3A.3.1.3 First Level of Screening: Identification of Alternatives under CEQA and NEPA

The legal requirements of CEQA and NEPA were considered with the project objectives and purpose and need for the action included in the February 13, 2009 NOP and NOI to develop the following first level screening criteria.[16]

- Could the potential alternative provide for the conservation and management of covered species through actions within the BDCP Planning Area that will contribute to the recovery of the species?
- Could the potential alternative protect, restore, and enhance certain aquatic, riparian, and associated terrestrial natural communities and ecosystems?
- Could the potential alternative reduce the adverse effects on certain listed species of diverting water by relocating the intakes of the SWP and CVP?
- Could the potential alternative restore and protect the ability of the SWP and CVP to deliver up to full contract amounts, when hydrologic conditions result in the availability of sufficient water, consistent with the requirements of state and federal law and the terms and conditions of water delivery contracts held by SWP contractors and certain members of San Luis Delta Mendota Water Authority, and other existing applicable agreements?

Under CEQA, the answers to *most* of these questions should be "Possibly" or "Unknown" for first level screening alternative to continue to be considered in the second level screening. (See the earlier reference to the CEQA requirement that a potentially feasible alternative would "feasibly attain *most* of the basic objectives of the project" [emphasis added]). If, however, the answers to most of these questions are "No" or "Not Likely," the first level screening alternative may not need to be considered in the second level screening.

[15] The above phrase—*restore and protect the ability of the SWP and CVP to deliver up to full contract amounts*—is related to the upper limit of legal CVP and SWP contractual water amounts and delineates an upper bound for development of EIR/EIS alternatives, not a target. It is not intended to imply that increased quantities of water will be delivered under the BDCP. As indicated by the "up to full contract amounts" phrase, alternatives need not be capable of delivering full contract amounts on average in order to meet the project purposes. Alternatives that depict design capacities or operational parameters that would result in deliveries of less than full contract amounts are consistent with this purpose.

[16] These screening criteria reflect the project objectives and purpose and need as they read at the time the NOP and NOI are issued. Notably, nothing in CEQA requires a Lead Agency to continue to use this kind of language from an NOP throughout the remainder of the CEQA process. In fact, in preparing the Draft EIR/EIS, DWR developed its own CEQA "fundamental purpose" and "project objectives." As stated in Chapter 2, *Project Objectives and Purpose and Need*, DWR's project objectives now reflect DWR's view that its "*fundamental purpose* in the proposing the BDCP is to make *physical and operational improvements* to the SWP system in the Delta necessary to restore and protect ecosystem health, water supplies of the SWP and CVP south-of-Delta, and water quality within a stable regulatory framework, consistent with statutory and contractual obligations." (Emphasis added.)

Under general NEPA principles, the answers to *all* of these questions should be "Possibly" or "Unknown" if an alternative is to continue to be considered in the second level screening. (See the earlier reference to the DOI NEPA requirement that an alternative must meet a federal agency's stated purpose and need, not just "most" aspects of them.) However, because the EIR/EIS is a joint document and the project/action will be a joint state/federal undertaking, first level screening alternatives with "Possibly" or "Unknown" answers to *most* of these questions (the CEQA standard) is adequate to continue consideration in the second level screening. If the answers to most of the questions are "Not Likely," the first level screening alternative would not be considered under subsequent levels of screening under either NEPA or CEQA.

3A.3.1.4 Second Level of Screening: Identification of Alternatives under CEQA and NEPA

Under CEQA, alternatives that continued to the second level screening would be evaluated with the following second level screening criterion.

- Would the potential alternative avoid or substantially lessen any of the expected significant environmental effects of the "proposed project"?

If the answer to the question embodying the CEQA criterion question is "Possibly" or "Unknown," the secondary level screening alternative would be considered for the third level screening.

Under NEPA, a secondary level screening alternative that continued to the second level screening would be evaluated with the following second level screening criterion.

- Would the potential alternative "address one or more significant issues" related to the proposed action?

If the answer to the NEPA criterion question is "Possibly" or "Unknown," the secondary level screening alternative would be considered for the third level screening. If the answers to both questions are "No" or "Not Likely," the secondary level screening alternative would not be considered under subsequent levels of screening.

As described for the first level screening, the secondary level screening alternative does not need to comply with both CEQA and NEPA requirements to be considered in the next step of screening. Meeting the requirements under one of the statutory schemes is enough for purposes of these initial levels of screening. If any NEPA-only alternatives and/or CEQA only-alternatives are found to exist at this stage, however, those alternatives must also meet their respective legal requirements in the subsequent analytical stages, because the final range of alternatives will be analyzed in full compliance with both CEQA and NEPA requirements.

3A.3.2 Third Level Screening: Defining Potentially Feasible Alternatives under CEQA and Reasonable Alternatives under NEPA

Under CEQA, alternatives should be evaluated with a focus on issues of potential feasibility. CEQA defines feasible as capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors.

Under NEPA, an EIS must rigorously explore and objectively evaluate all reasonable alternatives. Reasonable alternatives include those that are practical or feasible from the technical or economic standpoint and using common sense, rather than just desirability from the standpoint of the applicant.

Under both CEQA and NEPA, alternatives can be developed using economic considerations, social factors, legal feasibility under species protection laws, and other laws and technical factors to inform the general concepts of feasibility under CEQA and reasonableness under NEPA.

Under CEQA, excessive cost as compared to other alternatives can be a basis for rejecting an alternative as being infeasible or impracticable. However, an alternative cannot be rejected simply because it would impede to some degree the attainment of project objectives, or would be more costly. In this context, the relevant question related is whether the additional costs are sufficiently severe to render it impractical to proceed with the project. Put another way, the question is whether the marginal costs of the alternative as compared to the cost of the proposed project are so great that a reasonably prudent project proponent would not proceed with the alternative. Under CEQA, an alternative also can be rejected due to excessive time needed for implementation.

Furthermore, "feasibility" under CEQA encompasses "desirability" from a policy standpoint, or in terms of the effectiveness in meeting project objectives, to the extent that desirability is based on a reasonable balancing of the relevant economic, environmental, social, and technological factors supported by substantial evidence.

It is also possible for CEQA determinations regarding the potential feasibility of alternatives to be considered under NEPA to determine if an alternative would be practical or feasible from the technical or economic standpoint and using common sense. Although, in most instances, federal agencies do not reject alternatives under NEPA solely because they do not qualify as valid CEQA alternatives, such rejection may be appropriate for the BDCP, which, by its very nature, is a joint state-federal undertaking that cannot succeed unless state agencies can make alternatives work under state law and federal agencies can make the same alternatives work under federal law. Here, then, alternatives that, even with reasonable modifications and feasible mitigation, could not be approved under either state or federal laws may be rejected under both CEQA and NEPA. Notably, since DWR is the primary advocate of, and applicant for, the BDCP, an alternative that would not satisfy DWR's fundamental purpose (see footnote 8 above) or that would not be consistent with the California legislature's coequal goals for the Delta, as set forth in the Delta Reform Act, could not be a potentially feasible alternative under CEQA or a reasonable alternative under NEPA.

These considerations are reflected in the following third level screening criteria.

- Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that a reasonably prudent public agency would not proceed with the alternative?
- Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that it would be impractical to proceed with the alternative?
- Would the potential alternative take so long to implement, as compared with the proposed project or action, that it would not meet the project objectives or purpose within an acceptable time frame?

- Would the potential alternative require technology or physical components that are clearly technically infeasible based on currently available science and engineering criteria for the scope of the potential alternative?
- Would construction, operation, and/or maintenance of the potential alternative violate any federal or state statutes or regulations (other than sources of law that would be amended or eliminated as part of the alternative)?
- Would the potential alternative involve an outcome that is clearly undesirable from a policy standpoint in that the outcome could not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors?[17]

If the answers to all of these questions are "Not Likely" or "Unknown," the third-level screening alternative would be considered in the EIR/EIS. If the answers to any of these questions are "Likely" or "Yes," the third level screening alternative would not be considered for detailed analysis in the EIR/EIS, unless its inclusion is contemplated by the Delta Reform Act (discussed below), or is necessary in light of reasonable requests by a public agency that has approval authority over some aspect of the project (e.g., a CEQA responsible agency or federal agency with permitting authority, such as the United States Army Corps of Engineers [USACE]) (also discussed below).

3A.3.3 Application of the Sacramento–San Joaquin Delta Reform Act

On November 12, 2009, Governor Schwarzenegger signed into law Senate Bill 7X 1 (SB7X 1), which included the Sacramento–San Joaquin Delta Reform Act of 2009 (Delta Reform Act) (Division 35 of Water Code, Commencing from section 85000).

The Delta Reform Act created a new agency, the DSC, to develop and implement a long-term management plan for the Delta, known as the Delta Plan. The Delta Plan must further the coequal goals for the Delta as set forth in the 2009 legislation. These coequal goals are "providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem." The Delta Reform Act provides that following completion of the BDCP, the BDCP shall be incorporated into the Delta Plan by operation of law if the California Department of Fish and Game (now CDFW) determines that the BDCP meets the requirements of Water Code sections 85320 and 85321, including that the BDCP:

- Complies with the requirements for preparation of an NCCP (Chapter 10 [commencing with section 2800] of Division 3 of the Fish and Game Code).
- Complies with CEQA (Division 13 [commencing with section 21000] of the Public Resources Code),[18] including a comprehensive review and analysis of all of the following.

[17] The state and federal BDCP lead agencies both agree that this last criterion should be used for screening purposes only in relatively unusual situations in which a proposed alternative would embody a policy outcome that is *clearly* unacceptable for a variety of policy reasons. Otherwise, this criterion is more appropriately used at the time of final decision on a proposed project/action when final decision-makers are called upon to weigh the policy benefits and detriments of proposed alternatives that have been analyzed in an EIR/EIS.

[18] Notably, in enacting the Delta Reform Act, the Legislature stated that its legislation "does not amend, or create any additional legal obligation or cause of action under" CEQA (Water Code section 85322).

- A reasonable range of flow criteria, rates of diversion, and other operational criteria required to satisfy the criteria for approval of an NCCP (as provided in subdivision (a) of Section 2820 of the Fish and Game Code), and other operational requirements and flows necessary for recovering the Delta ecosystem and restoring fisheries under a reasonable range of hydrologic conditions, which will identify the remaining water available for export and other beneficial uses.
- A reasonable range of Delta conveyance alternatives, including through-Delta, dual conveyance, and isolated conveyance alternatives and including further capacity and design options of a lined canal, an unlined canal, and pipelines.
- The potential effects of climate change, possible sea level rise up to 55 inches, and possible changes in total precipitation and runoff patterns on the conveyance alternatives and habitat restoration activities considered in the EIR.
- The potential effects on migratory fish and aquatic resources.
- The potential effects on Sacramento River and San Joaquin River flood management.
- The resilience and recovery of Delta conveyance alternatives in the event of catastrophic loss caused by earthquake or flood or other natural disaster.
- The potential effects of each Delta conveyance alternative on Delta water quality.

- Has been approved as an HCP pursuant to the federal Endangered Species Act (16 U.S.C. Section 1531 et seq.).

These criteria must be addressed, and other factors must be present, if the BDCP is to be incorporated by operation of state law into the Delta Plan by the DSC, as contemplated by the Delta Reform Act. Although, as noted above, CDFW is charged by statute with the responsibility for making initial determinations as to whether the BDCP meets these requirements, its decisions can be appealed to the DSC. Notably, the above-quoted statutory language, with its repeated references to the need for a "reasonable range" of such things as "flow criteria," "rates of diversion," "other operational criteria," and "conveyance alternatives" seems to anticipate the kind of "bookend" approach to formulating alternatives under CEQA described earlier. The California legislature's apparent intention in providing a detailed roadmap for an alternatives analysis in the BDCP EIR was to ensure that state agency decision makers ultimately had the benefit of a wide range of choices with varying levels of environmental impacts and tradeoffs. New conveyance options figure prominently among the alternatives to be considered. Nothing in the legislation, however, suggests any intention to modify or repudiate general CEQA case law principles governing the formulation of a range of alternatives or to impair state agencies' ultimate discretion to take final actions consistent with their underlying statutory functions and other legal commitments, except to the extent that the policy prescriptions in the Delta Reform Act (e.g., the need to pursue the state's "coequal goals") must be honored for incorporation into the Delta Plan.

Although the roadmap for CEQA alternatives laid out in the Delta Reform Act do not qualify as project objectives, these statutory considerations are nevertheless relevant to the identification of alternatives, in that DWR would like to avail itself of the statutory process for automatic inclusion of the BDCP in the Delta Plan. These considerations are therefore reflected in the following questions, which are to be applied to the range of alternative that remain following the third screening level.

- Does the range of alternatives provide a reasonable range of flow criteria?

- Does the range of alternatives provide a reasonable range of diversion rates?
- Does the range of alternatives provide a reasonable range of other operational criteria to satisfy the criteria of approval as an NCCP?
- Does the range of alternatives provide a reasonable range of hydrologic conditions?
- Does the range of alternatives include a Through Delta Conveyance alternative?
- Does the range of alternatives include a Dual Conveyance alternative?
- Does the range of alternatives include an Isolated Conveyance alternative?
- Does the range of alternatives include a Dual or Isolated Conveyance - Lined Canal alternative?
- Does the range of alternatives include a Dual or Isolated Conveyance - Unlined Canal alternative?
- Does the range of alternatives include a Pipeline/Tunnel Conveyance alternative?

If the answers to any of these questions are "No," then an additional alternative should be included or an alternative should be modified to support a "Yes" answer. A single alternative could meet several requirements. For example, a dual conveyance unlined canal alternative could be considered for a "Yes" answer for questions related to both Dual Conveyance and an unlined canal.

3A.3.4 Scoping Comments from Responsible and Cooperating Agencies Related to Range of Conveyance Alternatives

The EIR/EIS will be used by *responsible agencies* under CEQA to provide environmental clearance for their discretionary approvals related to the BDCP and CEQA *trustee agencies* to assist with their commenting function. Responsible agencies are those that have a legal responsibility to approve some aspect or portion of the project, and will have to rely upon the EIR as a basis for preparation and issuance of findings (CEQA Guidelines section 15096). Trustee agencies are those that have jurisdiction over certain resources held in trust for the people of California but do not have legal authority over approving or implementing the proposed project. The California Department of Fish and Wildlife (still called DFG during the scoping process), California Department of Parks and Recreation, California State Water Resources Control Board (State Water Board), California Air Resources Control Board, California Department of Boating and Waterways, California Department of Transportation, California State Lands Commission, and San Francisco Bay Conservation and Development Commission are responsible or trustee agencies.

Under NEPA, the CEQ regulations define a *cooperating agency* as any agency, other than the lead agencies, with discretionary authority over the proposed project or action, jurisdiction by law, or special expertise with respect to the environmental impacts expected from the proposed project or action (40 CFR 1508.5). In general, a federal lead agency shall "[u]se the environmental analysis and proposals of cooperating agencies with jurisdiction by law or special expertise to the maximum extent possible consistent with its responsibility as lead agency" (40 CFR 1501.6). The U.S. Environmental Protection Agency (EPA) and USACE are cooperating agencies with jurisdiction by law or special expertise.

Scoping comments were received from the following CEQA responsible and trustee agencies.

- Delta Stewardship Council
- California Department of Food and Agriculture
- California Department of Parks and Recreation
- California Department of Transportation
- California State Lands Commission
- California State Water Resources Control Board
- San Francisco Bay Conservation and Development Commission
- Alameda County Flood Control and Water Conservation District, Zone 7
- San Luis Delta-Mendota Water Authority

The scoping comments by CEQA responsible and trustee agencies that specifically addressed the range of conveyance alternatives were submitted by the State Water Board and the DSC. The following scoping comments were submitted by the State Water Board in a May 30, 2008 scoping letter.

> …to achieve BDCP's project objectives to assure protection and restoration of fish and wildlife resources, the EIR/EIS should analyze a broad range of alternate water quality objectives and operational strategies, including reductions in exports, that may be more protective of fish and wildlife beneficial uses…the State Water Board requests analyses of a broad range of alternatives under the following scenarios: (1) potential interim changes to the Bay-Delta Plan; (2) long-term changes to the Bay-Delta Plan with new conveyance facilities; and (3) long-term changes to the Bay-Delta Plan without new conveyance facilities.
>
> Specifically, the State Water Board requests analysis of a broad range of conveyance alternatives, flows (including changes to Delta outflow objectives), and diversions by the SWP and CVP (including reduced diversions or a cap on diversions) for providing open water habitat under the above scenarios.

The State Water Board addressed the range of alternatives in a May 15, 2009 scoping letter with the following scoping comments.

> A reduced diversion alternative should be lower than diversions allowed for in the current delta smelt biological opinion and soon-to-be released salmonid and green sturgeon biological opinions for the Long-Term CVP and SWP Operations, Criteria, and Plan. This reduced diversion alternative should be low enough to assure not only continued existence of the species, but also some level of rehabilitation for the estuary. To determine what this level should be, State Water Board staff suggests reviewing historic fisheries data and water export data to arrive at a low export level that is reflective of the quantity of water that could be diverted from the Delta with reasonable confidence of not causing significant or long term impacts to the estuary. Through environmental analysis of such an alternative and higher export alternatives, the State Water Board and other responsible agencies will have information on which to consider the various environmental tradeoffs related to export restrictions.
>
> Combined with analyzing potential reductions in exports, an alternative for changes to Delta outflows (and potentially inflow requirements) should also be analyzed that reflects a more natural hydrograph. Current outflows and operations have tended to flatten the natural hydrograph and produce more static flow conditions in the Delta. Outflows and export regimes that support a more natural variable hydrograph should be analyzed, including both the naturally high outflow and naturally low outflow ends of the hydrograph for both the interim and long-term. One way to conduct

> this analysis would be to analyze the effects of providing various percentages of the unimpaired Delta inflow and outflow, and managing storage releases and exports to attempt to parallel this pattern.

Under the Delta Reform Act, the DSC is characterized as a "responsible agency" for purposes of working with DWR in the development of the BDCP EIR/EIS (California Water Code section 85320, subdivision [c]). In that capacity, the DSC sent two scoping letters to DWR, dated June 28, 2010, and November 15, 2010, respectively. In both letters, the DSC stated its view that the EIR/EIS alternatives should reflect the "coequal goals" of the Delta Reform Act, as well as the policy of "[r]educing reliance on the Delta in meeting California's future water needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency." In the first of its two letters, the DSC also stated its view that the EIR "must include 'a comprehensive review and analysis of seven specifically described items concerning flow and other operational criteria, *conveyance alternatives*, climate change, fish and aquatic resources, flood management, natural disasters, and Delta water quality."(Emphasis added.)

Scoping comments by cooperating agencies with jurisdiction by law or special expertise that specifically addressed the range of alternatives only were submitted by the EPA. The following scoping comments were submitted by the EPA in a May 14, 2008 scoping letter.

> …EPA believes that reduced inflow and reduced export scenarios are not just reasonable alternatives to evaluate, but represent a likely future for the Bay Delta basin that needs to be reflected in the EIS/EIR.

In preparing the EIR/EIS range of alternatives, DWR as CEQA lead agency must carefully consider comments from CEQA responsible agencies as long as such comments are within the area of expertise of such agencies (California Public Resources Code, section 21104[c]), and the federal NEPA lead agencies, as noted earlier, must "[u]se the environmental analysis and proposals of cooperating agencies with jurisdiction by law or special expertise to the maximum extent possible consistent with its responsibility as lead agency" (40 CFR 1501.6). Although input from responsible, trustee, and cooperating agencies cannot independently or unilaterally alter lead agencies' project objectives or purposes for pursuing a proposed project or action, the input from these agencies nevertheless is reflected in the following questions to be applied to the range of alternatives that remain following the third screening level and application of the Delta Reform Act requirements in California Water Code section 85320.

- Does the range of alternatives include alternatives with a broad range of water quality objectives and operational strategies?
- Does the range of alternatives include an alternative with potential interim changes to the State Water Resources Control Board Bay-Delta Plan?
- Does the range of alternatives include an alternative with long-term changes to the State Water Resources Control Board Bay-Delta Plan with new conveyance facilities?
- Does the range of alternatives include an alternative with long-term changes to the State Water Resources Control Board Bay-Delta Plan without new conveyance facilities?
- Does the range of alternatives include an alternative with reduced diversions lower than diversions allowed for in the 2008 USFWS and 2009 NMFS biological opinions to assure continued existence of the species and some level of rehabilitation for the estuary?

- Does the range of alternatives include an alternative with Delta outflows, and potentially Delta inflows, that reflect a more natural hydrograph than current State Water Resources Control Board Bay-Delta Plan?
- Does the range of alternatives reflect the coequal goals of the Delta Reform Act of providing a more reliable water supply for California and protecting, restoring, and enhancing the Delta ecosystem?
- Does the range of alternatives include an alternative that would contribute to reducing reliance on the Delta in meeting California's future water needs through a statewide strategy of investing in improved regional supplies, conservation, and water use efficiency?

The Lead Agencies have determined that, if the answers to any of these questions are "No," an additional alternative should be included or an alternative should be modified to support a "Yes" answer.

With respect to whether particular alternatives are consistent with the Delta Reform Act, a single alternative could meet several of the related statutory requirements. For example, a dual conveyance alternative with operational criteria for Delta outflow and inflow patterns similar to a natural hydrograph would be considered for a "Yes" answer for questions related to new conveyance and operations that reflect a more natural hydrograph.

Alternatives responding to the requests from the State Water Board, the DSC, and EPA will likely form low-impact "bookends." The State Water Board's letter specifically asked for an alternative involving "*reductions* in exports," with diversions "*lower* than . . . allowed for in the current delta smelt biological opinion and soon-to-be released salmonid and green sturgeon biological opinions for the Long-Term CVP and SWP Operations, Criteria, and Plan." EPA's letter similarly asked for "reduced export scenarios." The DSC's letter asked for an alternative that reflected the State of California's coequal goals of reducing California's reliance on the Delta in connection with future water needs. At least arguably, the alternatives envisioned by the three agencies seemed unlikely to fully meet DWR's project objectives for the BDCP, and thus could be eliminated from further formal environmental analysis under CEQA. Even so, DWR and its sister federal Lead Agencies opted to proceed with the three agencies' requests. Notably, in making its request, State Water Board specifically (though impliedly) invoked the "bookend" concept. According to that agency, "[t]hrough environmental analysis of such an alternative and higher export alternatives, the State Water Board and other responsible agencies will have information on which to consider the various environmental tradeoffs related to export restrictions." The Lead Agencies found this logic to be persuasive.

3A.3.5 Consideration of Legal Rights of Entities that are not BDCP Participants

Some of the suggested alternatives that emerged through the scoping process could affect or require changes to legal rights, including senior water rights, of entities that are not participants in the BDCP and whose legal rights and entitlements are beyond the regulatory authority and reach of DFG, which approves NCCPs under California law, and of both USFWS and NMFS, which approve HCPs under federal law. For example, several scoping comments suggested that the BDCP EIR/EIS should include alternatives that would achieve increased Delta inflow or outflow through mandatory reductions in existing water diversions occurring upstream in the Delta watershed from parties

other than DWR and Reclamation. These proposed reductions would come from entities that are *not* seeking incidental take authorization as part of the BDCP process and that possess senior water rights or other entitlements that, as a legal matter, could not be infringed by CDFW, USFWS, or NFMS through those agencies' actions in response either to an HCP/NCCP application filed by DWR or through "ESA Section 7 consultation" with Reclamation. Since the potentially affected upstream parties other than DWR and Reclamation are not parties to the BDCP process, their diversions may not be modified through the process of completing the BDCP by DWR and Reclamation. These considerations are reflected in the following question to be applied to the range of alternatives that remain following the third screening level and application of the Delta Reform Act and scoping comments from responsible and cooperating agencies.

- Would the potential alternative result in the impairment of existing senior water rights in the Sacramento-San Joaquin Rivers watershed who are not applicants for incidental take authorization through the proposed Bay Delta Conservation Plan?

If the answers to this question are "Not Likely" or "Unknown," the alternative would be considered in the EIR/EIS. If the answers to this question are "Likely" or "Yes," the alternative would not be considered for detailed analysis in the EIR/EIS, unless its inclusion is required by the Delta Reform Act process for incorporation of the BDCP into the Delta Plan, or is necessary in light of reasonable requests by a public agency that has approval authority over some aspect of the project (e.g., a CEQA responsible agency or federal agency with permitting authority).

3A.4 Conveyance Approaches Identified in Programs Prior to the BDCP Process

This section includes a brief history of approaches to water supply conveyance alternatives that have been considered to convey water from the Sacramento River watershed to San Joaquin Valley (including Tulare Lake basin in southern San Joaquin Valley), San Francisco Bay area, central coastal areas (San Luis Obispo and Ventura counties), and southern California.

3A.4.1 Historical Development of Existing CVP and SWP Conveyance Approaches

California water resources changed substantially during the first 100 years following the granting of statehood in 1850. The demand for irrigated crops increased in the late 1860s and 1870s following completion of the transcontinental railroad that enabled fruits and vegetables from California to be delivered to markets throughout the nation. In 1873, following a severe drought in the 1870s, Congress authorized the Alexander Commission to develop solutions for water supplies of the Sacramento and San Joaquin Valleys. The report outlined a system of large-scale irrigation-water supply facilities and suggested that federal assistance would be required to accomplish these recommendations (DPW 1930).

In 1919, the U.S. Geological Survey completed the Marshall Plan, which recommended the transfer of water from northern California to meet urban and agricultural needs of central and southern California (CSIA 1919). The Marshall Plan recommended a series of storage reservoirs on the Sacramento River near the confluence with the McCloud and Pit Rivers, with large canals along the west and east sides of the Sacramento and San Joaquin Valleys; a storage reservoir on the San

Joaquin River near Friant, with canals to along the east side of the San Joaquin Valley to deliver water to areas north and south of the San Joaquin River; and diversion of the Kern River to Los Angeles. A portion of the water from the Sacramento River would be conveyed through the Delta to lower San Joaquin River water rights holders in exchange for water diverted at Friant Dam to the eastern San Joaquin Valley, including the Kern River area.

During the 1920s, the state continued investigation of the Marshall Plan and other alternatives to reduce salinity intrusion in the Delta and provide water to the San Joaquin Valley. Most of the alternatives included construction of reservoirs in northern California and conveyance through the Delta to San Francisco Bay area and San Joaquin Valley water users. Delta conveyance alternatives included isolated canals or use of Delta channels with a Cross Delta Channel that would convey water from the Sacramento River near Walnut Grove to the San Joaquin River (DPW 1930). In 1930, the Division of Water Resources *Bulletin No. 25* outlined a statewide water plan, which was approved by the state legislature in 1941 as the State Water Plan.

The federal government began construction of the recommended facilities in 1937 as part of the CVP, completing Shasta Dam in 1944, followed by the completion of Friant Dam and the Madera, Friant-Kern and Contra Costa canals between 1945 and 1949. In 1951, the Delta Cross Channel, Tracy Pumping Plant (now known as the Jones Pumping Plant), and Delta-Mendota Canal were completed to convey water through the Delta to users in the San Joaquin Valley. As these facilities were completed, however, it became apparent that California's rapid urban, agricultural, and industrial growth would quickly increase demands for water and power to levels that exceeded the initial CVP system capacity. In response to this increase in projected demand, Reclamation expanded the CVP upstream storage facilities, as well as conveyance facilities, to serve users in the Sacramento Valley, San Francisco Bay area, and San Joaquin Valley. By the late 1980s, the CVP was the largest surface water storage and delivery system in California, with a geographic scope covering 35 of the state's 58 counties.

In 1947, the state began an investigation to meet additional water needs through development of the SWP. In 1957, DWR Bulletin No. 3 defined the need for new SWP facilities for flood control in northern California and for conveying water from the Sacramento Valley to water-short areas of California in the San Francisco Bay area, San Joaquin Valley, and central coast and southern California areas due to projected population and industrial growth and irrigation needs for approximately 25% of irrigated agricultural acreage in the United States in 1950 (DWR 1957a). The study identified a seasonal deficiency of 2,675,000 acre-feet of water in 1950 that had been met with groundwater pumping, primarily from over-drafted aquifers. In 1960, California voters authorized the Burns-Porter Act to construct the initial SWP facilities, including Oroville Dam on the Feather River, San Luis Dam (to be jointly constructed and operated with the CVP), North and South Bay Aqueducts, and the California Aqueduct. Most of these facilities were constructed before 1970.

Both the SWP and CVP facilities relied upon a Through Delta conveyance strategy using Delta channels and the Delta Cross Channel facility to convey water from the Sacramento River to South Delta intakes that diverted water to the SWP and CVP pumping plants. Even before construction of the SWP and CVP pumping plants, however, the Delta was already characterized by high salinity, especially in late summer and fall months or during drought periods. Use of the Delta Cross Channel improved water quality in the central and South Delta during some periods by diverting Sacramento River water from its natural path towards San Francisco Bay into artificial paths that direct this fresh water into the lower-quality flows of the Mokelumne and San Joaquin Rivers. Although both the state and federal agencies have continued to evaluate Delta conveyance alternatives to improve

Delta water quality for water users located in the Delta as well in parts of the San Francisco Bay area, in the meantime Delta water has been used continuously in export areas in the San Joaquin Valley, the central coast, and southern California.

3A.4.2 Existing Delta Conveyance

The current method for conveying water from the Sacramento River to the South Delta intakes of the SWP and CVP pumping plants is based solely upon Through Delta Conveyance. The Sacramento and San Joaquin Rivers and Delta sloughs are effectively used as conveyance channels to convey water to the South Delta. Water from the Sacramento River flows along one of two paths to the SWP and CVP South Delta intakes. One path is based on Sacramento River water flowing towards the western Delta near the confluence with the San Joaquin River, and then being pulled in a reverse-flow manner along Old and Middle Rivers by the momentum created by the SWP and CVP pumping plants. Under this method, the reverse flows also convey saline water from Suisun Bay into the Delta towards the SWP and CVP South Delta intakes and decrease the ability for fish passage through the Delta. During periods of low-flow conditions along the Sacramento and San Joaquin Rivers, Delta salinity increases and the ability to divert water by the SWP and CVP is restricted in order to protect Delta water quality.

The second Through Delta Conveyance path is based upon flows diverted through the Delta Cross Channel located along the Sacramento River near Walnut Grove. Flows through the Delta Cross Channel are controlled with operable gates. When the gates are open, freshwater from the Sacramento River flows through the southern Mokelumne River system to the San Joaquin River, and is then pulled in a reverse-flow manner along Middle River towards the SWP and CVP South Delta intakes. Although this method also results in a reverse flow along Middle River, the potential for drawing salt water in from Suisun Bay is less than under the first method. The Delta Cross Channel gates are closed during flood events to protect the interior Delta and during periods when juvenile salmon are migrating in the Mokelumne and Sacramento River corridors.

In December 1999, low flow conditions on the Sacramento River occurred at the same time as the emigration of juvenile Sacramento Basin salmon. The Delta Cross Channel gates were closed to protect the salmon and Delta salinity increased substantially (DWR 2007). Following this event, DWR and other agencies initiated several studies to evaluate the feasibility of installing fish passage facilities at the Delta Cross Channel, entrance to Clifton Court Forebay, and approach channel to the Jones Pumping Plant. In 2009, DWR evaluated the feasibility of installing fish screens at Clifton Court Forebay for low flows (about 2,000 cfs, or about 20% of the capacity of the SWP facilities). As described in Section 3A.7, DWR, Reclamation, and other agencies have proceeded with other measures to protect fish survival in the south Delta prior to analysis of fish screens at Clifton Court. The studies related to the Delta Cross Channel gates are still ongoing by Reclamation.

3A.4.3 Delta Conveyance Alternatives Considered Prior to the BDCP Process

Many of the studies that originally analyzed the existing CVP and SWP facilities also identified the need for facilities to control Delta salinity to protect water quality of agricultural and municipal/industrial water supplies. This section describes the following Delta conveyance alternatives.

- Western Delta Salinity Control Barrier.
- Improved Through Delta Conveyance.
- Isolated Eastern Conveyance.
- Isolated Western Conveyance Using the Sacramento Deep Water Ship Channel.

This section also describes Governor Schwarzenegger's direction for sustainable management of the Delta and initiation of the BDCP process.

3A.4.3.1 Western Delta Salinity Control Barrier

Western Delta salinity control facilities have been evaluated since the late 1940s, including:

- 1957 DWR Evaluation of Salinity Control Barriers
- 1960 DWR Evaluation of Salinity Control Facilities

3A.4.3.1.1 1957 DWR Evaluation of Salinity Control Barriers

In 1957, DWR prepared Bulletin No. 60 in accordance with the Abshire-Kelly Salinity Control Barrier Act (DWR 1957b). This study investigated methods (1) to convey large quantities of water across the Delta without major losses to Suisun Bay and property damage to Delta property owners; (2) to reduce salinity in the Delta; and (3) to deliver water to the San Francisco Bay area. The study results indicated that freshwater could be maintained in the Delta by either of the following methods.

- Maintaining Delta outflows to dilute poor quality water from Suisun Bay. However, this method would require additional releases of water from upstream reservoirs and would reduce the amount of water available for water supplies to be used in other parts of California.
- Isolate poor quality water from Suisun Bay from high quality Delta water with a physical barrier.

The study evaluated three salinity barrier options: the Junction Point Barrier Plan, Biemond Plan, and Chipps Island Barrier Plan. The Junction Point Barrier Plan and the Biemond Plan were similar, with barriers and fish passage facilities located in slightly different positions along the Sacramento River as described below.

- Operable barriers would be constructed across the Sacramento River and Steamboat Slough to prevent salinity intrusion into the Sacramento River and to increase the elevation of the Sacramento River so that the flow would be directed through a new Cross Delta Channel with a diversion structure near Isleton or through the existing CVP Delta Cross Channel with continued flow into the southern Mokelumne River system.
- Channels along the southern Mokelumne River system would be expanded to increase conveyance of freshwater from the Sacramento River to the San Joaquin River.
- A siphon would be constructed under the San Joaquin River to convey water from the Mokelumne River to Middle River for continued conveyance to the South Delta intakes of the SWP and CVP pumping plants.
- Major flood control levees would be constructed throughout the central Delta to maintain flood waters within the Delta, including a flood control structure on the San Joaquin River at Paradise Cut with a possible channel to divert flood waters to the South Delta intakes of the SWP and CVP pumping plants.

- The North Bay Aqueduct pumping plant and canal would be constructed to deliver water to the northern San Francisco Bay counties.
- The South Bay Aqueduct pumping plant and canal would be constructed to deliver water to the southern San Francisco Bay counties.

The Chipps Island Barrier Plan would include the following facilities to form a freshwater Delta.

- A 22,000-foot long barrier with ship locks would be constructed across the Sacramento River from a location near the City of Pittsburg to a location near Collinsville. The barrier would be designed to pass flood waters from the Delta and to withstand high tide and wave events from San Francisco Bay.
- Major flood control levees would be constructed throughout the Delta and Yolo Bypass to maintain flood waters within the Delta.
- Major flood control levees would be constructed along Suisun Bay due to increased tidal amplitude that would occur along the Contra Costa and Solano counties shorelines on the west side of the barrier.
- Methods would be developed to provide mixing within the Delta to dilute waste products from municipal and industrial wastewater treatment plants, high-temperature flows from industrial plants in the Delta, accumulated salts from discharges in the Delta watershed, and salt water that would enter the Delta through the ship locks on the barrier.

The study indicated that there would be adverse impacts of these plans on anadromous fish; however, there could be benefits to other fish that could accommodate warmer waters. The study recommended continued evaluation of the Biemond Plan, including levee improvements to reduce flood risks in the Delta, and implementation of the North Bay Aqueduct.

3A.4.3.1.2 1960 DWR Evaluation of Salinity Control Facilities

In 1960, DWR prepared the Preliminary Edition of Bulletin 76 (DWR 1960), which evaluated the following plans.

- Chipps Island Barrier Project, as described above.
- Single Purpose Delta Water Project, similar to the Biemond Plan, with barriers on the Sacramento River near Walnut Grove, Steamboat Slough, San Joaquin River, Piper Slough, Holland Cut, Old River at Connection Slough, and head of Old River to maintain the freshwater within the central and south Delta. The Contra Costa Canal would be expanded to provide freshwater to the western Delta communities and industries.
- Typical Alternative Delta Water Project, same as Single Purpose Delta Water Project with additional levee improvements along Mokelumne and San Joaquin Rivers to improve flood protection.
- Comprehensive Delta Water Project, same as Typical Alternative Delta Water Project with additional barriers along Middle River to improve freshwater flows in the central and western Delta.

The results of the study stated that:

> The Chipps Island Barrier would be functionally feasible… However, the net benefits would be less than the project costs…Therefore, the project would not be economically justified…would probably cause disastrous reductions in the fisheries resources of the Delta…
>
> The Single Purpose Delta Water Project would be the least detrimental of all projects…
>
> Losses resulting from the Typical Alternative Delta Water Project and Comprehensive Delta Water Project would be slightly greater than with the Single Purpose Delta Water Project…
>
> The Single Purpose Delta Water Project and Typical Alternative Delta Water Project would be financially feasible.
>
> The Comprehensive Delta Water Project would not be completely feasible unless local tax revenues could be obtained to recover additional costs allocated to flood and seepage control.
>
> Recommendations…that the Single Purpose Delta Water Project be adopted as an integral feature of the State Water Resources Development System…the United States Corps of Engineers and Bureau of Reclamation be requested to investigate the extent of federal interest…that further planning for the Delta Water Project include consideration of joint financing and construction by federal, state, and local agencies to the extent that respective interests are involved.

These plans were further evaluated in 1963 (IDC 1963) by the Coordination of Delta Planning Subcommittee of the Interagency Delta Committee in coordination with analysis of a "peripheral canal," as described in Section 3A.4.3.2. The results of this report stated:

> The construction of a physical barrier [as described for Chipps Island Barrier in this and Preliminary Edition of Bulletin 76] and the creation of a fresh-water pool operated for water supply could effectively conserve water and provide local water supply. This approach, however, would limit future development of navigation in the two Central Valley deep water ports. In addition, the fisheries resources of the Delta area would be jeopardized. Water quality problems related to necessary waste discharge of industry and agriculture within the Delta area are not, as yet, entirely defined but in general would tend to the disadvantage of this plan…
>
> Control structure, channel enlargements and overland canals [as described in Single Purpose Delta Water Project, Typical Alternative Delta Water Project, and Comprehensive Delta Water Project] could provide water transfers across the Delta and meet the quantity and quality requirements of the local water user. While this plan would not interfere with deep draft navigation, there would be restrictions of recreational navigation movements. The influence of the export pumps presents a serious problem to young fish, eggs, and fry. Additional channel closures would be required to solve the San Joaquin flow reversal problem. This alternative would be the least expensive solution.

The analysis recommended additional study of a peripheral canal.

3A.4.3.2 Improved Through Delta Conveyance

DWR and other agencies also evaluated methods to improve Delta water quality and to maintain Delta water supply availability with the continued use of a Through Delta Conveyance, including the following.

- 1995–2000 and 2000–2008: CALFED Evaluations of Through Delta Conveyance Improvements.
- 1960–Present: Various DWR Evaluations of South Delta and Western Delta Salinity Control Barriers.
- 1960 DWR Evaluation of Separate Corridors Conveyance.

- 1960 Through Delta Conveyance improvements that included separated South Delta water supply corridors, as suggested in the Preliminary Edition of Bulletin 76 in the Typical Alternative Delta Water Project.
- 1990 DWR South Delta Water Management.
- 2007 Metropolitan Water District of Southern California Eco-Crescent/Middle River Corridor Conveyance.

3A.4.3.2.1 1995–2000/2000–2008 CALFED Evaluations of Through Delta Conveyance Improvements

Between 1995 and 2000, CALFED considered methods to preserve both the fish benefits of closing the Delta Cross Channel gates and the water quality benefits of diverting Sacramento River water into the northern interior Delta, particularly during low-flow periods. One of the options considered the possibility of a single channel, originating at a variety of locations, or the possibility of using several smaller channels. Various combinations of fish screens at the Delta Cross Channel and the new channel(s) were evaluated by CALFED. As described in Section 3A.2, the CALFED ROD recommended continued use of the Through Delta Conveyance with improved fish screens at the SWP and CVP South Delta intakes, changes in operations of the SWP and CVP pumping plants and construction of an intertie between the facilities, and operable barriers within the south Delta to improve flow and fish conditions.

Since 2000, numerous studies have investigated various approaches to improve the existing system for conveying water through the Delta. DWR has evaluated numerous proposals, including (1) the Franks Tract Project (described below),which would reduce tidal mixing of waters from the western Delta into the central Delta and the water supply corridor, (2) improvements to the Through Delta Facility recommended by CALFED ROD to increase transfer of water from the Sacramento River to the central Delta, (3) increasing the western outflow of the San Joaquin River, (4) operational criteria for closure of the Delta Cross Channel gates, and (5) isolating a freshwater water supply corridor (described below) along Old and Middle rivers. These alternatives were evaluated to be independently implemented. Several of the alternatives, such as reoperating the Delta Cross Channel, also have been evaluated in coordination with several other alternatives listed above.

3A.4.3.2.2 1960 to Present DWR/CALFED Evaluations of South Delta and Western Delta Salinity Control Barriers

Between 1960 and 2000, DWR focused on evaluation of South Delta barriers to improve water supply and flood management programs.

In the 1990s and 2000s, DWR installed temporary barriers at the head of Old River on the San Joaquin River, Middle River near Victoria Canal, Grant Line Canal near Old River, and Old River near the Delta Mendota Canal Barrier (referred to as Old River near Tracy). These barriers were installed to improve water elevations, water circulation, and fisheries habitat. The use of permanent gates was recommended in the proposed DWR South Delta Improvements Program. However, efforts to provide for the installation of the proposed gates were suspended following publication of the NMFS 2009 Biological Opinion (NMFS 2009).

DWR completed a Proposed Mitigated Negative Declaration and Initial Study (IS/MND) for the Temporary Barriers Project, 2001–2007, in 2000 (DWR 2000). The proposed project consisted of

three tidal rock barriers—at Old River near Tracy, Middle River, and Grant Line Canal—designed to improve water levels and circulation for local south Delta farmers, and a fourth barrier—at the head of Old River—designed to improve migration conditions in the south Delta for salmon migrating in the San Joaquin River during the spring and fall. The analysis in the IS/MND also considered 10 alternatives, including (1) No Project; (2) a pumping plant on Middle River and a canal across Roberts Island to convey water to San Joaquin River and Old River; (3) rechannelization of the Westley Wasteway to allow water diverted from the Delta Mendota Canal to augment the San Joaquin River; (4) modification of water demands and reallocation of water supplies of the lower San Joaquin River watershed; (5) increasing San Joaquin River flows by reducing diversions into the San Francisco Public Utilities Commission's Hetch Hetchy facilities; (6) modifying agricultural diversion facilities in the Delta to reduce the need for agricultural-related barriers; (7) developing water treatment facilities for agricultural water users to reduce the need to maintain freshwater in the central and southern Delta in support of agricultural water uses; (8) reducing SWP and CVP exports; (9) dredging south Delta channels to improve water circulation; and (10) conveying water from Clifton Court to south Delta agricultural water users to reduce the need to maintain water elevation and quality for these users. These alternatives were determined either to have greater adverse impacts to the physical environment or to not be institutionally feasible.

The CALFED Bay-Delta Authorization Act of 2004 (Public Law 108-361, Section 103) authorized the Secretary of the Interior to prepare a feasibility study of actions at Franks Tract to provide water quality in the Delta to support both aquatic resources and water supply needs. The gates would be designed to reduce salinity at the south Delta intakes and to constrain migration of fish species of concern into the central and south Delta. The Franks Tract project is currently delayed.

The "Separate Corridors" alternative identified through the BDCP process (described in the following section of this appendix), includes an operable barrier at Threemile Slough similar to the Franks Tract Project. The Separate Corridors alternative includes Franks Tract as part of the fish passage corridor to allow fish to move from Old River through Franks Tract to the San Joaquin River near Jersey Island. The Separate Corridors alternative would isolate Franks Tract for fish passage, with operable barriers along the San Joaquin River at Franks Tract and Fisherman's Cut to prevent fish from moving towards Middle River and the water supply corridor.

3A.4.3.2.3 1990 DWR South Delta Water Management

In 1986, DWR, Reclamation, and South Delta Water Agency committed to develop long-term solutions to provide water supplies for all three entities and to address water supply problems of water users in South Delta Water Agency (DWR 1990). The project objectives were (1) to improve and maintain water levels, circulation patterns, and water quality in the south Delta for local agricultural diversions, (2) to reduce fishery impacts, (3) to improve fisheries conditions, (4) to improve SWP and CVP water supply reliability and water quality (especially for drinking water users), (5) to connect Clifton Court Forebay and Contra Costa Canal in order to improve drinking water quality for Contra Costa Water District, (6) to improve navigation and flood protection, and (7) to increase recreational opportunities. The Draft EIR/EIS evaluated eight alternatives for south Delta facilities, including barriers; expansion of Clifton Court Forebay without and with new intakes on Old River and Middle River near Victoria Canal; enlargement of south Delta channels to improve circulation; increasing the pumping rate at Banks Pumping Plant; and water conservation and recycling programs for SWP and CVP water users. The recommended alternative included the installation of permanent barriers in the south Delta to improve water elevations and circulation; a

permanent barrier at the head of Old River and San Joaquin River to establish a pathway to reduce diversion of San Joaquin River flows; improvements of Clifton Court Forebay to enhance south Delta water quality; and increased interim releases from New Melones Reservoir to improve south Delta water quality. Relocation of the intakes was not recommended in this study.

3A.4.3.2.4 2007 Metropolitan Water District of Southern California Alternative for Separated Delta Corridor for Water Supply Conveyance

In 2007, the "Eco-Crescent/Middle River Corridor Conveyance" approach was developed (MWD 2007). This approach was to develop an area within the central and south Delta that would improve habitat for delta smelt and other native fishes with variable salinity and turbidity to mimic historic estuarine conditions. A separate water supply corridor would convey water from the Delta Cross Channel through the lower Mokelumne River system to a siphon under the San Joaquin River for continued conveyance in an isolated Middle River corridor. The Middle River corridor would be isolated from Old and San Joaquin Rivers by barriers along Middle River at Connection Slough, Railroad Cut, and Woodward Canal.

The separated Delta corridors were similar to those recommended in Preliminary Edition of Bulletin 76 Comprehensive Delta Water Project (DWR 1960), as described above in Section 3A.4.3.1.

3A.4.3.2.5 2007–2009 South Delta Water Agency Evaluation of Separated Delta Corridors for Water Supply Conveyance and Fish Passage

In 2007, the South Delta Water Agency developed the Delta Corridors Plan (SDWA 2007). The Delta Corridors Plan provided an estuarine fish passage corridor along Old River from the head of Old River into the Delta, and a water supply corridor that extended from the Delta Cross Channel and Georgiana Slough confluences along the Sacramento River through the lower Mokelumne River and along Middle River and Victoria Canal to the SWP and CVP south Delta intakes. Fish screens would be installed at Delta Cross Channel and Georgiana Slough along the Sacramento River. Fish-handling facilities would be improved at the SWP and CVP intakes. Portions of Middle River would be dredged to improve capacity. Portions of Old River near the Delta Mendota Canal intake and along Victoria Canal would be divided to separate the fish passage and water supply corridors. Barriers would be constructed at the head of Old River near the San Joaquin River, Old River near the Delta Mendota Canal approach channel, Old River at Grant Line Canal, Old River at Victoria Canal, Old River at West Canal, Woodward Canal at Middle River, Railroad Cut at Middle River, Connection Slough at Middle River, Middle River at Victoria Canal, and Franks Tract at San Joaquin River. Water would be siphoned from Victoria Canal under Old River and Coney Island into West Canal. Water would be pumped from north to south at the Head of Old River Barrier and at the barrier on Middle River at Victoria Canal. This alternative was presented to the Delta Vision Blue Ribbon Task Force and the BDCP Steering Committee.

The Delta Corridors Plan was revised in 2009 to provide fisheries protection in the Mokelumne River system upstream of Delta Cross Channel (SDWA 2009). Under existing conditions, fish passage in the Mokelumne River is from the upper Mokelumne River through Snodgrass Slough into the lower Mokelumne River and into the San Joaquin River. However, use of the lower Mokelumne River for a water supply corridor could increase entrapment of fish in the SWP and CVP intakes. Therefore, under the 2009 version of the Delta Corridors Plan, Meadows Slough would be connected through a new channel to the Sacramento River and operable barriers would be constructed to

provide a fish passage corridor from the upper Mokelumne River into the Sacramento River via Lost and Meadows Sloughs.

3A.4.3.2.6 2009 Conceptual Engineering Report Through Delta Facility Conveyance Option

In 2009, DWR prepared a conceptual engineering report to provide information to the BDCP EIR/EIS process (DWR 2009e). The facilities included:

- Intakes and pumping plants on the Sacramento and San Joaquin Rivers, Victoria Canal, and potentially near Stone Lake Drain.
- Siphons under Mokelumne, San Joaquin, and Old Rivers and West Canal.
- Nine to eleven operable barriers on the cross channels between Old and Middle River and potentially in the Mokelumne River system.
- Armoring of about 78 miles of existing levees or new setback levees along Snodgrass, Deadhorse Island, Beaver, Hog, Sycamore, Little Potato, White, Little Connection, Latham, and Trapper sloughs; Mokelumne, San Joaquin, and Middle rivers; Columbia and Empire cuts; and Victoria Canal.

This alternative is considered in Section 3A.6 as Initial Screening Conveyance Alternative C2.

3A.4.3.3 Isolated Eastern Conveyance

DWR and other agencies also evaluated Isolated Eastern Conveyance alternatives for many years, including:

- 1963 Interagency Delta Committee Evaluation of a Peripheral Canal.
- 1965–1974 DWR Evaluations of a Peripheral Canal.
- 1978 DWR Evaluation of Isolated Eastern Facilities.
- 1983 DWR Evaluation of Delta Water Transfer Facilities.
- 1995–2000 CALFED Evaluations of an Isolated Eastern Facility.
- 2009 Conceptual Engineering Report Isolated Conveyance Facility East Option.

3A.4.3.3.1 1963 Interagency Delta Committee Evaluation of a Peripheral Canal

In the early 1960s, an Interagency Delta Committee was convened to coordinate water resources planning for the SWP, CVP, and local agencies. In a 1963 report, the Interagency Delta Committee evaluated alternatives to protect Delta water quality and water supplies, maintain flood protection, control drainage and seepage in the Delta, maintain Delta navigation, maintain Delta recreation, protect fish and wildlife, and maintain vehicular transportation (IDC 1963). The study considered hydraulic and physical barriers and Delta waterway control and a peripheral canal. The peripheral canal would be constructed along the eastern edge of the Delta from Walnut Grove on the Sacramento River to Stockton and continue to Italian Slough near the Clifton Court Tract. The report concluded that the peripheral canal allowed for balanced growth of Delta-oriented activities and recommended that further study be completed.

3A.4.3.3.2 1965–1974 DWR Evaluations of a Peripheral Canal

A DWR study in 1965 defined the peripheral canal alignment along the eastern edge of the Delta as starting from Hood on the Sacramento River with siphons beneath the Mokelumne, San Joaquin, and Old Rivers and connecting canals to the SWP and CVP pumping plants (DWR 1965). In the 1970s, construction of Interstate 5 involved some initial excavation of borrow pits along the potential Peripheral Canal alignment (DWR 1970).

The 1974 Draft EIR for the Peripheral Canal Project described an isolated facility to convey freshwater from the Sacramento River to the SWP and CVP pumping plants with up to 12 release facilities to distribute water from the canal into Delta channels (DWR 1974). The canal was planned to initially operate by gravity with the addition of a pumping plant within 10 years following construction. Other purposes of the project were to convey flood flows from Morrison Creek in Sacramento County and Middle River in San Joaquin County into the Peripheral Canal and to incorporate recreational facilities into the project.

3A.4.3.3.3 1978 DWR Evaluation of Isolated Eastern Facilities

Comments submitted during the evaluation of the 1974 Draft EIR for the Peripheral Canal included numerous alternatives, including isolated eastern facility alignments. DWR evaluated a wide range of options during preparation of the Bulletin 76-78 (DWR 1978). This report identified a range of Delta conveyance alternatives and evaluated the alternatives using a two-step screening process. The first step considered: (1) adverse impacts on fish, wildlife, recreation, water quality, or other environmental resources; (2) technological feasibility; (3) legal, institutional, and political constraints; and (4) whether proposed alignments were already part of a similar proposal. The second step included a rating system of the alignments by DWR and other technical specialists that considered: (1) system effectiveness (e.g., implementability, public acceptance, flexibility in the future, and reliability); (2) adequacy of supply (including supplies and water quality for Delta water users and other users of Delta water); (3) physical environmental factors (relating to, e.g., biological resources, drainage, and erosion); (4) socio-cultural factors (e.g., land use and demography, archaeology, historic sites, paleontology, recreation, and aesthetics); (5) economic factors; (6) construction factors, and (7) resource supply and demand (relating to, e.g., energy and construction materials).

A wide range of alignments were evaluated in the first screening process. Some alignments were eliminated during the initial screening. For example, sea water desalination was eliminated due to potential adverse impacts on aquatic resources, energy requirements, and costs. Reductions in SWP and CVP contract amounts and increased diversions from the Colorado River for southern California were eliminated based on institutional limitations. A proposal to tow icebergs from the Antarctic was eliminated due to technological infeasibility. And a proposal to extend the Folsom-South Canal to convey water from American River to the Delta was eliminated due to limited water supplies and based on factors considered as part of the American and Mokelumne Rivers watershed studies.

The second screening analysis evaluated several conveyance routes and selected the Peripheral Canal alignment as the most appropriate alignment. The other conveyance routes were eliminated for the following reasons.

- The North Stub alignment incorporated the northern portion of the Peripheral Canal route to convey water from the Sacramento River near Hood to the San Joaquin River, and was

eliminated due to minimal benefits to the San Joaquin River fisheries as compared to the Peripheral Canal.

- The North Stub and South Stub alignment would be similar to the Peripheral Canal alignment, and was eliminated due to this similarity.
- The Mathena Landing Canal alignment would have diverted water from the Sacramento River between Walnut Grove and Isleton for conveyance to Clifton Court. This alignment was eliminated due to geotechnical issues near the diversion location.
- The Isleton alignment would have diverted water at Isleton with conveyance to Clifton Court. This alignment was eliminated due to the need for boat locks on Steamboat, Miner, and Georgiana Sloughs that would result in recreational and fisheries adverse impacts.

The recommended alignment was the Peripheral Canal alignment that diverted water from the Sacramento River near Hood for conveyance to Clifton Court.

3A.4.3.3.4 1983 DWR Evaluation of Delta Water Transfer Facilities

In 1983, following the defeat of the 1982 statewide ballot referendum on construction of the Peripheral Canal, DWR initiated a study to identify other alternatives to reduce the limitations of the SWP Through Delta Conveyance processes (DWR 1983). A study of alternatives for delta water transfer considered several concepts. One concept included enlargement of the South Fork Mokelumne River to increase its capacity to convey water from the Sacramento River at the Delta Cross Channel to the San Joaquin River. The second major concept included construction of a New Hope Cross Channel to convey water from the Sacramento River near Hood to the San Joaquin River. These conveyance facilities would replace the northern portion of the Peripheral Canal and continue conveyance of the water through Old and Middle Rivers towards the south Delta intakes. The conveyance facilities were evaluated without and with (1) a new intake channel along Victoria Canal between Middle River and Clifton Court; (2) expanded Clifton Court facilities; and (3) a dual conveyance similar to a small Peripheral Canal facility. The alternatives were evaluated with respect to public attitude, compatibility with established activities, ease of implementation, extent of fish screen problems, and potential for staged construction. The evaluation results indicated that use of dual conveyance was preferable. Other portions of the alternatives were eliminated due to need for barriers that would adversely affect boaters, potentially require federal participation, and need for "excessive" fish screens. No recommended project was included in the report.

3A.4.3.3.5 1995–2000 CALFED Evaluations of an Isolated Facility

The CALFED Phase II Alternative Descriptions included an Isolated Facility with a canal that extended from Hood or Freeport to Clifton Court Forebay in conjunction with Through Delta improvements (CALFED 1997a). The study described an isolated facility that ranged in size from 5,000 to 15,000 cubic feet per second (cfs). The CALFED Phase II Alternative Descriptions also included Isolated Facility alignments between a storage facility on Holland Tract and Clifton Court Forebay along Old River, and between Lower Roberts Island and Upper Roberts Island on the San Joaquin River and Clifton Court Forebay. The isolated conveyance facility was to be operated in coordination with a Through Delta Facility.

The 2000 CALFED ROD (CALFED 2000) recommended a through-Delta approach with new screened intakes as the SWP and CVP south Delta intakes; new conveyance to connect the SWP and CVP

pumping plants and allow for joint operations; new operable barrier at the head of Old River and other locations in the south Delta to improve water quality, protect fish, and protect water elevations for Delta water diverters; and changes in SWP pumping plant operations to fully use the existing capacity of the facilities. The Preferred Program also included recommendations for further evaluation of new screens on facilities in the Sacramento River, levee improvements on the Mokelumne and San Joaquin Rivers, and methods to provide public health protection for drinking water. The ROD stated that:

> "Although the CALFED Agencies did not rule out the possibility of constructing an isolated conveyance facility in the future, they were mindful that, even if approved immediately following the ROD, such a facility could not be studied, approved, funded, and constructed within Stage 1 of implementation.
>
> In light of the technical and feasibility issues discussed above, the CALFED Agencies propose to begin with through-Delta modifications. As part of the Preferred Program Alternative, the Program also would:
>
> - Continue to investigate storage opportunities in the context of the broader water management strategy.
> - Evaluate and implement storage projects, predicated on complying with all environmental review and permitting requirements. These efforts will be coordinated under CALFED's Integrated Storage Investigation.
> - Implement the Stage 1 of the Ecosystem Restoration, Water Quality, Water Use Efficiency, Water Transfers, Watershed, and Levee System Integrity Program Plans.
> - Monitor the results of these actions to determine whether an isolated conveyance facility as part of a dual-Delta conveyance configuration is necessary to meet the Program objectives.
>
> If the Program purposes cannot be fully achieved with the actions proposed in the Preferred Program Alternative, additional actions including an isolated conveyance facility will need to be considered in the future. Until additional information is available to determine whether water quality objectives and fish recovery goals can be met and which, if any, additional actions will be necessary to achieve the Program goals and objectives, the Preferred Program Alternative is the best alternative to achieve overall project purposes and provide significant beneficial improvements over the conditions anticipated under the No Action Alternative, while establishing a process for obtaining this additional information. Moreover, the way the alternatives are structured, going forward with the Preferred Program Alternative does not preclude the Program's ability to undertake additional conveyance actions in the future, subject to appropriate environmental review."

3A.4.3.3.6 2009 Conceptual Engineering Report Isolated Conveyance Facility East Option

In 2009, DWR prepared a conceptual engineering report to provide information to the BDCP EIR/EIS process (DWR 2009f). The facilities included:

- Intakes and pumping plants on the Sacramento River between Freeport and Walnut Grove and a canal from the intakes to Byron Tract (near Clifton Court Forebay).
- Siphons and tunnels under a drain; six sloughs; a railroad; and Sacramento, Mokelumne, San Joaquin, and Old Rivers.

- Intermediate pumping plant.
- New forebay near Byron Tract.

This alternative is considered in Section 3A.6 as Initial Screening Conveyance Alternative B2.

DWR also completed conceptual engineering reports for Isolated Conveyance Facility West Option (DWR 2009g), Isolated Conveyance Facility All Tunnel Option (2009h), and Dual Conveyance Facility with Isolated Conveyance Facility East Component and Through Delta Facility Component (2009i). The alternatives evaluated in the these conceptual engineering reports included intakes and pumping plants on the Sacramento River between Freeport and Walnut Grove and a new forebay near Byron Tract. The West Option (Initial Screening Conveyance Alternative B3 in Section 3A.6) included a canal from the intakes to Byron Tract; siphons under 10 sloughs and a railroad; tunnels under Sherman, Twitchell, Bradford, and Bethel Islands and the Sacramento and San Joaquin Rivers; and an intermediate pumping plant. The All Tunnel Option (Initial Screening Conveyance Alternative B1 in Section 3A.6) included an intermediate forebay with an intermediate pumping plant and a tunnel from the intermediate forebay to Byron Tract. The Dual Conveyance Facility option (Initial Screening Conveyance Alternative A2 in Section 3A.6) was a combination of the Isolated Conveyance Facility East Component and continued use of existing through-Delta facilities without modification.

3A.4.3.4 Isolated Western Conveyance Using the Sacramento Deep Water Ship Channel

State agencies made several evaluations of an Isolated Western Conveyance, including:

- 1977 Association of State Water Project Agencies Evaluation Montezuma Hills Canal
- 1995–2000 CALFED Evaluation of an Isolated Western Facility Using the Sacramento Deep Water Ship Channel
- 2001 DWR Evaluation of Using the Sacramento Deep Water Ship Channel for Fish Passage
- 2009 DWR/DFG evaluation in response to Public Scoping comments

3A.4.3.4.1 1977 Association of State Water Project Agencies Evaluation Montezuma Hills Canal

Isolated Western Conveyance concepts have been considered since the 1970s. A February 1977 report prepared by the Association of State Water Project Agencies describes a potential Montezuma Hills Canal that could be constructed with an intake along the Sacramento River near Rio Vista and siphons under Sacramento River, Sherman Island, and the San Joaquin River to a canal that extends to Clifton Court Forebay (ASWPA 1976). The canal and siphon would cross islands with peat soils that had been previously inundated, including Brannon and Andrus Islands and Webb, Frank, and Bethel Tracts. The report stated that, because the islands were located below sea level and the soils were not ideal to support a canal structure, the canal embankments would need to be both very high to protect the canal if the island became inundated and very wide to provide foundational support to the canal levees. In addition, the report stated that, although this concept would eliminate reverse-flow impacts in the central and south Delta, it would not be possible to supply freshwater into the extreme eastern Delta to maintain water quality for beneficial uses.

3A.4.3.4.2 1995–2000 CALFED Evaluation of an Isolated Western Facility Using the Sacramento Deep Water Ship Channel

In 1997, CALFED identified an isolated conveyance alternative (Alternative 3G) with an intake along the Sacramento River near West Sacramento to divert water into the Sacramento Deep Water Ship Channel (CALFED 1997a). A ship lock would be constructed near the western boundary of the Sacramento Deep Water Ship Channel. An intake would be located along the Sacramento Deep Water Ship Channel levee upstream of the ship lock to divert water into a conveyance facility that includes siphons under Sacramento River, Sherman Island, and the San Joaquin River to a canal that extends to Clifton Court Forebay. The isolated conveyance facility was to be operated in coordination with the Through Delta Facility (or Dual Conveyance). This report also identified seven other conveyance alternatives that included isolated facilities, as well as eight conveyance alternatives that relied upon Through Delta alternatives. These alternatives were evaluated in an "alternative narrowing process" in July 1997 (CALFED 1997b). The results of this narrowing process stated that Alternative 3G had "no major technical problems" and only "slight differences" in environmental impacts as compared to other isolated conveyance alternatives evaluated. However, because the preliminary cost estimates were two to three times greater than an isolated eastern canal, the recommendation was to eliminate Alternative 3G from further consideration. The results were reviewed with the CALFED Policy Group and the Bay Delta Advisory Committee. In October 1997, a summary of that review process stated:

> "Alternative 3G - Ship Channel. More detailed study indicated that the diversion point near Sacramento did not provide the fishery benefits originally anticipated when the alternative was formulated. Alternative 3B [Isolated Canal with Through Delta conveyance] was judged to provide the same conveyance function at substantially lower cost."

3A.4.3.4.3 2001 DWR Evaluation Using the Sacramento Deep Water Ship Channel for Fish Passage

In 2001, CALFED and DWR initiated a study of the use of the Sacramento Deep Water Ship Channel to provide an alternative for fish passage as compared to the mainstem of the Sacramento River (DWR 2001). The study was to evaluate conditions needed to move upstream migrating fish of concern into and through the existing boat locks near the Port of West Sacramento. The species of concern included delta smelt, Sacramento splittail, Chinook salmon, steelhead, American shad, striped bass, and white sturgeon. Data were collected through 2005.

3A.4.3.5 2007 Governor Schwarzenegger's Direction for Sustainable Management of the Delta

Executive Order 2-17-06 initiated the Delta Vision process. In December 2007, that process resulted in a Blue Ribbon Task Force of experts issuing to a committee of state agency directors a final set of recommendations to chart a new course for the Delta. In a February 28, 2008, letter to state Senators Perata, Machado, and Steinberg, Governor Schwarzenegger stated his intention to direct DWR to proceed with preparation of the BDCP environmental review and permitting activities, including the evaluation of at least four alternative Delta conveyance strategies developed in coordination with the BDCP efforts to better protect at-risk fish species. Alternatives were to be developed in light of broad habitat conservation principles, recognizing at the same time, as suggested by the Delta Vision Task Force, the importance of water supply reliability and other issues such as seismic safety, flood durability, ecosystem health and resilience, water quality, schedule

considerations, and the costs of various options. Section 3A.2.3 above describes the conveyance options outlined in the February letter.

3A.5 Delta Conveyance Alternatives Identified in BDCP Steering Committee Process: 2007–2010

Starting in 2007, the BDCP Steering Committee developed and evaluated a wide range of alternatives related to conveyance and other conservation measures. In 2007, conservation strategy options were identified and evaluated. Based upon the results of this preliminary analysis, the BDCP Steering Committee's process focused on development of a range of long-term operational criteria for a dual conveyance option between 2008 and 2010.

3A.5.1.1 Development of Conveyance Alternatives by the Conservation Strategy Workgroup

In 2007, the BDCP Steering Committee formed the Conservation Strategy Workgroup, which identified potential conservation strategy alternatives that included conveyance alternatives (BDCP 2007b, BDCP 2007c, BDCP 2007d, BDCP 2007e). The following conveyance alternatives were identified through this process.

- Existing Through Delta Conveyance (with modified operations) (*Conservation Strategy Alternatives 1, 2, 3, 6, and 7*).
- Isolated Conveyance to convey water from the Sacramento River to the Lower San Joaquin River *and* continued use of existing south Delta intakes for the SWP and CVP pumping plants (*Conservation Strategy Alternative 4*).
- Isolated Conveyance to convey water from the Sacramento River to the existing SWP and CVP pumping plants (Conservation Strategy Alternatives 5 and 9).
- Isolated Conveyance to convey water from the Sacramento River to the existing SWP and CVP pumping plants *and* to the Lower San Joaquin River with continued use of existing south Delta intakes (Conservation Strategy Alternative 8).
- Through Delta Conveyance with separate a water supply corridor along Middle River and a fish passage corridor along Old River (Conservation Strategy Alternative 10).

Following several months of evaluation, the BDCP Steering Committee reduced the number of potential conservation strategy alternatives to the following four Conservation Strategy Options (BDCP 2007a).

- Option 1: Existing Through Delta Conveyance with Opportunistic Delta Operations and Potential New Storage
- Option 2: Through Delta Conveyance with San Joaquin River Isolation (Separate Corridors for Water Supply and Fish Passage)
- Option 3: Dual Conveyance: Isolated Conveyance between Sacramento River and SWP and CVP Pumping Plants *and* Through Delta Conveyance with San Joaquin River Isolation (as in Option 2)
- Option 4: Isolated Conveyance between Sacramento River and SWP and CVP Pumping Plants

The options were evaluated to determine how well they fared with respect to the following: overall biological benefits primarily for estuarine species dependent on the Delta; ability to meet BDCP water supply goals with practicable implementation methods; comparative costs for initial and long-term costs; ability to be flexible, durable, and sustainable; and ability to minimize unintended adverse effects on the human environment and other biological resources. The results of the report are summarized below.

- **Biological Criteria:** Option 4 was determined to provide the greatest benefits to estuarine species among all options, with the most benefits for delta smelt, longfin smelt, and splittail; and benefits for salmonids. Option 3 was determined to provide the next greatest benefits to the estuarine fish and salmonids. Option 2 had fewer benefits for estuarine species than Option 3. Option 1 was determined to provide the lowest benefits of all options for delta smelt, longfin smelt, San Joaquin River salmonids and white sturgeon, but was similar to all other options for Sacramento River salmonids, green sturgeon, and splittail.
- **Planning Criteria:** Option 4 was determined to be slightly more cost effective and practicable than Option 3, although Option 3 provided greater flexibility to meet water supply goals. Option 1 was determined to be limited in the ability to meet habitat conservation and water supply goals and could result in poor Delta water quality.
- **Flexibility/Durability/Sustainability Criteria:** Option 4 was determined to have the most flexibility and adaptability to adjust conservation approaches, both for habitat restoration and flow management, with the least input of future resources. Option 3 was determined to have more limited adaptability for restoration of natural hydrology and physical habitat restoration. Option 2 was determined to be less durable and less flexible related to adaptive management than Options 3 and 4 and more durable than Option 1. Option 1 was determined to be the most reversible but was ranked the lowest for this criterion because of a high risk of loss of habitat and water supply from catastrophic events and sea level rise, and low flexibility for adaptive management.
- **Other Resource Impacts Criteria:** Option 1 was determined to be the most favorable for avoiding direct impacts on other biological and human resources because of the minimal amount of new infrastructure. Option 3 was determined to have the highest impact on the human and biological environment due to the more extensive new infrastructure.

3A.5.1.2 Identification of Conveyance Alternatives for Further Analysis by BDCP Steering Committee

In September and October 2007, the BDCP Steering Committee considered the results of the *Conservation Strategy Options Evaluation Report* during the development of the Points of Agreement to define the subsequent methods for completion of the BDCP (BDCP 2007f). The *Draft Bay Delta Conservation Plan Framework (October 29, 2007)* (BDCP 2007g) stated that, in order to improve biological productivity, improve water quality, and reduce entrainment, the most promising long-term solution would involve an isolated conveyance facility. The draft framework documentation stated that the long-term approach to water conveyance would include (1) intake facilities with positive barrier fish screens on the Sacramento River near Hood or Clarksburg; (2) a peripheral aqueduct and associated appurtenant facilities (e.g., pumping plant and siphons) that would (a) traverse from the new intake facilities on the Sacramento River southerly along an alignment in the east Delta parallel to, and west of, Interstate 5, (b) terminate south of Clifton Court Forebay, and (c)

tie into the existing SWP and CVP pumping and conveyance facilities; (3) improved through-Delta conveyance, potentially using channel improvements, operable barriers, and levee improvements in the areas around Old and Middle Rivers to reduce entrainment and improve habitat functions; and (4) continued use of the existing CVP Jones Pumping Plant and SWP Banks Pumping Plant and associated project facilities in the south Delta.

The final Points of Agreement (BDCP 2007f) stated that the Steering Committee agrees that the most promising approach involves a conveyance system with new points of diversion: "The main new physical feature of this conveyance system includes the construction and operation of a new point (or points) of diversion in the North Delta on the Sacramento River and an isolated conveyance facility around the Delta. Modifications to existing South Delta facilities to reduce entrainment and otherwise improve the State Water Project's (SWP) and Central Valley Project's (CVP) ability to convey water through the Delta while contributing to near and long-term conservation and water supply goals will also be evaluated. This approach may provide enhanced operational flexibility and greater opportunities for habitat improvements and fishery protection."

3A.6 Initial Screening Conveyance Alternatives Identified in EIR/EIS Scoping Process and BDCP Process

As described in previous sections, the EIR/EIS scoping process occurred in 2008 and 2009 and resulted in 1,051 comments related to the development of alternatives. As also noted above, the DSC submitted two scoping letters in June and November 2010. All of this input, along with the conveyance alignment alternatives identified in the BDCP Steering Committee Process between 2006 and 2010 and conveyance alignment alternatives identified in correspondence to the California Natural Resource Agency between 2006 and June 2012, were compiled in putting together the following initial list of conveyance alternatives to be considered in the first level screening process.

- **Initial Screening Conveyance Alternative A1.** *Dual Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*. Tunnel could be up to 50 miles in length with north Delta intake pumping plant capacity from 3,000 cfs to 15,000 cfs (assuming 3,000 cfs capacity of each pumping plant). Above-ground facilities would be designed to withstand the 200-year return flood and 55 inches of sea level rise.
- **Initial Screening Conveyance Alternative A2.** *Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*. East Canal could be up to 45 miles in length with north Delta intake pumping plant capacity from 3,000 cfs to 15,000 cfs (assuming 3,000 cfs capacity of each pumping plant). Above-ground facilities would be designed to withstand the 200-year return flood and 55 inches of sea level rise. It is anticipated that the amount of materials required for construction of the canal levees will be similar to the amount of material excavated along the canal alignment.
- **Initial Screening Conveyance Alternative A3.** *Dual Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of*

Existing South Delta Intakes. West Canal could be up to 55 miles in length with north Delta intake pumping plant capacity from 3,000 cfs to 15,000 cfs (assuming 3,000 cfs capacity of each pumping plant). Above-ground facilities would be designed to withstand the 200-year return flood and 55 inches of sea level rise. It is anticipated that the amount of materials required for construction of the canal levees will be similar to the amount of material excavated along the canal alignment.

- **Initial Screening Conveyance Alternative A4.** *Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the Lower San Joaquin River, and Continued Use of Existing South Delta Intakes.* East Canal could be up to 30 miles in length with north Delta intake pumping plant capacity from 3,000 cfs to 15,000 cfs (assuming 3,000 cfs capacity of each pumping plant). Above-ground facilities would be designed to withstand the 200-year return flood and 55 inches of sea level rise. It is anticipated that the amount of materials required for construction of the canal levees will be similar to the amount of material excavated along the canal alignment.

- **Initial Screening Conveyance Alternative B1.** *Isolated Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*. Tunnel could be up to 50 miles in length with north Delta intake pumping plant capacity of 15,000 cfs (assuming 3,000 cfs capacity of each pumping plant). Above-ground facilities would be designed to withstand the 200-year return flood and 55 inches of sea level rise.

- **Initial Screening Conveyance Alternative B2.** I*solated Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*. East Canal could be up to 45 miles in length with north Delta intake pumping plant capacity of 15,000 cfs (assuming 3,000 cfs capacity of each pumping plant). Above-ground facilities would be designed to withstand the 200-year return flood and 55 inches of sea level rise. It is anticipated that the amount of materials required for construction of the canal levees will be similar to the amount of material excavated along the canal alignment.

- **Initial Screening Conveyance Alternative B3.** *Isolated Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*. West Canal could be up to 55 miles in length with north Delta intake pumping plant capacity of 15,000 cfs (assuming 3,000 cfs capacity of each pumping plant). The facilities could include over 36 miles of canals located between the Sacramento River and the eastern boundary of the Sacramento Deep Water Ship Channel and between Hotchkiss Tract and a new forebay on Byron Tract; 17 miles of tunnels under the western Delta islands and the Sacramento and San Joaquin Rivers; and connecting pipelines between the intakes and western canal alignment. Above-ground facilities would be designed to withstand the 200-year return flood and 55 inches of sea level rise. It is anticipated that the amount of materials required for construction of the canal levees will be similar to the amount of material excavated along the canal alignment.

- **Initial Screening Conveyance Alternative B4.** *Isolated Conveyance with a Lined or Unlined East Canal between the Sacramento River near the Confluence with the Feather River and the and Lower San Joaquin River, and Abandonment of Existing South Delta Intakes*. East Canal could be up to 150 miles in length with ability to discharge water into American River and Stanislaus River. The intake and pumping plant near the Feather River would be at least 15,000 cfs in capacity (approximately 2 to 3 miles in length) unless a smaller size pumping plant would be

required because less water flows in the Sacramento River upstream of the American River. Above-ground facilities would be designed to withstand the 200-year return flood and 55 inches of sea level rise. It is anticipated that the amount of materials required for construction of the canal levees will be similar to the amount of material excavated along the canal alignment.

- **Initial Screening Conveyance Alternative B5.** *Isolated Conveyance with Diversion from the Sacramento River near West Sacramento into the Sacramento Deep Water Ship Channel and a Tunnel between the Deep Water Ship Channel and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*. New diversion would be constructed near West Sacramento with a pumping capacity of 15,000 cfs (approximately 2 to 3 miles in length), as previously described in Section 3A.4.3.4. Sacramento Deep Water Ship Channel would be modified through rebuilding of levees, locks, and spillways to withstand the 200-year return flood and 55 inches of sea level rise. A new barrier would be constructed near the southern boundary of the Deep Water Ship Channel with a ship lock to prevent freshwater from flowing from the Deep Water Ship Channel into the Sacramento River. A 15,000 cfs new intake and pumping plant would be constructed along the southeastern levee near Prospect Island. A 40-mile conveyance that would include both a tunnel and canal would be constructed between the Sacramento Deep Water Ship Channel and the existing SWP and CVP pumping plants.

- **Initial Screening Conveyance Alternative B6.** *Isolated Conveyance with a Tunnel between the Sacramento River near Fremont Weir and the SWP and CVP Pumping Plants, Isolated Conveyance with a Tunnel between the Sacramento River near Decker Island to Clifton Court Forebay and Bethany Reservoir, and Continued Use of the South Delta Intakes*. An intake and pumping plant would be located along the Sacramento River near Fremont Weir with an initial capacity of 3,000 cfs and an ultimate capacity of 7,000 cfs. A tunnel would be constructed from this location under the Yolo Bypass, Cache Slough, Montezuma Hills, Sacramento River near Decker Island, Sherman and Jersey Islands, San Joaquin River, and Contra Costa County from a location near Oakley to a location near Clifton Court Forebay. The tunnel could be 80 to 90 miles in length. A second intake and pumping plant would be located along the Sacramento River near Decker Island with a capacity of 7,500 cfs. A conveyance using both tunnel and pipeline features would be constructed from this location along Decker, Sherman, and Jersey Islands; under the San Joaquin River, and through Contra Costa County from a location near Oakley to Clifton Court Forebay and Bethany Reservoir along the South Bay Aqueduct. The conveyance, which could be 20 to 30 miles in length, would be constructed for connections to users within the north Delta and the North Bay Aqueduct, Contra Costa Water District conveyance facilities, and East Bay Municipal Utility District conveyance facilities. This concept is a combination of proposals submitted during the scoping and BDCP processes (see Initial Screening Conveyance Alternative B4 and B7) and similar to a concept recently identified by the Water Advisory Committee of Orange County (WACO 2012).

- **Initial Screening Conveyance Alternative B7.** *Isolated Conveyance with Diversion from the San Joaquin River near Antioch and Desalination Facilities, a Tunnel between the Desalination Facilities and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*. An intake and pumping plant would be located along the San Joaquin River near Antioch. It is unclear the capacity of the proposed intake, pumping plant, and desalination facility, and therefore, the size of the facility is unclear. A recent study of potential desalination facilities in eastern Contra Costa County indicated that a 25 mgd desalination facility would require approximately 10 acres of land (EBMUD 2010). That facility probably would require an intake of

less than 100 cfs capacity. A tunnel would be constructed to convey treated water from the desalination facility approximately 18 miles to the existing SWP and CVP pumping plants.

- **Initial Screening Conveyance Alternative C1.** *Separate Corridors*. New fish screens with operable gates and boat locks along the Sacramento River at the Delta Cross Channel and Georgiana Slough to allow increased use of the Delta transfer of water, as previously described in Section 3A.4.3.2. Water would be conveyed through the lower Mokelumne River system and across the San Joaquin River (within the surface water, not a tunnel) to Middle River and eventually to Victoria Canal in existing channels. A barrier would be constructed at the western boundary of Victoria Canal and water would be conveyed into Clifton Court through a siphon under Old River for continued conveyance to the existing SWP and CVP pumping plants. Operable barriers would be constructed on Snodgrass Slough to reduce risk to salmon migration in the upper Mokelumne River. Operable barriers would be constructed along cross channels between Old River and Middle River (at Woodward Canal, Railroad Cut, and Connection Slough) to isolate Middle River for water supply flows and Old River for fish passage. Operable barriers would be constructed at the head of Old River and San Joaquin River with a small pumping plant to transfer water into the existing lower San Joaquin River channel to maintain water quality and facilitate downstream flows in the existing San Joaquin River channel. Operable barriers would be constructed along Threemile Slough or Sevenmile Slough to improve fish passage and water quality in the central and south Delta. Dredging would occur and setback levees would be constructed along portions of Middle River. Continued use of the existing SWP and CVP south Delta intakes would occur during flood periods. This alternative would require over 10 million cubic yards of materials to be dredged along the water supply corridor and placed in areas within the Delta.

- **Initial Screening Conveyance Alternative C2.** *Through Delta Conveyance with Armored Corridors*. - Several options for this alternative were considered. To protect the channels that convey water from the Sacramento River to existing SWP and CVP south Delta intakes, approximately 78 miles of setback levees or traditional levees would be modified or constructed along the Mokelumne and Middle Rivers and Victoria Canal. Over 10 operable barriers would be constructed to isolate the water supply corridor along the Mokelumne and Middle Rivers in case of levee failure in other locations throughout the Delta. This alternative also could include two intakes along the Sacramento River near Hood, 12 miles of canals, and approximately 2 miles of tunnel to convey water from the Sacramento River into the armored corridor. The capacity of the facilities would be 15,000 cfs. This alternative would require over 150 million cubic yards of materials to be transported to central and southern Delta to strengthen the levees along the water supply corridor.

  Another alternative only would protect the channels that convey water from the San Joaquin River to existing SWP and CVP south Delta intakes with approximately 30 to 35 miles of setback levees or traditional levees modified or constructed primarily along Middle River and Victoria Canal. The capacity of the facilities would be 15,000 cfs. This alternative would require extensive amounts of materials to be transported to southern Delta to strengthen the levees along the water supply corridor.

  Another alternative would protect channels throughout the Delta with a range of 300 to 600 miles of setback levees or traditional levees modified or constructed. The capacity of the facilities would be 15,000 cfs. This alternative would require extensive amounts of materials to be transported throughout the Delta to strengthen the levees along the water supply corridor.

- **Initial Screening Conveyance Alternative C3.** *Through Delta Conveyance with West Delta Salinity*. This concept includes construction of an operable barrier near Chipps Island with boat locks and fish passage facilities to maintain a fresh water lake in the Delta, as previously described in Section 3A.4.3.1. Water would continue to flow through existing channels to existing SWP and CVP south Delta intakes.
- **Initial Screening Conveyance Alternative C4.** *Through Delta Conveyance with Fish Screens at Clifton Court Forebay*. This concept includes construction of fish screens along Old River at the existing Clifton Court Forebay and at the entrance of the approach channel to the Jones Pumping Plant. Water would continue to flow through existing channels to existing SWP and CVP south Delta intakes.

At the time of the EIR/EIS scoping process, operational scenarios had not been considered or developed. Therefore, these concepts were focused on conveyance alignments.

3A.7 Results of Initial Screening of Conveyance Alternatives

The conveyance alternatives identified in Section 3A.6 were compared to the first, second, and third level screening criteria based upon legal considerations under CEQA and NEPA, as described in Section 3A.3. The results of that comparison are summarized in Tables 3A.1 through 3A.3 (located at the end of this appendix).

Initial screening was completed prior to consideration of technical considerations such as a range of operations for each of the conveyance alignment alternatives. The initial screening was focused instead upon the legal considerations under CEQA and NEPA. Comments received from Responsible and Cooperating Agencies and input from other entities that are not BDCP participants had a greater emphasis on factors related to water conveyance operations, such as timing of diversions or capacity of facilities. Therefore, these technical issues, as well as application of the Delta Reform Act, will be considered for the secondary screening process presented in Section 3A.10.

The results of the initial screening resulted in elimination of the following conveyance alternatives.

- **Initial Screening Conveyance Alternative A4.** *Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the Lower San Joaquin River, and Continued Use of Existing South Delta Intakes*. This alternative was eliminated from further evaluation because it would result in discharge of Sacramento River water directly into the San Joaquin River, which could cause false attraction flows for sturgeon and salmonids upstream of the area currently affected by reverse flows from the Delta and Sacramento River. (*Attraction flows* are flows that historically have occurred due to rainfall in a watershed and that trigger the migration of anadromous fish from the ocean or an estuary into the upper watershed for subsequent spawning. Attraction flows from each watershed have unique water quality characteristics that appear to trigger the return of fish that were spawned in that watershed. *False attraction flows* can occur due to discharges that can trigger seasonal migration at times or locations that are not appropriate for spawning for the fish that are lured into the watershed. Therefore, if water from the Sacramento River is discharged to the San Joaquin River, this discharge could falsely attract fish that spawned in the Sacramento River watershed into the San Joaquin River watershed.)

- **Initial Screening Conveyance Alternative B4.** *Isolated Conveyance with a Lined or Unlined East Canal between the Sacramento River near the Confluence with the Feather River and the Lower San Joaquin River, and Abandonment of Existing South Delta Intakes*. This alternative was eliminated from further evaluation because it would be at least three times longer than most other isolated conveyance alignments considered and would therefore increase the extent of disturbance to communities and habitat along this conveyance alignment and be drastically more expensive to construct than substantially shorter alignments. This alternative also was eliminated because the amount of water available for export at the SWP and CVP pumping plants would be substantially less than under the existing conditions. Available flows in the Sacramento River upstream of the American River would be approximately 10 to 20% less than downstream of the American River, especially in the spring months. Results of a preliminary evaluation presented on July 29, 2010 at the BDCP Steering Committee indicated that diversions upstream of American River probably would not occur until the flows were greater than 5,000 cfs due to the need to provide water to diversions located between the Feather and American Rivers (including over 200,000 acre-feet/year of water rights or CVP water rights settlement contracts with Natomas Central Mutual Water Company; the cities of West Sacramento, Davis, Woodland, and Sacramento; and several reclamation districts). The presentation to the BDCP Steering Committee indicated that these types of restrictions and the inability to divert water from the American River could reduce the amount of diversions from the Sacramento River by 30% as compared to intakes located downstream of the American River. This conveyance alternative does not include use of the existing south Delta intakes, and there would be no opportunity to replace the reduction in exports from these south Delta intakes. Therefore, the total SWP and CVP exports probably would be substantially less than under existing conditions.

- **Initial Screening Conveyance Alternative B5.** *Isolated Conveyance with Diversions from the Sacramento River near West Sacramento into the Sacramento Deep Water Ship Channel, a 15,000 cfs intake along the eastern levee of the Deep Water Ship Channel upstream of Prospect Island, Pumping Plant near the intake, a Tunnel between the Deep Water Ship Channel and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*. Under this alternative, a ship lock would be constructed immediately downstream of the intake to prevent the conveyed water from flowing into the Sacramento River and to prevent fish from swimming from the Delta into the conveyance facility. Some of these elements are similar to those described with respect to a subsequent proposed alternative addressed below in Section 3A.11.2.

  DWR and CDFW evaluated the use of the Sacramento Deep Water Ship Channel for Conveyance in 2008 in response to public scoping comments, and presented the results at two meetings of the BDCP Steering Committee in 2009 (DWR 2009b and DWR 2009k). The analysis considered use of the five north Delta intakes located along the Sacramento River to avoid disruption of operations of the Port of West Sacramento and provide multiple intake locations as compared to only one intake location near the port.

  The January 14, 2009, presentation stated that use of the Deep Water Ship Channel would avoid impacts on about 2,200 acres due to construction and operations of a portion of a western isolated canal that would be parallel to the eastern levee of the Deep Water Ship Channel. However, the presentation stated that this alternative would cause delays to ship transit times in the Deep Water Ship Channel due to ship handling/piloting through the new lock. The presentation also stated that there was a potential for delta smelt to enter the conveyance facility by passing through the lock. Considerations relating to potential adverse impacts on

delta smelt include impacts on important habitat features and the fact that surveys have found delta smelt in this area.

The presentation also stated that the Deep Water Ship Channel would require reconstruction because the facility (1) does not meet the seismic criteria for the Isolated Conveyance Facility, (2) was not designed to withstand the 200-year return flood and associated inundation, and (3) was not designed to withstand sea level rise that could occur over the next 100 years, and because levees may require improvement to store the additional water at higher elevations than existing flows.

The April 15, 2009 presentation included results from the 2006, 2007, and 2008 delta smelt surveys. The results showed the presence of over 700 delta smelt/10,000 cubic meters along the lower Deep Water Ship Channel near the potential locations of the new ship lock and intake. The information in the presentation included results of an analysis that showed that the number of delta smelt observed was generally less than 5% of the delta smelt observed in the western Delta.

This alternative was eliminated from further evaluation because it could adversely affect delta smelt and navigation along a federal navigation corridor. This alternative would include the same intakes and conveyance facilities between the Sacramento River to the eastern levee of the Deep Water Ship Channel as in Initial Screening Conveyance Alternative A3. Therefore, the difference in potential adverse impacts on the lands located to the east of the Deep Water Ship Channel would be limited to the lands located along the toe of the Deep Water Ship Channel levee. If the intake were located near the Port of West Sacramento, a single, large intake would be constructed at one location along the Sacramento River, which could result in localized impacts on aquatic resources and navigation, and could require modification of the locks at the Port of West Sacramento.

- **Initial Screening Conveyance Alternative B6.** *Isolated Conveyance with a Tunnel between the Sacramento River near Fremont Weir and the SWP and CVP Pumping Plants, Isolated Conveyance with a Tunnel between the Sacramento River near Decker Island to Clifton Court Forebay and Bethany Reservoir, and Continued Use of the South Delta Intakes*. This alternative was eliminated from further evaluation because it would require a longer alignment than most other isolated conveyance alignments considered, and would therefore increase the extent of disturbance to communities and habitat along this conveyance alignment and be drastically more expensive to construct than substantially shorter alignments. This alternative also was eliminated because the amount of water diverted from the Sacramento River would be less than under other isolated conveyance alternatives, and therefore, the amount of water to be diverted at the south Delta intakes would be greater than under other isolated conveyance alternatives. This would occur because use of the intake upstream of the American River and the intake in the western Delta probably would be more limited than for intakes located along the Sacramento River between Freeport and the southern confluence with Steamboat Slough. The reduced flows in the Sacramento River upstream of the American River and the need to provide water for water rights holders or CVP water rights settlement contractors would be the same as described above for Initial Screening Conveyance Alternative B4.

  The ability to divert water in the western Delta near Decker Island could be limited due to the presence of delta smelt in the western Delta. A recent pilot study completed by the Bay Area Regional Desalination Project in March 2010 for a desalination facility with a diversion in

Mallard Slough indicated that during operations of a 25 mgd intake (approximately 40 cfs) from November 2008 through October 2009, prickly sculpin, bluegill, redear sunfish, longfin smelt, and delta smelt were entrained. The longfin smelt and delta smelt were entrained during January through June. Presence of these species in the western Delta during the period when high flows would occur in the Sacramento River could reduce the effectiveness of a western Delta intake. During July through November, salinity could be too high for diversions from the western Delta, especially as sea level rise progresses through the end of the study period in 2060.

- **Initial Screening Conveyance Alternative B7.** *Isolated Conveyance with Diversion from the San Joaquin River near Antioch and Desalination Facilities, a Tunnel between the Desalination Facilities and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*. This alternative was eliminated from further evaluation because this alternative would depend upon the capacity of the desalination facility, the intake along the San Joaquin River shoreline could extend over 3 miles for a 15,000 cfs intake, and the desalination facility could be several square miles in size. This could result in substantial impacts on land use, given the generally dense existing development in the affected areas. In addition, desalination of up to 15,000 cfs of flow would add an enormous ongoing cost not required for other options and would result in substantial energy use and, absent the development of practicable "green" power sources that could replace fossil fuel inputs, related substantial greenhouse gas emissions. Such emissions could undermine California's ability to meet its legislative mandate under the California Global Warming Solutions Act of 2006 to reduce the state's 2020 greenhouse gas emissions to 1990 levels. Other options would convey fresh water that would not need to be desalted prior to transport.

  The ability to divert water in the western Delta near Antioch also could be limited due to the presence of delta smelt in the western Delta, as described for Initial Screening Conveyance Alternative B6. Presence of delta smelt and longfin smelt in the western Delta during the period when high flows would occur in the Sacramento River could reduce the effectiveness of a western Delta intake. During July through November, salinity could be too high to for diversions from the western Delta, especially as sea level rise progresses through the end of the study period in 2060.

- **Initial Screening Conveyance Alternative C2.** *Through Delta Conveyance with Armored Corridors* was evaluated with conceptual engineering designs (CER). This alternative was eliminated from further evaluation because this alternative would result in substantial disturbance and either removal or placement of over 120 million cubic yards of materials for levee construction along the Mokelumne and Middle Rivers and Victoria Canal. This could result in substantial adverse impacts on aquatic habitat, land use, air quality, and transportation in the area during construction. In particular, concentrated air quality effects from the huge number of diesel-powered truck trips could create hotspots of toxic air contaminants that would not exist with other potential alternatives. This alternative would also take substantially longer to construct, again given the huge number of truck trips associated with importing 120 million cubic yards of materials.

- **Initial Screening Conveyance Alternative C3.** *Through Delta Conveyance with West Delta Salinity Barrier*. This alternative was eliminated from further evaluation because this concept would not meet the BDCP objectives of a brackish water system in the Delta that would support the estuarine habitat required by the BDCP covered species, and would reduce the ability of fish

passage for anadromous fish. This alternative would not support project objectives and aspects of the project purpose and need that focus on creating ecological improvements in the Delta ecosystem and contributing to recovery of declining listed species. Nor would the alternative meet the coequal goal under the 2009 Delta Reform Act of "protecting, restoring, and enhancing the Delta ecosystem."

Initial Screening Conveyance Alternative C4. *Through Delta Conveyance with Fish Screens at Clifton Court Forebay*. This alternative was eliminated from further evaluation because initial results of recent studies, including information included in the recent NMFS biological opinions, supported a phased approach that would emphasize improvements to operations of fish handling facilities and reduced predator potential within Clifton Court Forebay prior to further analysis of installation of fish screens. Clifton Court Forebay is surrounded by levees with the present gated intake located in the southeast corner near the confluence of West Canal and Old River. The forebay is surrounded by West Canal on the east, subsided Eucalyptus and King Island and sloughs on the north, and Italian Slough on the west. The forebay is surrounded by upland areas on the southwest and south sides. Water enters Clifton Court and then is conveyed by gravity to the Skinner Fish Facility, which is located upstream of the Banks Pumping Plant. Fish that enter Clifton Court Forebay are affected by predation and operations of the fish facilities. Over 60 studies have been completed by DWR in the past 20 years to evaluate the feasibility of providing fish screens along the intakes to Clifton Court Forebay. These studies have indicated that it is difficult to find a location at the Clifton Court Forebay site for a single location that would provide appropriate sweeping velocities to reduce the entrainment of fish in accordance with USFWS and NMFS fish screen operations criteria or guidance. The screen would have to be more than a mile in length, which could expose fish to excessive times in front of the screen. Because the screens are located in short sloughs with limited cross-waterways, the fish could accumulate in front of the screens and be subject to predation, poor habitat quality, or increased potential of entrainment at the Clifton Court Forebay screens and other intakes in the adjacent portions of the south Delta.

In 2002, the South Delta Fish Facilities Forum (Forum) was created by CALFED to address fish screen issues in the south Delta. The CALFED ROD directed that fish screens would be installed on the south Delta intakes for the SWP and CVP Pumping Plants. The Forum was charged with making recommendations to the California Bay-Delta Authority and state and federal agencies regarding future investments in south Delta fish screens. In April 2005, the Forum published a *Co-Chair's Report: Some Policy Conclusions* (DWR 2005). This report recommended that the best strategy included immediate actions to remedy facility deficiencies, completing ongoing investigations, and developing a long-term strategy to achieve functionally equivalent estuary and fish benefits. The co-chairs did not eliminate the possibility of future actions to implement modular screening, but stated that modular screening strategies not be pursued if cost-effective alternatives provide for increased abundance in fish populations and supporting habitat. The co-chairs recommended that following initial steps be completed first.

1. Focused investigations (including South Delta Hydrodynamic and Fisheries Investigations; and Collection, Handling, Transportation, and Release (CHTR) studies).
2. Investigation of functionally equivalent actions and assurances by the involved agencies with adequate funding.
3. Immediate actions

a. Reduction of predation losses in Clifton Court Forebay.

b. Improved debris handling operations at SWP and CVP south Delta intake facilities.

c. Completion of CHTR and south Delta hydrodynamic, water quality, and fish movement studies.

d. Improved fish handling facilities.

e. Improved water weed control measures in Clifton Court Forebay.

f. Modification of staffing, equipment, and fish handling operations procedures.

In 2009, a report was prepared for DWR to evaluate the potential for development of a low-flow screen that would be used only for diversion of part of the flow into Clifton Court Forebay (DWR 2009c). The report analyzed alternative fish screens for diversions up to 2,000 cfs that would allow limited diversions when delta smelt are present in the south Delta between April and June. Fish would continue to enter Clifton Court Forebay through the existing intake, and the fish would continue to be subject to predation and fish handling facilities losses between July and March. A low-flow diversion would provide for a portion of the SWP and CVP exports, especially for users that do not have adequate storage to continue operations when south Delta diversions are restricted. The analysis considered the feasibility of fish screens on low-flow intakes, but did not consider specific operational criteria to be developed by USFWS and NMFS or the potential that this would reduce predation in Clifton Court Forebay or population risks to species due to all SWP diversions. The evaluation considered the following intakes and identified some potential issues to be evaluated in future studies.

1. Intake Along Italian Slough – The screened water would be diverted around Clifton Court Forebay to the west into Italian Slough in order to avoid predation potential for any fish remaining in the forebay. This proposal requires a long screen with multiple pumps at several elevations, creating its own predation problems. According to DWR, "this alternative would require a very long pumped fish bypass system including multiple pump lifts. A long bypass would increase risk of injury and losses and predation at the outfall." Thus, "[a]dditional predator management strategies in Italian Slough would also need to be developed for periods during [low-flow intake] diversion."

2. Intake along Kings, Eucalyptus, and Widdows Islands or the eastern boundary of Byron Tract – Screens could be located along levees with adequate sweeping velocities, and could require a pumped bypass to provide fish passage away from the screens. The screened water would be diverted around Clifton Court Forebay to avoid predation potential of any remaining fish in the forebay.

3. Intake along West Canal at locations in the northern, central, or southern portions of the existing Clifton Court Forebay levee – Screens would be located along the existing levee. Fish could be bypassed from the screens, depending upon the design, into Old River at one location, which could contribute to predation losses. The screened water would be diverted into Clifton Court Forebay and any remaining fish would be subject to predation.

4. Intake along Old River upstream of West Canal – This screen may not be able to provide 2,000 cfs of capacity due to limited sweeping velocities in this location. The screened water would be diverted around Clifton Court Forebay to avoid predation potential of any remaining fish in the forebay.

No specific recommendations were presented in the 2009 report for a preferred alternative. The report identified issues that would require further evaluation prior to completing a feasibility study, including additional hydrologic and hydraulic modeling, geotechnical analysis, bathymetry data, specific operating criteria, topographic data, environmental analysis, and predation control analysis.

The 2008 USFWS Biological Opinion analyzing the effects of the coordinated long-term operation of the SWP and CVP on delta smelt and its critical habitat and the 2009 NMFS Biological Opinion analyzing the effects of the coordinated long-term operation of the SWP and CVP on the listed species of salmonids, green sturgeon, and southern resident killer whale addressed several aspects of the proposed SWP and CVP operations of the south Delta intakes, but did not include specific recommendations in the proposed Reasonable and Prudent alternatives related to fish screens at the south Delta intakes. The NMFS Biological Opinion (Action IV.4) recommended changes in operations and infrastructure of the CVP and SWP fish collection facilities to increase fish salvage efficiency, reduce pre-screen losses, and improve screening efficiencies. Prior to the issuance of the biological opinions, DWR conducted a study (published in March 2009) to identify methods that would reduce predation in Clifton Court Forebay (DWR 2009d). In response to the recommendations of the March 2009 study and recommendations of the NMFS Biological Opinion, DWR initiated actions to reduce predation in Clifton Court Forebay, including the following.

1. Submitted a letter on March 24, 2011, to the California Fish and Game Commission requesting a bag limit exemption and size limit modification for striped bass to reduce the striped bass population in Clifton Court Forebay. This petition was not approved by the Fish and Game Commission.
2. Initiated design of facilities to improve fishing access in Clifton Court Forebay
3. Completed two reports in 2010 that summarized the results of focused investigations on the release phase of the CHTR process (DWR 2010a, DWR 2010b).The reports contained recommendations for release site design criteria and recommended modifications to the existing release sites including predatory bird deterrents, larger pipe flushing systems, and site debris removal to reduce predator habitat.
4. Initiated design for improving conditions to reduce predation at locations where salvaged fish are released into the Delta, including refurbishing and modifying the existing release sites to incorporate the recommendations from the CHTR release site investigations, and evaluating the use of additional release locations to reduce the frequency of releases at each site.

Based upon these efforts, in May 2011, DWR requested an extension of the schedule to comply with the suggested schedules for most provisions of the NMFS Biological Opinion Action IV.4.2 (DWR 2011). The extension was granted in July 2012 with a concurrence that NMFS agreed with DWR's proposal for this provision (NMFS 2012).

The remaining conveyance alignment alternatives were renumbered and presented below.

- **Second Screening Dual Conveyance Alignment Alternative A.** *Dual Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes* (Initial Screening Conveyance Alternative A1).

- **Second Screening Dual Conveyance Alignment Alternative B.** *Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes* (Initial Screening Conveyance Alternative A2).
- **Second Screening Dual Conveyance Alignment Alternative C.** *Dual Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes* (Initial Screening Conveyance Alternative A3).
- **Second Screening Isolated Conveyance Alignment Alternative A.** *Isolated Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes* (Initial Screening Conveyance Alternative B1).
- **Second Screening Isolated Conveyance Alignment Alternative B.** *Isolated Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes* (Initial Screening Conveyance Alternative B2).
- **Second Screening Isolated Conveyance Alignment Alternative C.** *Isolated Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes* (Initial Screening Conveyance Alternative B3).
- **Second Screening Through Delta Conveyance Alignment Alternative.** *Separate Corridors with new fish screens along the Sacramento River at the Delta Cross Channel and Georgiana Slough to convey water through the lower Mokelumne River system and across the San Joaquin River to Middle River and Victoria Canal; a siphon under Old River for continued conveyance to the existing SWP and CVP pumping plants; operable barriers on Snodgrass Slough, head of Old River, Threemile Slough or Sevenmile Slough, and between Old River and Middle River (at Woodward Canal, Railroad Cut, and Connection Slough); dredging and setback levees along portions of Middle River; and continued use of the existing SWP and CVP South Delta intakes would occur during flood periods* (Initial Screening Conveyance Alternative C1).

The general approaches to conveyance could be implemented with facilities of different diversion and conveyance capacities (e.g., 3,000, 6,000, 9,000, or 15,000 cfs).The ultimate decisions regarding what capacities should be addressed in particular EIR/EIS alternatives would turn in large part on how differing capacities would affect overall SWP/CVP systems operations. Operational issues are discussed below.

3A.8 Development of Conveyance Operations Alternatives by BDCP Steering Committee in 2010

This section describes the processes conducted by the BDCP Steering Committee to develop and evaluate a range of Delta water operations and integration of those operations with various habitat restoration elements. These processes included specific evaluations by the Conveyance Workgroup and the Habitat and Operations Technical Team, an independent review by scientists using an approach developed for the Delta Regional Ecosystem Restoration Implementation Plan, and the BDCP Steering Committee.

3A.8.1 BDCP Steering Committee Conveyance Workgroup and Habitat and Operations Technical Team Development of Operations Alternatives

In October 2007, the BDCP Steering Committee formed the Conveyance Workgroup and the Habitat and Operations Technical Team (HOTT) to develop and consider screening-level evaluations for the operations of conveyance facilities and restoration programs in the north, west, and south Delta. Working groups and technical teams met periodically to develop technical information or recommendations about aspects of the Conservation Plan elements for consideration by the Steering Committee. The following operational issues related to the Dual Conveyance and/or Isolated Conveyance alternatives were evaluated.

- Diversion criteria for the new north Delta intakes along the Sacramento River for use with Dual or Isolated Conveyance alternatives, including limitations on timing and quantities of water to be diverted from the Sacramento River between the City of Sacramento and Walnut Grove.
- Diversion criteria for the new north Delta intakes along the Sacramento River for use with Dual or Isolated Conveyance alternatives, including river bypass flows, effects on Delta Cross Channel and Threemile Slough flows, and Rio Vista flows.
- West Delta outflow criteria.
- Summer-fall flow criteria on the San Joaquin River at Vernalis.
- Two alternative spring X2 operating assumptions:
    - Operations where salinity is maintained roughly to the requirements of State Water Board Decision 1641 (D1641) but implemented as a function of Eight-River Index and over the 5-month period between February and June.
    - A proposal by the environmental stakeholders where outflow is increased in many years and implemented as a function of the Eight-River Index (which includes four rivers in addition to the four Sacramento River basin rivers used in the more traditional Four-River Index that is used by DWR to define water year types).

These groups also addressed operational issues that were more related to north Delta diversion intake design criteria and habitat restoration conservation measures, including inundation of Yolo Bypass; establishment of new floodplain bypasses to be located to the east of the existing Sacramento Deep Water Ship Channel and between Sacramento River and Stone Lakes; hydraulic connections between the Sacramento River and upper reaches of Sutter and Steamboat Sloughs; tidal habitat in the west Delta, south Delta, and Suisun Marsh; and effects of conveyance along Old River. As described in Section 3A.1, separate appendices have been prepared to describe the development of intake design criteria (Appendix 3F, *Intake Location Analysis*) and habitat restoration conservation measures (Appendix 3G, *Background on the Process of Developing the BDCP Conservation Measures*).

Throughout 2008, the work products and findings of several BDCP Steering Committee workgroups and technical teams were presented to the BDCP Steering Committee. The work products can be accessed on the BDCP website (http://baydeltaconservationplan.com/Library.aspx). The Conveyance Workgroup, Habitat and Operations Technical Team, and Integration Team considered and incorporated the results into the following interactive screening evaluations.

- **Fluctuating Delta Salinity.** Relaxations in the net Delta outflow requirements were investigated for summer and fall (4,000 cfs in wet years, 3,000 cfs in above normal years, 2,000 cfs in below normal years, 1,000 cfs in dry years, and 0 cfs in critical dry years) to explore a range of salinity and X2 effects. (X2 is the location in the Delta that represents the location of 2 parts per thousand salinity contour, or isohaline contour, measured one meter above the bottom of the estuary, and reported in kilometers upstream of the Golden Gate Bridge [State Water Board 2000].) Rio Vista, salinity and Delta export/inflow (EI) ratio standards were also relaxed during this period. The goal was to evaluate the range of variable salinity conditions (increasing salinity in summer and fall of dry years) to be achieved and believed to provide a competitive advantage to native species. Preliminary results of the analyses are summarized below.
    - Higher fall and/or summer salinity could be managed with a rather rapid return to fresher water quality conditions in the western Delta in early winter, as long as salinity intrusion in the south Delta was not substantial.
    - South Delta water quality could be severely degraded during times without increased San Joaquin River flows or discharge of water from the Isolated Conveyance into the Lower San Joaquin River.
    - Fluctuating Delta salinity throughout the year allows for significantly enhanced upstream storage in the Sacramento River watershed and improved coldwater pools, but increased Delta salinity results in reduced Sacramento River flows. Increased flow requirements at Rio Vista would require increased Sacramento River flows.
    - Available water for SWP and CVP is increased under fluctuating salinity criteria, particularly if western Delta salinity is allowed to increase in the summer.
    - Fluctuating salinity scenarios with increased Rio Vista flow criteria did not have a significant impact on upstream or Delta conditions.
- **Flooded Western Island.** Based on the DWR Delta Risk Management Study (DRMS) analyses, scenarios related to salinity intrusion due to levee failures and Sherman Island flooding were conducted. The workgroup and technical teams determined that the DRMS work suggested that such a flooding event could result in an eastward shift in X2 of approximately 6 kilometers (km). The conditions were evaluated to determine if flooding of large tracts of western islands may create large areas of low salinity habitat and allow X2 to be managed at a more easterly location than under existing conditions. Preliminary results of the analyses are summarized below.
    - Significant salt water intrusion would occur if Sherman Island were flooded, and X2 would move eastward by almost 6 km if there were no changes in Delta outflow criteria.
    - Under the same X2 compliance conditions as prescribed in D1641, Delta outflow requirements would cause significant loss of water supply availability and largely eliminate the ability for coldwater pool management in upstream Sacramento River reservoirs due to the need to release water to maintain X2.
- **Preferential Diversion on the Sacramento River at Hood as Compared to South Delta Diversions.** All D1641 standards were removed from a basic Dual Conveyance simulation to evaluate system operations effects and incremental tradeoffs of potential regulatory actions. Preliminary results of the analyses are summarized below.

- North Delta Bypass criteria (also known as Hood Bypass Rules), Delta outflow criteria, and Old and Middle Rivers (OMR) reverse flow criteria in the south Delta could be used to modify Delta conditions in accordance with biological goals and objectives.
- Use of North Delta Bypass criteria without additional Delta outflow and OMR criteria did not substantially change water supply availability for SWP and CVP.
- Changing the location of the diversions from the north Delta to the existing south Delta intakes resulted in changes in salinity that were similar to those of the fluctuating salinity scenario.

- **Increased Spring River Flows.** Reservoir releases to increase peak flows in the Sacramento and San Joaquin Rivers in March and April and achieve Yolo Bypass inundation of approximately 5,000 cfs were evaluated to determine the effects of substantially restoring spring hydrographs on the Sacramento and San Joaquin Rivers. Preliminary results of the analyses are summarized below.
  - Spring releases both increased the extent of flooding with higher flows and reshaped the hydrograph along the Sacramento River from Keswick Reservoir to Rio Vista.
  - Reductions in available water supplies for SWP and CVP due to spring reservoir release actions were potentially as high as 250,000 to 300,000 acre-feet/year without consideration of additional releases of San Joaquin River flows.
  - Increased San Joaquin River flows generally had a positive effect on spring time QWEST (net flow of the Lower San Joaquin River) and OMR flows, potentially decreasing entrainment effects and improving water quality at the existing south Delta SWP and CVP intakes.
  - Changing the flow targets to increase river flows in December through January could achieve some biological benefits for winter run salmon and improve water supply availability as compared to increased spring releases.
- **Increased Spring Delta Outflow.** The Eight-River Index approach to defining release patterns from upstream reservoirs to meet X2 criteria between February and June was evaluated except for critical dry years when the index was less than 5 million acre-feet. The objective was to evaluate the potential for achieving substantially higher Delta outflow without creating adverse coldwater pool management concerns in upstream reservoirs on the Sacramento River. Preliminary results of the analyses are summarized below.
  - Spring X2 was moved towards the west; however, water supply availability for SWP and CVP and Sacramento Valley water rights and CVP water users was reduced.
  - High Delta outflow requirements in the spring reduced upstream reservoir storage, especially during sequential drier years, with some system recovery occurring during wetter periods.
  - Provision of "off-ramps," or adjustments (e.g., provisions to allow additional diversions from the Sacramento River if water storage in upstream reservoirs exceeded agreed-upon values), based on upstream storage conditions reduced the impact, but failed to protect declining storage during extended drought periods.
- **Increased Fall X2 Delta Outflow.** Implementation of Fall X2 targets between September and November were explored based on water year types under the Eight-River Index. Storage criteria were included to limit reductions in upstream storage, including maintaining Shasta

Lake storage greater than 2.8 million acre-feet and Oroville Reservoir storage greater than 1.0 million acre-feet. The goal was to evaluate the potential for achieving higher fall Delta outflow targets without creating adverse coldwater pool management conditions in upstream reservoirs. Initial assessments indicated that the Fall X2 targets using a sliding scale based on the prior water year types under the Eight-River Index appeared achievable with some reductions in SWP and CVP water supply availability.

- **Preferred South Delta Diversion.** Continued use of the existing south Delta intakes at an increased diversion rate resulted in limited reduction of entrainment effects as compared to existing conditions while reducing the need for higher diversion in the north Delta. Preliminary results of the analyses are summarized below.
    - Dual Conveyance operations with a preference for south Delta diversions could be configured to result in SWP and CVP water supply availability similar to what occurs under existing conditions.
    - Reducing flow conditions at the SWP and CVP south Delta intakes that may lead to entrainment could be accomplished through modification of OMR or managing south Delta intake diversions as a function of San Joaquin River flows.
    - Greater flexibility in opening the Delta Cross Channel gates after August would reduce the potential for central and south Delta water quality degradation and could increase SWP and CVP water supply availability under a south Delta preferred point of diversion.
- **Fully Isolated Hood Diversion.** A set of scenarios were explored to evaluate the potential of a fully Isolated Conveyance from a north Delta diversion only and with more restrictive north Delta bypass flow operations. Preliminary results of the analyses are summarized below.
    - Project operations under a fully Isolated Conveyance with high flow north Delta bypass rules possibly could result in substantial reductions in SWP and CVP water supply availability in dry or critical dry years.
    - Increasing north Delta bypass flows would not necessarily result in a more natural hydrograph in the Sacramento River unless there were increased upstream reservoir releases.
    - Limitations on SWP and CVP water supply availability are often controlled by the north Delta bypass requirements and Rio Vista flow requirements.

3A.8.2 Delta Regional Ecosystem Restoration Implementation Plan (DRERIP) Assessment of Core Elements

At the end of 2008, the BDCP Steering Committee approved a draft set of core elements of a conservation strategy for preliminary evaluation (BDCP 2008). The preliminary evaluation was principally designed to provide information for the conceptual ecosystem and species evaluation process known as the Delta Regional Ecosystem Restoration Implementation Plan (DRERIP). The goal of this evaluation was to refine existing and develop new Delta-specific restoration actions as well as to provide Delta-specific implementation guidance, program tracking, performance evaluation and adaptive management feedback. The core elements consisted of the following items.

- Move primary point of diversion to new north Delta diversion facilities with state-of-the-art fish screens with up to 15,000 cfs capacity subject to north Delta bypass criteria, upstream river flows, downstream flow requirements, and conveyance limitations.
- Establish north Delta bypass flow criteria (two scenarios) at north Delta diversion to limit diversions during low Sacramento River flows and during periods of concern for covered species, including 11,000 cfs and 5,000 cfs bypass flow scenarios in winter and spring.
- Manage diversions at existing south Delta intakes to reduce entrainment of fish and food resources, including limiting diversions when OMR is greater than -3,500 cfs in December through June, and greater than -5000 cfs in July through November.
- Close the Delta Cross Channel except during July, August, half of September, and October to protect central and south Delta water quality.
- Modify Fremont Weir and Yolo Bypass to provide more frequent and greater duration of inundation, up to 4,000 cfs during December 1 through May 15.
- Large-scale tidal marsh restoration in the Cache Slough area of 5,000–15,000 acres; strategic tidal marsh restoration in the west Delta, and large-scale tidal marsh restoration in the Suisun Marsh area.

The results of modeling studies of these elements under two scenarios (Scenario 1 with high North Delta Bypass flow criteria, and Scenario 2 with low North Delta Bypass flow criteria) were presented to a scientific evaluation process very similar to that created under the DRERIP process in early 2009 (BDCP 2009a).

The BDCP Steering Committee and the BDCP HOTT considered the results of the DRERIP Course Evaluation in early 2009. The modified DRERIP analysis evaluated individual portions of the BDCP and a synthesis of all portions of the BDCP (assuming Dual Conveyance operations). The results related to conveyance indicated that joint operations of the north Delta diversions, Yolo Bypass, and south Delta intakes appeared to provide benefits for several covered fish species, but that more information would be needed to more fully understand potential outcomes (BDCP 2009b).

3A.8.3 BDCP Steering Committee Project Description for Preliminary Effects Analysis

Based on the results of the modified DRERIP analysis, the following additional analyses were completed for the BDCP Steering Committee during 2009 to further evaluate water conveyance and operations.

- **Climate Change "Early-Look."** In order to include changes in hydrology in the Delta watershed due to climate change and increased sea level rise over the next 50 to 60 years, regional climate change scenarios were developed based on the climate scenarios developed by DWR, Reclamation, USFWS, and NMFS. Results from a preliminary set of model simulations indicated that climate change could have a substantial effect on the timing of watershed runoff, with earlier runoff patterns due to more rain and less snow, increased amounts of rainfall during winter storms, and earlier snowmelt due to higher temperatures. Currently, during the winter and spring months, snow accumulates in the watershed above the reservoirs and rainfall increases the amount of water stored in the reservoirs. Then, during the late spring and summer months, as water is released from the reservoirs for downstream water uses, the water is

replaced in the reservoir by the melting snow. In the future, with climate change, more intense and frequent storms are projected to occur during the winter and spring months with less snowfall and more rain. Therefore, the reservoirs will attain maximum storage volumes earlier in the winter/spring months than under current conditions and will need to release flows downstream to maintain available storage in accordance with USACE flood management requirements. During the late spring and summer months, when water is released from the reservoirs for downstream water uses, including instream flow requirements and senior water rights, there will be less snow to melt and refill the reservoirs; therefore, there may be less water available for water uses in the summer and fall months, including cold water for aquatic resources in the fall and SWP and CVP water supplies.

- Salinity increased in the western and central Delta and X2 occurred at locations east of existing conditions. This required release of more Delta outflow to maintain the X2 location, which resulted in less water availability for SWP and CVP.
- **North Delta Bypass Flows and Operations.** Operational criteria for north Delta diversion facilities were developed to refine tidal operations under low flow conditions.
- **Tidal Marsh and Delta Simulation.** Corroborative simulations with a two dimensional model were conducted to improve simulation of Suisun Marsh restoration components, other tidal marsh restoration actions, Cache Slough, and current inundation of Liberty Island.
- **Daily Operations.** Other modeling improvements were completed to incorporate daily operations of the Fremont Weir operations and North Delta Bypass criteria and diversions.
- **Delta Island Consumptive Use Estimates.** The Delta island consumptive use and drainage assumptions were modified based upon recent data submitted to DWR by the Delta water users and data compiled by DWR.

In December 2009, a "mini-effects analysis" was performed. The objective of this analysis was to prepare a final set of conservation measures for the hydrologic and water quality modeling of the Preliminary Proposed Project to be defined in January 2010. The results of the mini-effects analysis were considered with other information presented to the BDCP Steering Committee as part of the effort to define the long-term water operations criteria for evaluation in the effects analysis (BDCP 2010a). The results of this analysis were used to conduct a preliminary effects analysis that was completed in 2010 and presented in the BDCP Steering Committee Progress Report published in November 2010 (BDCP 2010b). The description of the operational criteria presented to the BDCP Steering Committee in February 2010 is presented in Table 3A-4 (located at the end of this appendix).

The operations presented in Table 3A-4 were defined as the *January 2010 BDCP Operations* for Dual Conveyance. Initial modeling analysis completed for BDCP indicate that January 2010 BDCP Operations would increase SWP and CVP water supply availability as compared to existing conditions and would not adversely affect water deliveries to water rights holders and SWP and CVP water users located in the Sacramento Valley as compared to existing conditions.

Use of January 2010 BDCP Operations for Isolated Conveyance would be slightly different because the south Delta intakes would be abandoned, and therefore, there would not be any operations criteria for those intakes, as presented in Table 3A-5.

3A.9 Conveyance Operations Alternatives Identified in 2011

Following the completion of the BDCP Steering Committee November 2010 Project Status Report and Draft Plan, several additional conveyance alternatives were identified or more fully defined by the following agencies or groups.

- Following a series of model runs, federal and state agencies developed an operations proposal that became known as "Scenario 6," based on the fact that the final version was the product of six sets of model runs. Working together, the agencies used the January 2010 BDCP Operations as a starting point, but made several changes, including the addition of the Fall X2 requirement from the USFWS 2008 Biological Opinion (USFWS 2008), modifications of OMR criteria, modifications of the Head of Old River Barrier operations, and implementation of south Delta temporary agricultural barriers, as under existing conditions.[19]
- Federal and state agencies proposed an Enhanced Ecosystem Conveyance Operations approach similar to January 2010 BDCP Operations, with Fall X2 as under the USFWS 2008 Biological Opinion (USFWS 2008), reduced ability to divert water at the north Delta intakes through more stringent north Delta intake bypass criteria and Sacramento River flow requirements at Rio Vista, changes to OMR criteria, and reduced ability to divert water at the south Delta intakes.
- State Water Board provided additional information related to the scoping comments submitted in 2008 and 2009 (State Water Board 2011a, State Water Board 2011b, and State Water Board 2011c). The proposal, *Enhanced Spring Delta Outflow*, would provide additional spring Delta outflow in all water year types to promote abundance and productivity of longfin smelt and other estuarine species, and Delta inflows would be modified to promote a more natural hydrograph.
- Several environmental organizations proposed the following three alternatives (American Rivers et al. 2011).
    - An alternative to (1) achieve Fall X2 and protections in the south Delta, (2) re-establish a more natural hydrograph during winter and spring months, and (3) conduct reservoir operations to prevent unintended drawdowns with a range of potential conveyance capacities. The operations would be similar to Scenario 6 with (1) Fall X2 as under the USFWS 2008 Biological Opinion (USFWS 2008), (2) modifications to OMR flow criteria, (3) proportional inflow bypasses from Shasta Lake, Folsom Lake, and Oroville Reservoir into the Sacramento River, and (4) additional pulse flows in the late winter and through the spring to protect out-migrating fall-run and spring-run Chinook salmon.
    - Operations to provide Delta outflow as described in the *State Water Resources Control Board Flow Recommendations for the Sacramento-San Joaquin Delta Ecosystem*, published in 2010 (State Water Board 2010b).
    - Operations as described above under Scenario 6 with a conveyance capacity of 9,000 cfs.
- Contra Costa Water District and other commenters proposed a Limited Dual Conveyance Facility, similar to January 2010 BDCP Operations with only 3,000 cfs capacity for the north

[19] See "Rationale for Five Agency Proposed Alternative BDCP Initial Project Operations Criteria," May 18, 2011 Working Draft.

Delta intakes, addition of Fall X2 as under the USFWS 2008 Biological Opinion (USFWS 2008), and modifications to the San Joaquin River inflow/export ratio.

This section discusses considerations for the alternatives not previously evaluated under the initial screening process.

3A.9.1 Federal and State Agencies Alternative: Scenario 6 Alternative

Following the completion of the August 2010 preliminary draft effects analysis on the Preliminary Proposal, the state and federal agencies (DWR, CDFW, Reclamation, USFWS, and NMFS) (Five Agencies) developed what is known as "Scenario 6" to address concerns raised by CDFW, USFWS and NMFS in their review of the preliminary draft effects analysis. The alternative operating criteria are based on the BDCP Steering Committee 2010 Project Operations with modifications, including a north Delta diversion bypass criteria, OMR flow during certain months, and fall outflows targets.

Scenario 6, proposed by the agencies as an alternative to the 2010 operating criteria for evaluation in the effects analysis, includes modified criteria intended to address the following three issues: San Joaquin River migratory fish survival, April–May OMR flows, and Fall X2. Scenario 6 also includes an operable barrier at the head of Old River. Scenario 6 does not include modifications to address reduced Sacramento River flows downstream of the new intakes, or the winter-spring outflow issues related to longfin smelt (or the location of the north Delta intakes). The agencies' intent was to address these two issues in the development of adaptive ranges subsequent to completion of the effects analysis.

The operational criteria for Scenario 6 are presented in Table 3A-6. Initial modeling analysis completed for BDCP indicate that Scenario 6 operations would reduce SWP and CVP water supply availability as compared to the January 2010 BDCP Operations, increase SWP and CVP water supply availability as compared to Existing Conditions, and would not adversely affect water deliveries to water rights holders and SWP and CVP water users located in the Sacramento Valley as compared to existing conditions.

3A.9.2 Federal and State Agencies Alternative: Enhanced Ecosystem Conveyance Operations Alternative

The Enhanced Ecosystem Conveyance Operations alternative was developed by CDFW, USFWS, and NMFS to be considered in the EIR/EIS. The operations were based upon the January 2010 BDCP Operations with Fall X2 as under the USFWS 2008 Biological Opinion (USFWS 2008). This alternative increased the Sacramento River flow requirement at Rio Vista and constrained the ability to divert water at the north Delta intakes through more stringent north Delta intake bypass criteria than under the January 2010 BDCP Operations. This alternative also reduced the potential for reverse flow in the south Delta with (1) changes to OMR criteria; (2) changes to San Joaquin River inflow/export ratio criteria; and (3) not allowing use of the south Delta SWP and CVP intakes in April, May, October, and November to protect migrating fish. The operational criteria for the Enhanced Ecosystem Conveyance Operations alternative are presented in Table 3A-7.

It was determined that this alternative would include a tunnel conveyance alignment to minimize surface disturbance to the ecosystem during construction and operations.

3A.9.3 State Water Resources Control Board Enhanced Spring Delta Outflow Alternative

Following development of the Enhanced Ecosystem Conveyance Operations Alternative, preliminary modeling results were considered to determine if this alternative also could be responsive to the scoping comments submitted by the State Water Board because this agency is a responsible agency with jurisdiction by law and special expertise. It was determined that based upon scoping comments and other information provided by the State Water Board, an additional alternative would be required to be responsive to the agency's scoping comments. The State Water Board provided comments to the DWR 2008 and 2009 NOPs regarding the scope and content of the environmental analyses for the BDCP in letters dated May 30, 2008 (State Water Board 2008) and May 15, 2009 (State Water Board 2009). Additional information was provided from the executive director of the State Water Board to the deputy secretary of the Natural Resources Agency, in three letters dated April 19, 2011, August 24, 2011, and December 19, 2011 (State Water Board 2011a, State Water Board 2011b, and State Water Board 2011c).

The State Water Board's May 30, 2008 NOP scoping comments cited, among other things, the need for the BDCP EIR/EIS to "analyze a broad range of alternate water quality objectives and operational strategies, including reduction in exports, that may be more protective of fish and wildlife beneficial uses." The State Water Board's May 15, 2009, scoping comment letter referred specifically to the value of analyzing increased Delta outflow, as a percent of unimpaired flows (unimpaired flow is roughly defined as the flow that would occur without upstream reservoirs or diversions):

> Combined with analyzing potential reductions in exports, an alternative for changes to Delta outflows (and potentially inflow requirements) should also be analyzed that reflects a more natural hydrograph. Current outflows and operations have tended to flatten the natural hydrograph and produce more static flow conditions in the Delta. Outflows and export regimes that support a more natural variable hydrograph should be analyzed, including both the naturally high outflow and naturally low outflow ends of the hydrograph for both the interim and long-term. One way to conduct this analysis would be to analyze the effects of providing various percentages of the unimpaired Delta inflow and outflow, and managing storage releases and exports to attempt to parallel this pattern.

Pursuant to the Sacramento-San Joaquin Delta Reform Act of 2009, the State Water Board prepared a report with flow criteria for the Sacramento–San Joaquin Delta Ecosystem that can be used to aid in the development of potential alternatives for Delta outflows (State Water Board 2010b), including the reduced export alternative referenced in the State Water Board's previous NOP comments. On April 19, 2011, the Executive Director of the State Water Board sent a letter to the deputy secretary of the Natural Resources Agency stating (State Water Board 2011a):

> The State Water Board's Delta Flow Criteria Report includes determinations of flow criteria for the Delta ecosystem to protect public trust resources. The report makes clear that the flow criteria do not consider the balancing of public trust resource protection with public interest needs for water. The flow criteria also did not consider other public trust resource needs such as the need to manage cold-water resources in reservoirs tributary to the Delta. Nonetheless, the flow determinations contained in the Delta Flow Criteria Report, together with recent scientific conclusions of other State and federal agencies, including the Department of Fish and Game, National Marine Fisheries Service, and the Interagency Ecological Program provide a useful guide to establish one side of a reasonable range of alternatives. State Water Board staff suggests that a reasonable range of alternatives may be established by making changes to the operational criteria already being evaluated in one or several of the alternatives considered by the BDCP per

> the September 1, 2010 Table 1: Modified Array of Alternatives. The changes should be made to address two of the summary determinations in the Delta Flow Criteria Report: 1) provide additional spring Delta outflow in all years to promote increased abundance and improved productivity for longfin smelt and other estuarine species; and 2) provide flows that promote a more natural hydrograph at all times.

The Delta Flow Criteria Report summary determination was presented as 75% of unimpaired net Delta outflow for January through June. As described in the letter, this determination did not consider the competing needs for water or other public trust resource needs such as the need to manage cold-water resources in tributaries to the Delta. Implementing such a flow would also likely affect water users beyond just CVP and SWP south-of-Delta deliveries. The letter therefore described an approach that could be used to develop a BDCP alternative that increased spring Delta outflow.

> Model runs for these revised alternatives should be made in an iterative fashion to ascertain the maximum additional fixed quantity of additional Delta outflow that would provide useful information to evaluate balancing of the beneficial uses of water and achieving the coequal goals. As a starting point, staff suggests adding 1.5 million acre-feet per year to Delta outflow.

The letter also suggested that State Water Board and DWR could refine this modeling approach. Staff met several times in the following months and identified a general approach that could be used to model an increased spring Delta outflow alternative.

As described in the August 24, 2011 letter from the executive director of the State Water Board to the deputy secretary of the Natural Resources Agency (State Water Board 2011b), the goal of this general approach was to increase spring Delta outflow above that achieved in the Enhanced Ecosystem Conveyance Operations Alternative (described in Section 3A.9.2) and increase spring Delta outflow by approximately 1.5 million acre-feet, on average, above the NEPA baseline assumptions (No Action Alternative without the effects of sea level rise or climate change). The State Water Board anticipated that this would result in:

- No negative effects on cold water pool storage.
- Not drawing down Sacramento Valley groundwater levels.
- No decreased water supplies other than south-of-Delta CVP and SWP deliveries.
- No failure to deliver San Joaquin River exchange water rights.
- No failure to deliver refuge water.

The specific goal for this alternative was to increase spring Delta outflow by approximately 1.5 million acre-feet per year, on average. It was expected that this potential alternative would also result in an approximate average annual reduction in south-of-Delta deliveries of 1.5 million acre-feet per year. To achieve these goals, and to avoid the effects listed above, the alternative includes a requirement of 55% of unimpaired flow, as estimated for the Sacramento River at Freeport, to become Delta outflow. No Sacramento River inflow-specific objective is intended; however, the goal of the alternative is to achieve an increase in net Delta outflow of about 1.5 million acre-feet per year, on average. The State Water Board included modifications to minimum storage requirements for upstream reservoirs on the Sacramento River system in an attempt to achieve coldwater pool storage goals of the State Water Board and the USFWS and NMFS biological opinions that affect operations of the SWP and CVP.

On December 19, 2011, the executive director of the State Water Board sent a letter to the deputy secretary of the Natural Resources Agency that summarized the results of the preliminary modeling of the proposed enhanced ecosystem alternative.

> The State Water Board has been working with DWR to analyze an enhanced ecosystem protection alternative for the BDCP that results in reduced south of Delta diversions. Preliminary model results show that this alternative would result in increases to mean annual Delta outflow of approximately 1.6 million acre-feet per year for the February through June period at a cost of approximately 1.5 million acre-feet per year on average reduction in south of Delta diversions relative to the no action alternative. This alternative will allow DWR and other lead agencies, and the State Water Board to evaluate a sufficiently broad range of alternatives to inform their respective processes. As this enhanced ecosystem alternative results in a large negative water supply effect, it provides an alternative to the BDCP's preferred alternative that will assist in analyzing the project's effects. It is therefore useful to evaluate the tradeoffs that need be considered to achieve the two coequal goals required by the Delta Reform Act. Similar to what the State Water Board is doing for the evaluation of San Joaquin River flow objectives, an evaluation of the water supply and economic effects of the enhanced ecosystem BDCP alternative would be useful for the Board's decision-making. Ideally this evaluation of the water supply and economic effects of the enhanced ecosystem alternative could be performed in conjunction with an analysis of the costs and effects of obtaining alternative water supplies.

The operational criteria for the Enhanced Spring Delta Outflow alternative are presented in Table 3A-8.

3A.9.4 Environmental Organizations Conveyance Operations Alternatives

Following the completion of the 2010 Project Status Report, a consortium of environmental organizations (American River et al. 2011) proposed three alternatives (American Rivers et al. 2011).

- An alternative to (1) achieve Fall X2 and protections in the south Delta, (2) re-establish a more natural hydrograph during winter and spring months, and (3) conduct reservoir operations to prevent unintended drawdowns with a range of potential conveyance capacities. The operations would be similar to Scenario 6 with (1) Fall X2 as under the USFWS 2008 Biological Opinion (USFWS 2008), (2) modifications to OMR flow criteria, (3) proportional inflow bypasses from Shasta Lake, Folsom Lake, and Oroville Reservoir into the Sacramento River, and (4) additional pulse flows in the late winter and through the spring to protect out migrating fall run and spring run Chinook salmon. For the purposes of this document, this alternative is referred to as the *Proportional North Delta Inflow Bypass Alternative*.
- Operations to provide Delta outflow as described in the State Water Resources Control Board *Flow Recommendations for the Sacramento-San Joaquin Delta Ecosystem* published in 2010 (State Water Board 2010b).
- Operations as described above under Scenario 6 with a conveyance capacity of 9,000 cfs.

3A.9.4.1 Proportional North Delta Inflow Bypass Alternative

This potential alternative was proposed in a letter from American Rivers and other environmental organizations (American Rivers et al 2011). The letter stated:

> The first alternative includes criteria to achieve the fall X2 requirement, additional protections in the South Delta, reservoir bypass criteria to reestablish a more natural hydrograph during winter and spring months, and reservoir release off ramps to prevent unintended draw downs. Criteria for the North Delta diversion are similar to scenario 6, but will require additional pulse protection in the late winter and through the spring (e.g. an extension of the protections for winter run juveniles that were incorporated in previous operational alternatives) in order to protect out migrating fall run and spring run Chinook salmon. Partial details for these criteria are provided in tables 1, 2 and 3…, but the North Delta diversion rules will need to be more fully described. These criteria should be modeled with a broad range of canal sizes … to identify the optimal canal size for this operating regime.

The operational criteria included in "tables 1, 2, and 3" and other criteria are presented in Table 3A-9.

3A.9.4.2 State Water Resources Control Board Flow Recommendations for the Sacramento–San Joaquin Delta Ecosystem Required by the Delta Reform Act

Another conveyance operations alternative proposed by the consortium of environmental organizations (American River et al. 2011) was based on the 2010 State Water Board flow recommendations for the Sacramento–San Joaquin Delta ecosystem required by the Delta Reform Act (State Water Board 2010).

In 2009, the state adopted SBX7 1, which requires the State Water Board to develop new flow criteria for the Delta ecosystem to protect public trust resources and a prioritized schedule to complete instream flow studies for the Delta and high priority streams in the Delta watershed as identified by CDFW. In August 2010, the State Water Board completed the *Development of Flow Criteria for the Sacramento–San Joaquin Delta Ecosystem* (State Water Board 2010a and State Water Board 2010b). The final report presented flow criteria to protect the Delta and its ecological resources. This report provided an assessment of the flows needed to protect the Delta and its ecological resources, but does not address other public trust considerations such as water supply for cities and agriculture. More specifically, as explained on page 3 of the final report:

> [n]one of the determinations in this report have regulatory or adjudicatory effect. Any process with regulatory or adjudicative effect must take place through the State Water Board's water quality control planning, water rights processes, or public trust proceedings in conformance with applicable law. In the State Water Board's development of Delta flow objectives with regulatory effect, it must ensure the reasonable protection of beneficial uses, which may entail balancing of competing beneficial uses of water, including municipal and industrial uses, agricultural uses, and other environmental uses. The State Water Board's evaluation will include an analysis of the effect of any changed flow objectives on the environment in the watersheds in which Delta flows originate, the Delta, and the areas in which Delta water is used. It will also include an analysis of the economic impacts that result from changed flow objectives.
>
> Nothing in either the Delta Reform Act or in this report amends or otherwise affects the water rights of any person. In carrying out its water right responsibilities, the State Water Board may impose any conditions that in its judgment will best develop, conserve, and utilize in the public interest the water to be appropriated. In making this determination, the State Water Board considers the relative benefit to be derived from all beneficial uses of the water concerned and balances competing interests.
>
> The State Water Board has continuing authority over water right permits and licenses it issues. In the exercise of that authority and duty, the State Water Board may, if appropriate, amend

> terms and conditions of water right permits and licenses to impose further limitations on the diversion and use of water by the water right holder to protect public trust uses or to meet water quality and flow objectives in Water Quality Control Plans it has adopted. The State Water Board must provide notice to the water permit or license holder and an opportunity for hearing before it may amend a water right permit or license.

While informing the broader flow-standard-setting process, the report also underscores the importance to California of resolving future flow regime needs. SBX7 1 also stated that this report should be used to inform DWR in its preparation of environmental documentation for the BDCP. The flow criteria do not have regulatory effect but rather provide information to the State Water Board that may be used in the development of future flow and water quality objectives and water rights decisions, including the ongoing Bay-Delta Plan Update and consideration for future BDCP permits and approvals. Although by statute the State Water Board must consider its August 2010 flow recommendations at the point in time at which DWR and Reclamation seek to amend their existing water rights permits to include new authorized points of diversion, State Water Board's final August 2010 report makes it clear (on pages 3 and 4) that State Water Board's ultimate determinations regarding what Delta flow criteria to impose as part of such permit amendment must take into account a variety of factors, including ramifications for "all beneficial uses of water."

> If the DWR and/or the USBR in the future request the State Water Board to amend the water right permits for the State Water Project (SWP) and/or the Central Valley Project (CVP) to move the authorized points of diversion for the projects from the southern Delta to the Sacramento River, Water Code section 85086 directs the State Water Board to include in any order approving a change in the point of the diversion of the projects appropriate Delta flow criteria.
>
> At that time, the State Water Board will determine appropriate permit terms and conditions. That decision will be informed by the analysis in this report, but will also take many other factors into consideration, including any newly developed scientific information, habitat conditions at the time, and other policies of the State, including the relative benefit to be derived from all beneficial uses of water. The flow criteria in this report are not pre-decisional in regard to any State Water Board action. (See, e.g., Wat. Code, § 85086, subd. (c)(1).)

The phrase, "other policies of the State," as used above, presumably includes the coequal objective of "providing a more reliable water supply for California," as well as the codified water rights priority system that has been place in some form since not much after statehood. Elsewhere in its August 2010 final report, the State Water Board emphasized ongoing parallel processes—beyond the scope of the BDCP—in which the water rights of entities other than DWR and Reclamation might be affected. On pages 14 and 15, the State Water Resources Control Board explained that it

> has a number of ongoing proceedings that may be informed by the development of flow criteria. Some of these proceedings will result in regulatory requirements that affect flow, or otherwise affect the volume, quality, or timing of flows into, within, or out of the Delta. In July 2008, the State Water Board adopted a strategic work plan for actions to protect beneficial uses of the San Francisco Bay/Delta (Bay-Delta). In accordance with the work plan, the State Water Board recently completed a periodic review of the 2006 Water Quality Control Plan for the Bay-Delta Estuary (Bay-Delta Plan) that recommended the Delta Outflow objectives, as well as other flow objectives, for further review in the water quality control planning process. Currently, the State Water Board is in the process of reviewing the southern Delta salinity and the San Joaquin River flow objectives contained in the Bay-Delta Plan.

On page 17, the final report notes that the *water quality control planning* process will provide another regulatory venue independent of the BDCP in which the August 2010 Delta flow

recommendation can be revisited with far more players than just DWR and Reclamation "at the table," so to speak:

> SB 1 requires any order approving a change in the point of diversion of the State Water Project (SWP) or the Central Valley Project (CVP) from the southern Delta to a point on the Sacramento River to include appropriate flow criteria and to be informed by the analysis in this report. (Wat. Code, § 85086, subd. (c)(2).) The statute also specifies, however, that the criteria shall not be considered predecisional with respect to the State Water Board's subsequent consideration of a permit. (*Id*., § 85086, subd. (c)(1).) Thus, any process with regulatory or adjudicative effect must take place through the State Water Board's *water quality control planning* or water rights processes in conformance with applicable law. Any person who wishes to introduce information produced during this informational proceeding, or the State Water Board's ultimate determinations in this report, into a later rulemaking or adjudicative proceeding must comply with the rules for submission of information or evidence applicable to that proceeding.

Some initial modeling was conducted for the State Water Board in order to understand the impacts of the 2010 recommended flows. The draft report published in July 2010 (State Water Board 2010a) included results of preliminary model runs. Due to the inability to consider a balanced approach for implementation of the recommended flows, though, the final report did not include the model results (State Water Board 2010b). Even so, the preliminary results could be informative to determine general approaches to achieve increased Delta outflows. The two modeled scenarios provided for net Delta outflow of 75% of a 14-day average unimpaired flow for January through June and Fall X2 for September through November for wet and above normal years. One of the modeled scenarios also included estimated operations criteria for BDCP. Results of model runs indicated reductions in SWP and CVP water supplies and end-of-September reservoir storage in Trinity Lake, Shasta Lake, Oroville Reservoir and Folsom Lake in more years with the 2010 flow recommendations than under the baseline conditions (State Water Board 2011a: 178–191). The reduction in reservoir storage also resulted in an increased frequency of non-compliance with coldwater storage in accordance with NMFS biological opinion requirements. It should be noted that these reductions would have become more severe if the model assumptions had not reduced agricultural water demands in the Sacramento Valley, including water demands of pre-1914 water rights holders, to reduce surface water diversions. Since these water rights holders are not applicants for the BDCP, these modeling assumptions do not represent a reasonable component of a BDCP action alternative. Reduced water diversions from these water rights holders cannot be feasibly accomplished through approval of the BDCP. The Lead Agencies therefore concluded that, absent reduced diversions by pre-1914 water rights holders, the adverse effects of coldwater storage under a scenario based on the State Water Board's 2010 flow recommendation would be even worse than was predicted by the above-described modeling.

Notably, although the Lead Agencies did not include a possible alternative based on the State Water Board's 2010 flow recommendations for the reasons discussed immediately above, the Lead Agencies, after considering the State Water Board's scoping comments, developed the Enhanced Spring Delta Outflow Alternative, which is described in detail in Section 3A.9.3 above.

3A.9.4.3 Scenario 6 Conveyance Operations Alternative with Limited Dual Conveyance Facility Capacity of North Delta Intakes

Another conveyance operations alternative proposed by the consortium of environmental organizations (American River et al. 2011) was based on Scenario 6, as described in Section 3A.9.1, with a capacity of 9,000 cfs.

3A.9.5 Contra Costa Water District Conveyance Operations Alternative with Limited Dual Conveyance Facility Capacity

On February 2, 2011, Contra Costa Water District (CCWD 2011) submitted a letter to the deputy secretary of Natural Resources Agency identifying three key objectives towards resolving technical and policy issues of the Delta ecosystem, water quality, and water supply reliability. The objectives included (1) providing assurances to in-Delta water users that water quality impacts will be mitigated; (2) incorporating immediate and interim projects that address critical issues now, and will continue to provide benefits in the long-term; and (3) reassessing the configuration of new facilities in the current draft BDCP. The new configuration addressed in the third objective was described in the following manner in the letter.

> The 2009 legislative policy called for a reduction in reliance on the Delta in meeting California's future water supply needs (SBX7-1 85021). Nonetheless, some contractors have indicated they would not move forward with the project unless they can increase their water supply. Other BDCP participants oppose increasing water exports from the Delta. This disagreement must be addressed head-on before more money is wasted planning a project that either the contractors will not fund or the fishery agencies will not permit.
>
> A smaller conveyance facility (3,000 cfs instead of the 15,000 cfs now under consideration) appears to be the optimum solution based on the BDCP analysis and CCWD's own analysis, providing nearly the same water supply yield at half the cost of the larger facilities, and it allows the option to expand capacity later if necessary. The current BDCP studies show that 62% of the time, any capacity over 3,000 cfs is unused and unnecessary, and the full 15,000 cfs capacity is used only 1% of the time … The studies also make clear that the most pressing problem is extended droughts: there is more than a 30% chance of any year being dry or critically dry, and an isolated facility does nothing to change that or the water supply situation that results. Resolution of water supplies in dry years for fish and human activities is where the real focus should be: currently up to 80% of the water is removed from the system in dry years, and we still face severe shortages. It appears that incorporating storage is necessary to meet coequal goals and would allow more water supplies to be captured in wet years, taking the stress off the ecosystem in dry years.

Subsequently, DWR staff consulted with the Contra Costa Water District staff and determined that this operations alternative also should include Fall X2 and modifications to the San Joaquin River inflow/export ratio in order to improve water quality and to reduce impacts on fish in the south Delta, in accordance with the first objective in their letter. The letter was commenting on results of preliminary model runs for the January 2010 Operations and, therefore, it was assumed that this alternative would be based upon those operations criteria. Operations criteria for the Limited Dual Conveyance Facility Alternative are presented in Table 3A-10.

3A.9.6 Range of Capacities for Conveyance Alternatives

In addition to a range of conveyance alignments and operations, the state and federal agencies also addressed the need to consider a range of north Delta intake capacities. Initial modeling results indicated that there was limited difference between SWP and CVP water supply availability for Dual Conveyance alternatives between 15,000 cfs and 12,000 cfs capacity at the north Delta intakes, based upon the January 2010 BDCP Operations (BDCP 2010c). These results occurred because the reduction in diversion capacity in the north Delta could be replaced with increased diversions at the

existing south Delta intakes. The differences between 15,000 cfs capacity at the north Delta intakes and 9,000 cfs and 6,000 cfs capacities also were minimal but greater than the difference with 12,000 cfs.

Therefore, the EIR/EIS lead agencies determined that a range of capacities should be considered for Dual Conveyance alternatives that included north Delta intake capacities of 3,000 cfs, 6,000 cfs, 9,000 cfs, and 15,000 cfs. Based upon the preliminary modeling results for the January 2010 BDCP Operations (BDCP 2010c), it appeared that results for capacities of 6,000 cfs, 9,000 cfs, and 15,000 cfs would be similar for Dual Conveyance alternatives because in general, when diversions were limited at the north Delta intakes, water could be diverted at the south Delta intakes. Therefore, based upon the preliminary information, it was determined that the range of alternatives to be considered in the second screening should include the following Dual Conveyance alternatives to provide a range of flow criteria.

- Dual Conveyance with 15,000 cfs capacity at the north Delta intakes with January 2010 BDCP Operations.
- Dual Conveyance with 15,000 cfs capacity at the north Delta intakes with Scenario 6.
- Dual Conveyance with 9,000 cfs capacity at the north Delta intakes with Scenario 6.
- Dual Conveyance with 6,000 cfs capacity at the north Delta intakes with January 2010 BDCP Operations.
- Dual Conveyance with 3,000 cfs capacity with one north Delta intake with January 2010 BDCP Operations for the north Delta and current Biological Opinions operations for the south Delta.

The Enhanced Ecosystem Conveyance Operations Alternative also could be evaluated at a range of capacities. It was determined that a middle range value of 9,000 cfs for the north Delta intakes would be considered for the second screening process for the Enhanced Ecosystem Conveyance Operations Alternative, Modified Enhanced Ecosystem Operations, Scenario 7a, and State Water Resources Control Board 2010 Flow Recommendations for Delta Ecosystem Operations. Taken together, this range of capacity options was determined to be sufficient to meet the directive in the Delta Reform Act that the BDCP EIR, in order for the BDCP to be considered for automatic inclusion in the Delta Plan, include a "reasonable range of . . . rates of diversion"(Cal. Water Code Section 85320[b][2][A]).

Based upon the preliminary modeling results for the January 2010 BDCP Operations of the Isolated Conveyance Alternative (BDCP 2010c), it appeared that the long-term average Delta exports for an Isolated Conveyance facility with capacities of 3,000 to 15,000 cfs would be less than for the No Action Alternative, as summarized below; and therefore would not necessarily meet the project objectives of the voluntary BDCP process.

- No Action Alternative (no Isolated Conveyance, continued use of Through Delta Conveyance)—4.9 million acre-feet/year long-term average Delta exports.
- 15,000 cfs Isolated Conveyance (no Through Delta Conveyance)—4.5 million acre-feet/year long-term average Delta exports.
- 12,000 cfs Isolated Conveyance (no Through Delta Conveyance)—4.4 million acre-feet/year long-term average Delta exports.

- 9,000 cfs Isolated Conveyance (no Through Delta Conveyance)—3.8 million acre-feet/year long-term average Delta exports.
- 6,000 cfs Isolated Conveyance (no Through Delta Conveyance)—2.9 million acre-feet/year long-term average Delta exports.
- 3,000 cfs Isolated Conveyance (no Through Delta Conveyance—1.7 million acre-feet/year long-term average Delta exports.

Based upon this preliminary information, it was determined that it was not necessary to evaluate a range of north Delta intake capacities for the Isolated Conveyance alternative for a reasonable range of alternatives.

The Through Delta Conveyance/Separate Corridors alternative does not include facilities to reduce the amount of water to be conveyed from the Sacramento River to the south Delta intakes. Water would flow from the Sacramento River through the Delta Cross Channel and Georgiana Slough by gravity through existing channels. Improvements to the channels and the diversion structures would be sized based upon existing channel capacity and not necessarily upon conveyance capacity, with the exception of improvements near Clifton Court. It was determined that maintaining the Through Delta Conveyance/Separate Corridors alternative at the existing through-Delta capacity of 15,000 cfs would be more appropriate than construction of facilities to restrict the capacity of existing channels. Operational criteria for the Separate Corridors alternative are presented in Table 3A-11.

3A.10 Results of the Second Screening of Conveyance Alternatives

As described in Section 3A.7, the EIR/EIS process considered the results of the initial screening of conveyance alignments. Subsequently, as described in Sections 3A.8 and 3A.9, operational alternatives were identified to be considered in the second screening process. The conveyance alternatives identified in Section 3A.10 were compared to the first, second, and third level screening criteria, consideration of the Delta Reform Act, and the responsiveness to comments related to conveyance alternatives from responsible and cooperating agencies, as described in Section 3A.3. The results of this process are summarized in this section.

3A.10.1 Range of Conveyance Alignment Alternatives Identified through the Initial Screening Process

The EIR/EIS process considered the following conveyance alignment alternatives identified through the initial screening process.

- **Second Screening Dual Conveyance Alignment Alternative A.** *Dual Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*
- **Second Screening Dual Conveyance Alignment Alternative B.** *Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*

- **Second Screening Dual Conveyance Alignment Alternative C.** *Dual Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*
- **Second Screening Isolated Conveyance Alignment Alternative A.** *Isolated Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*
- **Second Screening Isolated Conveyance Alignment Alternative B.** *Isolated Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*
- **Second Screening Isolated Conveyance Alignment Alternative C.** *Isolated Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*
- **Second Screening Through Delta Conveyance Alignment Alternative.** *Separate Corridors*

3A.10.2 Range of Conveyance Operations Combined with the Conveyance Alignment Alternatives

As described in Sections 3A.8 and 3A.9, the following range of conveyance operations alternatives were identified for the conveyance alignment alternatives. The alternatives were combined to develop the following Delta Conveyance Alternatives to be compared to the screening criteria and identify the final range of conveyance alternatives to be evaluated in detail in the EIR/EIS.

- **Second Screening Dual Conveyance Alternative 1A.** *Dual Conveyance with a Tunnel—January 2010 BDCP Operations—15,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 1B.** *Dual Conveyance with a Lined or Unlined East Canal—January 2010 BDCP Operations—15,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 1C.** *Dual Conveyance with a Lined or Unlined West Canal—January 2010 BDCP Operations—15,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 2A.** *Dual Conveyance with a Tunnel—Scenario 6 Operations—15,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 2B.** *Dual Conveyance with a Lined or Unlined East Canal Scenario 6 Operations - 15,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 2C.** *Dual Conveyance with a Lined or Unlined West Canal—Scenario 6 Operations—15,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 3A.** *Dual Conveyance with a Tunnel—January 2010 BDCP Operations—6,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 3B.** *Dual Conveyance with a Lined or Unlined East Canal—January 2010 BDCP Operations—6,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 3C.** *Dual Conveyance with a Lined or Unlined West Canal—January 2010 BDCP Operations—6,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 4A.** *Dual Conveyance with a Tunnel—Scenario 6 Operations—9,000 cfs North Delta Intake Capacity*

- **Second Screening Dual Conveyance Alternative 4B.** *Dual Conveyance with a Lined or Unlined East Canal—Scenario 6 Operations—9,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 4C.** *Dual Conveyance with a Lined or Unlined West Canal—Scenario 6 Operations—9,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 5A.** *Dual Conveyance with a Tunnel—Limited Conveyance Operations Alternative—January 2010 BDCP Operations and Fall X2—3,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 6A.** *Dual Conveyance with a Tunnel, Enhanced Ecosystem Conveyance Operations Alternative, 9,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 7A.** *Dual Conveyance with a Tunnel—Enhanced Spring Delta Outflow Alternative—9,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 8A.** *Dual Conveyance with a Tunnel—Proportional North Delta Inflow Bypass Alternative—15,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 9A.** *Dual Conveyance with a Tunnel—State Water Resources Control Board 2010 Flow Recommendations for Delta Ecosystem—9,000 cfs North Delta Intake Capacity*
- **Second Screening Isolated Conveyance Alternative 1A.** *Isolated Conveyance with a Tunnel—January 2010 BDCP Operations—15,000 cfs North Delta Intake Capacity*
- **Second Screening Isolated Conveyance Alternative 1B.** *Isolated Conveyance with a Lined or Unlined East Canal, January 2010 BDCP Operations, 15,000 cfs North Delta Intake Capacity*
- **Second Screening Isolated Conveyance Alternative 1C.** *Isolated Conveyance with a Lined or Unlined West Canal, January 2010 BDCP Operations, 15,000 cfs North Delta Intake Capacity*
- **Second Screening Through Delta Conveyance Alternative 1D.** *Separate Corridors Operations, 15,000 cfs North Delta Intake Capacity*

These alternatives were compared to the screening criteria in a second screening process. The results of that process are described in the following section and are summarized in Tables 3A.12 through 3A.17 (located at the end of this appendix).

3A.10.3 Results of the Second Screening of Conveyance Alternatives

Based upon the results of the comparison of the Second Screening Conveyance Alternatives to the screening criteria, Second Screening Dual Conveyance Alternative 9A—*Dual Conveyance with a Tunnel, State Water Resources Control Board 2010 Flow Recommendations for Delta Ecosystem, 9,000 cfs North Delta Intake Capacity* was eliminated from further analysis. This alternative was eliminated because the preliminary modeling results presented in a draft report by the State Water Board (State Water Board 2010a) indicated the possibility of reductions in coldwater pool storage in Trinity Lake, Shasta Lake, Oroville Reservoir, and Folsom Lake that would lead to increased levels of non-compliance with the NMFS Biological Opinion and adverse impacts on salmonids in the Sacramento and Feather rivers as compared to existing conditions or the No Action Alternative. It is also noted that the preliminary model runs, as discussed in Section 3A.9.4.2, resulted in the possibility of these adverse impacts following the reduction of water available to pre-1914 water

rights holders in the Sacramento River basin. This would have the potential to require changes in the legal Sacramento River water rights or water entitlements of third parties other than BDCP permit applicants that are beyond the scope of the regulatory authority of the agencies charged with considering approval of the proposed BDCP (including CDFW, which approves the NCCP, and USFWS and NMFS, which approve the HCP). In addition, the State Water Board specifically stated in the 2010 report (State Water Board 2010b) that the report provided an assessment of the flows needed to protect the Delta and its ecological resources, but does not address other public trust considerations. More specifically, the final report describes that "Any process with regulatory or adjudicative effect must take place through the State Water Board's water quality control planning, water rights processes, or public trust proceedings in conformance with applicable law." For these reasons, it was determined that, in addition to failing to meet the purpose and need for the BDCP, this alternative was likely to violate federal and state statutes or regulations and was not evaluated in a detail as an alternatives in the EIR/EIS.

3A.10.4 Identification of Conveyance Alternatives with Similar Conveyance Facilities

As described in Sections 3A.3.1.1 and 3A.3.1.2, the range of reasonable alternatives 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. The DOI NEPA regulations are more specific and provide that "when there are potentially a very large number of alternatives then a reasonable number of *examples* covering the full spectrum of reasonable alternatives" will suffice.

Based upon a review of the range of conveyance alternatives, it was determined that the conveyance facilities for Second Screening Dual Conveyance Alternatives 1A through 1C and Second Screening Dual Conveyance Alternatives 2A through 2C would be identical to Second Screening Dual Conveyance Alternatives 3A through 3C and Second Screening Dual Conveyance Alternatives 4A through 4C except for the number of north Delta intakes. The footprint of disturbance for construction of a tunnel component would be assumed to be the same for a range of north Delta intake capacities between 6,000 and 15,000 cfs, though the extent of disturbance associated with intake construction would vary between alternatives depending on the number of intakes. Similarly, the footprint of disturbance for construction of a canal would be assumed to be the same for a range of north Delta intake capacities between 6,000 and 15,000 cfs. In addition, the north Delta intakes are anticipated to be identical between alternatives with conveyance alternatives using a tunnel, eastern canal, or western canal. Therefore, it was determined that results of detailed analyses of construction of conveyance facilities with an eastern canal or western canal for Second Screening Dual Conveyance Alternatives 1B through 1C and 2B through 2C would be adequate to disclose potential adverse impacts and benefits that could occur for Second Screening Dual Conveyance Alternatives 3B and 3C and 4B and 4C. Therefore, the following conveyance alternatives were eliminated from further detailed analyses in the EIR/EIS.

- **Second Screening Dual Conveyance Alternative 3B.** *Dual Conveyance with a Lined or Unlined East Canal, January 2010 BDCP Operations, 6,000 cfs North Delta Intake Capacity*
    - Potential impacts due to construction and operations of the north Delta and south Delta intakes will be the same as under Second Screening Dual Conveyance Alternative 3A.

- Potential impacts due to construction of the eastern canal will be the same as under Second Screening Dual Conveyance Alternative 1B.

- **Second Screening Dual Conveyance Alternative 3C.** *Dual Conveyance with a Lined or Unlined West Canal, January 2010 BDCP Operations, 6,000 cfs North Delta Intake Capacity*
  - Potential impacts due to construction and operations of the north Delta and south Delta intakes will be the same as under Second Screening Dual Conveyance Alternative 3A.
  - Potential impacts due to construction of the western canal will be the same as under Second Screening Dual Conveyance Alternative 1C.
- **Second Screening Dual Conveyance Alternative 4B.** *Dual Conveyance with a Lined or Unlined East Canal, Scenario 6 Operations, 9,000 cfs North Delta Intake Capacity*
  - Potential impacts due to construction and operations of the north Delta and south Delta intakes will be the same as under Second Screening Dual Conveyance Alternative 4A.
  - Potential impacts due to construction of the eastern canal will be the same as under Second Screening Dual Conveyance Alternative 1B.
- **Second Screening Dual Conveyance Alternative 4C.** *Dual Conveyance with a Lined or Unlined West Canal, Scenario 6 Operations, 9,000 cfs North Delta Intake Capacity*
  - Potential impacts due to construction and operations of the north Delta and south Delta intakes will be the same as under Second Screening Dual Conveyance Alternative 4A.
  - Potential impacts due to construction of the western canal will be the same as under Second Screening Dual Conveyance Alternative 1C.

3A.10.5 Identification of Conveyance Alternatives with Similar Conveyance Operations

In a similar manner as described in Section 3A.10.4, operations under the following conveyance alternatives appear to be similar.

- **Second Screening Dual Conveyance Alternative 7A.** *Dual Conveyance with a Tunnel, Enhanced Spring Delta Outflow Alternative, 9,000 cfs North Delta Intake Capacity*
- **Second Screening Dual Conveyance Alternative 8A.** *Dual Conveyance with a Tunnel, Proportional North Delta Inflow Bypass Alternative, 15,000 cfs North Delta Intake Capacity*

Both of these alternatives include methods to achieve Fall X2, provide additional protections for the south Delta as compared to the January 2010 Operations or Scenario 6, include reservoir releases to achieve a more natural hydrograph as compared to existing conditions or No Action Alternative, include provisions to minimize reductions in cold water storage, and provide for additional Delta outflow as compared to existing conditions or No Action Alternative. Because the Proportional North Delta Inflow Bypass Alternative (proposed, as noted above, by the consortium of environmental organizations) may be more protective of the coldwater pool due to the restrictions provided to reduce reservoir bypasses during periods of low storage, it is anticipated that the Enhanced Spring Delta Outflow Alternative (proposed by the State Water Board) may result in lower Delta exports and more severe coldwater pool storage reductions. Therefore, of these two alternatives, the Enhanced Spring Delta Outflow Alternative would result in the most severe

potential adverse impacts associated with the ability to provide cold water in the rivers downstream of the reservoirs and the ability to provide water supplies for Delta exports; and therefore, will be evaluated in detail in the EIR/EIS as the "low-end bookend" alternative.

Notably, the Proportional North Delta Inflow Bypass Alternative is very similar to the Enhanced Spring Delta Outflow Alternative, and could also function as either a low-end bookend or as an option close to the low-impact end of the spectrum of potential alternatives. Given the already enormous size of the Draft EIR/EIS and the burdens readers will already face in working through the document, however, there is no need for two low-bookend alternatives. Out of deference to the State Water Board as a CEQA responsible agency, the Lead Agencies opted to address their sister agency's proposal instead of the very similar recommendation put forward by the consortium of environmental groups. Accordingly, the Proportional North Delta Inflow Bypass Alternative will not be carried forward for analysis in the Draft EIR/EIS. In the event, though, that BDCP agency decision makers ultimately are inclined to approve the Proportional North Delta Inflow Bypass Alternative as the conveyance and operational components of the final BDCP, the detailed analysis of the Enhanced Spring Delta Outflow Alternative should provide sufficient information to allow such decision makers and their staffs to ascertain the impacts of the Proportional North Delta Inflow Bypass.

3A.10.6 Development of DWR "Proposed Project" in 2012

The final step in identifying the range of alternatives to be included in the Draft EIR/EIS was for DWR, working with USBR, USFWS, NMFS, and CDFW, to develop a "proposed project" that included a proposed version of CM1 that DWR believes meets the water supply and ecological goals of the BDCP. This proposal was then analyzed in the effects analysis and the BDCP Draft EIR/EIS. The proposed project, as embodied in the draft BDCP document published together with the Draft EIR/EIS, will form a major portion of the HCP and NCCP that support applications for take authorization and other permits needed to proceed with implementation of the BDCP.

DWR's goal in this step in the process of formulating alternatives was to identify a proposed version of CM1 that would be part of an overall BDCP that met the standards of the ESA and NCCPA while striking an appropriate balance between the coequal goals of ecosystem restoration and water supply reliability and minimizing physical impacts within the Delta. In order to accomplish this objective, DWR decided to propose only three (rather than five) intake facilities, thereby greatly reducing the potential project footprint within the Delta itself. In doing so, DWR willingly reduced the export capacity of the proposed new north Delta diversions and conveyance structures while providing enough export capacity in the north to permit dual operations that could minimize historic adverse effects associated with operation of south Delta water conveyance facilities. Further refinements to CM1 were proposed in August 2013 and are detailed in Alternative 4 of this EIR/S and also on the BDCP website. (See *BDCP Conservation Measure 1: Water Facilities and Operation* [DWR March 2013]; *BDCP Refinements Respond to Community and Statewide Needs* [DWR August 2013] http://baydeltaconservationplan.com\BDCPPlanningProcess\BrochuresAndFactSheets.) A more difficult challenge was to identify proposed operations that provide an appropriate balance between exports and ecological issues in the Delta, giving all covered aquatic species through flow changes, habitat restoration, and other conservation measures what the species need to reverse the trends towards their decline and contribute to their recovery. DWR and its partner agencies used as their starting point the alternative described above as Alternative 4A: *Dual Conveyance with a Tunnel, Scenario 6 Operations, 9,000 cfs North Delta Intake Capacity* because that option included

only three new intakes with a total of 9,000 cfs capacity and included Scenario 6 operations developed with active input from USFWS, NMFS, and CDFW.

In reviewing the February 2012 effects analysis, including the evaluation of the preliminary BDCP proposal, the fish and wildlife agencies identified a number of concerns with the preliminary proposal. As a result of these concerns, a new set of operational criteria was developed and is presented in BDCP Section 3.4.1.4.3, *Flow Constraints*. These criteria are intended to meet the ESA requirement to minimize and mitigate incidental take to the maximum extent practicable, and the NCCPA requirement to conserve each of the covered species in the Plan Area.

To support the selection of a revised operational scenario, the fish and wildlife agencies conducted modeling to examine the recovery needs of the covered fish throughout their range in the absence of habitat restoration. This analysis was refined over multiple runs to explore the operational flexibility of the BDCP to help meet the rangewide recovery needs without adversely affecting upstream reservoir operations. The fish and wildlife agencies worked collaboratively with DWR to develop an operational scenario that contributed to the recovery of the covered fish and fit within the constraints of the BDCP. As a result, it has been agreed that the uncertainties about level of needed spring and fall outflow are to be addressed by adopting decision trees prescribing selection of criteria at the time the north Delta diversions become operational. The decision trees set criteria for spring outflow and fall outflow. Under the decision tree structure, one of four possible operational criteria will be implemented initially based on the results of targeted research and studies. Targeted research and studies will proceed until the north Delta intakes become operational, with the results of those studies forming the basis for determining the outcome of each decision tree. Operating criteria may also be modified after that time, based on concurrence by the permittees and the fish and wildlife agencies, by means of the adaptive management process specified in the Plan. The decision tree concept is discussed in detail in Section 3A.10.6.3, and the decision tree process and outcomes are described further in Chapter 3, Section 3.6.4.2 for Scenario H.

With these operational issues resolved, the Proposed Project (Alternative 4 as described in the Draft EIR/EIS [see Section 3A.10.7 below]) would consist of the following basic components (see Chapter 3 of the Draft BDCP for a more complete technical description).

3A.10.6.1 Proposed Water Facilities

Three new north Delta intakes with their associated conveyance and support facilities would be constructed, along with a new permanent head of Old River operable gate.

Each intake would have a capacity of up to 3,000 cfs and would be fitted with fish screens designed to minimize entrainment or impingement risk for all covered fish species. Diverted waters would be conveyed to a new regulating forebay, and then south to SWP/CVP canals, via a pipeline and tunnel system. Construction of the north Delta intakes would allow greater flexibility in operation of both south and north Delta diversions, as well as operation of the Delta Cross Channel. Diversions at the north Delta intake would be greatest in wetter years and lowest in drier years. Actual Delta channel flows and diversions could be modified to respond to real-time operational needs such as those related to Old and Middle Rivers and the Delta Cross Channel.

3A.10.6.2 Flow Criteria

The flow criteria applied under CM1 would affect the same parameters as those constrained under the biological opinions and D-1641, but parameter values would be different. The following four criteria would be used to define the flow constraints:

- **Old and Middle River flows.** This parameter chiefly would serve to constrain the magnitude of reverse flows in the Old and Middle Rivers, also known as the OMR flows, for entrainment protection and minimization of adverse indirect effects.
- **Head of Old River Barrier operations.** This parameter criterion refers to the opening and closing of an operable gate on the head of Old River and thus would influence OMR and San Joaquin River flows.
- **Delta outflow/X2.** This parameter refers to the longitudinal location of the 2-ppt salinity line in the Delta (measured in kilometers upstream from the Golden Gate) and would be used to manage the low-salinity zone, as well as water quality in the Delta.
- **North Delta bypass flows.** This parameter would serve several biological functions, including: minimizing or avoiding flow conditions that might encourage migration of anadromous fish into the interior Delta; providing adequate outmigration flows in the spring; providing pulse flows in the Sacramento River to protect outmigrating juvenile anadromous fish; and providing adequate upstream migration flows for adults in the fall.

In addition, flow criteria would also apply for the Delta Cross Channel gates and the Suisun Marsh Salinity Control Gates. These facilities would continue to be operated as they are now operated under the terms of the Biological Opinions. The Delta Cross Channel gates would be closed from December through June, open from July through September, and closed if fish are present in October and November, with closure decisions at that time reached through a real-time operations process. The Suisun Marsh Salinity Control Gates would continue to be opened up to 20 days per year from October through May.

Flow criteria would also be applied seasonally (month by month) and according to the following five water-year types.

- 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 the BDCP would then be further constrained, as shown in detail in Table 3A-18 and in Tables 3A-19 and 3.4.1-2 in Chapter 3 of the Draft BDCP.

3A.10.6.3 Decision Trees

Because over the past decades there has been uncertainty and disagreement over the causes and the relative importance of various factors contributing to the decline of many Delta aquatic species, the Proposed Project includes a mechanism by which additional scientific information will be obtained

and applied prior to commencing operations of new and existing diversion and conveyance infrastructure. This mechanism is called the *decision tree*.

Two key areas of uncertainty for the BDCP are the importance of Fall X2 for delta smelt in achieving abundance and habitat objectives and the importance of spring outflow for achieving the longfin smelt abundance objective. Because of the potential importance of these two factors in meeting the biological goals and objectives for these species, their effect on water operations, and the level of uncertainty surrounding them, these two factors would be treated in a way that acknowledges their effects on the two species.

The CM1 component of the Proposed Project would include two decision trees (one for fall outflow and one for spring outflow) that allow for alternative outcomes for each water operations criterion. To support the decision trees, hypotheses supporting each criterion would be tested in detail during the years before dual conveyance operations commence. The information gained during this period would be used to select one of the two potential criteria defined by each decision tree that would be applied at the beginning of dual conveyance operations. Because each decision tree has two possible outcomes, this would create four possible outcomes in outflow criteria when the spring and fall are combined.

The decision tree process would involve the following steps.

1. Clearly articulate scientific hypotheses designed to test the sufficiency of each operating criterion to meet the biological goals and objectives.

2. Develop and implement a science plan and data collection program to test the hypotheses and reduce uncertainties.

3. Identify spring and fall outflow criteria to meet the biological goals and objectives.

The decision tree process would function as a part of CM1. Once the initial fall and spring outflow criteria are selected based on the decision tree process, the decision tree process would end. At that point, the adaptive management and monitoring program would provide the primary process for potentially adjusting aspects of the conservation strategy, including dual conveyance operations.

It is possible that adaptive management might be used to refine the outcomes of the decision tree, depending on what knowledge is gained between the approval of the Plan and the initial operation of CM1.

The four possible combinations of spring and fall outflow criteria that could result from the decision tree have been addressed at a project-level of detail in combination with Alternative 4 (identified in Section 3A.10.7, below). However, the decision tree outflow criteria are not operational criteria, and could be implemented in combination with any other project alternative, thereby creating a hybrid alternative within the bookends created by the entire range of alternatives addressed in the EIR/EIS. If such a hybrid alternative is ultimately identified, the analysis of decision tree spring and fall outflow criteria will provide important evidence and analysis to assist the public and decision makers to understand the relative impacts of such a hybrid in combination with such outflow criteria.

3A.10.7 Series of Conveyance Alternatives to be Evaluated in Detail in the EIR/EIS

Based upon the results of the screening analysis and consideration of similar conveyance alternatives, as summarized in Tables 3A-20 and 3A-21, the final range of conveyance alternatives to be evaluated in the EIR/EIS is presented below. The conveyance alternatives have been renumbered to be consistent with information presented in the BDCP process.

- **Alternative 1A.** *Dual Conveyance with a Tunnel, January 2010 BDCP Operations, 15,000 cfs North Delta Intake Capacity*
- **Alternative 1B.** *Dual Conveyance with a Lined or Unlined East Canal, January 2010 BDCP Operations, 15,000 cfs North Delta Intake Capacity*
- **Alternative 1C.** *Dual Conveyance with a Lined or Unlined West Canal, January 2010 BDCP Operations, 15,000 cfs North Delta Intake Capacity*
- **Alternative 2A.** *Dual Conveyance with a Tunnel, Scenario 6 Operations, 15,000 cfs North Delta Intake Capacity*
- **Alternative 2B.** *Dual Conveyance with a Lined or Unlined East Canal, Scenario 6 Operations, 15,000 cfs North Delta Intake Capacity*
- **Alternative 2C.** *Dual Conveyance with a Lined or Unlined West Canal, Scenario 6 Operations, 15,000 cfs North Delta Intake Capacity*
- **Alternative 3.** *Dual Conveyance with a Tunnel, January 2010 BDCP Operations, 6,000 cfs North Delta Intake Capacity*
- **Alternative 4 (DWR Proposed Project).** *Dual Conveyance with a Tunnel, Scenario H Operations, 9,000 cfs North Delta Intake Capacity*
- **Alternative 5.** *Dual Conveyance with a Tunnel, January 2010 BDCP Operations and Fall X2, 3,000 cfs North Delta Intake Capacity*
- **Alternative 6A.** *Isolated Conveyance with a Tunnel, January 2010 BDCP Operations, 15,000 cfs North Delta Intake Capacity*
- **Alternative 6B.** *Isolated Conveyance with a Lined or Unlined East Canal, January 2010 BDCP Operations, 15,000 cfs North Delta Intake Capacity*
- **Alternative 6C.** *Isolated Conveyance with a Lined or Unlined West Canal, January 2010 BDCP Operations, 15,000 cfs North Delta Intake Capacity*
- **Alternative 7.** *Dual Conveyance with a Tunnel, Enhanced Ecosystem Conveyance Operations Alternative, 9,000 cfs North Delta Intake Capacity*
- **Alternative 8.** *Dual Conveyance with a Tunnel, Modified Enhanced Ecosystem Operations to Increase Delta Outflow per Scoping Comments from State Water Resources Control Board (Enhanced Spring Delta Outflow Alternative), 9,000 cfs North Delta Intake Capacity*
- **Alternative 9.** *Through Delta Conveyance/Separate Corridors Operations, 15,000 cfs North Delta Intake Capacity*

3A.11 Conveyance Proposals Identified in 2012 and 2013

Following the screening analysis described above, analysis of the 15 conveyance alternatives was initiated during preparation of the EIR/EIS. The environmental analysis was conducted from late 2011 through early 2013. During this same time period, the following agencies, entities, and individuals either refined or developed five additional proposals, all of which included some form of potential new conveyance facilities.

- The Natural Resources Defense Council (NRDC) proposed a *Portfolio-Based BDCP Conceptual Alternative* in January 2013 (NRDC 2013), referred to herein as the Portfolio-Based Proposal.
- United States Representative Garamendi proposed *A Water Plan for All of California* in March 2013 (Rep. Garamendi 2013), referred to herein as Congressman Garamendi's Water Plan.
- The Water Advisory Committee of Orange County proposed the *Modified and Phased Bay-Delta West Conveyance Option with Canal & Tunnel Components including Dual Conveyance* in May 2012, referred to herein as the WACO Proposal.
- Robert Pyke proposed the *Western Delta Intake Concept* in January 2012, herein referred to as the *Pyke Proposal*.
- The Delta Stewardship Council, in a letter dated April 18, 2012, suggested that "the BDCP EIR/EIS may want to consider including evaluation of implementation through staging i.e., build a smaller and less expensive project first or implement the preferred alternative in phases." This suggestion is referred to herein as the DSC Staged Proposal.

These proposals included portions of previous alternatives considered during the screening process. As described below, many of the proposed actions within these proposals also are evaluated in the alternatives considered in detail in the EIR/EIS.

3A.11.1 Portfolio-Based Proposal

The Portfolio-Based Proposal includes the following actions.

- Use of Dual Conveyance with a Tunnel—3,000 cfs north Delta intake capacity using operation criteria similar to the DWR Proposed Project with more emphasis on increased Delta diversions in wet years and reduced Delta diversions in drier years, especially in spring and fall months. NRDC estimated exports of 4.0–4.3 million acre feet per year using this conveyance facility, combined with south-of-Delta storage.
- Continued operation of the south Delta intakes.
- Increase water storage capacity in areas located south of the Delta to store increased Delta diversions in wet years and provide water supplies in drier years.
- Increase water recycling and conservation to improve water supply reliability in dry years in areas that use water diverted from the Delta. Integrate water supply operations among water agencies that use water diverted from the Delta to coordinate benefits of water recycling and increased water storage.

- Improve Delta levees to reduce vulnerability of Delta water supplies to earthquakes, sea level rise, and climate change impacts.
- Provide for Delta floodplain and tidal marsh habitat restoration, but greatly reduced acreages as compared to the BDCP Proposed Project level of restoration.
- Expanded use of science in Delta water management

3A.11.1.1 The Portfolio-Based Proposal

Although there is much merit in this Portfolio-Based Proposal, the entire portfolio, viewed as a package, does not qualify as an EIR/EIS alternative for the BDCP, as its scope is far greater than can be achieved through a Delta-focused HCP/NCCP. Rather, the Portfolio-Based Proposal is akin to a statewide water plan that would treat areas receiving water from the Delta as a single water planning unit and include an approach to increase water-use efficiency and water supplies.

For example, "[d]ramatically increasing local water recycling and conservation" (words taken from the January 16, 2013, NRDC et al. press release on the proposal) is simply beyond the scope of the BDCP, though it is an excellent idea—and one being pursued independently of the BDCP, as set forth in Appendix 1C, *Water Demand Management*, to the EIR/EIS.

DWR has no control over *local* water recycling and conservation, even with respect to the water agencies and water districts in California that receive SWP water from DWR, many of which are water wholesalers, and cannot control the actions of water retailers.

Similarly, "[d]eveloping new water storage south of the delta" (see January 16, 2013, press release) is also beyond the scope of an HCP/NCCP focused on the Delta. DWR agrees that such new storage should be part of an overall water supply program for California in coming decades, as is made clear in Appendix 1B, *Water Storage*; but DWR's support for such supply augmentation cannot transform the BDCP from an incidental take permit focused on the Delta into a water plan for all users of Delta water. Also outside the scope of the BDCP is "[r]einforcing delta levees" (see January 16, 2013, press release). The BDCP investments available for new, more reliable conveyance facilities or habitat restoration are not available for levee improvements for flood control that are unrelated to more reliable conveyance. One of the fundamental premises of the Portfolio-Based Proposal—that there are billions of state dollars available for levee improvements—is simply inaccurate. There is no evidence that massive new investment in Delta levees would meet any of the biological goals and objectives of BDCP, and relatively little evidence that such investment would, in the long run, provide water supply benefits commensurate with the large required investment.

In short, many aspects of NRDC's "portfolio-based" approach are not achievable through an HCP/NCCP, but rather could only be accomplished through statewide water management efforts such as those described in DWR's California Water Plan, through Integrated Regional Water Management, or through the Central Valley Flood Protection Plan. DWR and the federal Lead Agencies will work with NRDC and other supporters of the portfolio-based approach to pursue many of the components of the portfolio in such larger contexts. Although these agencies recognize the daunting challenges facing the state and the Delta with regard to population growth, water availability, and climate change, DWR and the other Lead Agencies also recognize that there are independent, if related, federal, statewide, regional, and local regulatory and legislative efforts that could address many of the portfolio-based approach proponents' statewide goals.

3A.11.1.2 Conveyance Facilities of the Portfolio-Based Proposal

Some components of the Portfolio-Based Proposal, namely, the conveyance facilities and conveyance operations, are similar to those of several alternatives being fully evaluated in the EIR/EIS.

3A.11.1.2.1 Considerations for Conveyance Operations with One 3,000 cfs Intake

Importantly, the conveyance facilities in the Portfolio-Based Proposal are similar to facilities described in the EIR/EIS Alternative 5 (Section 3A.9.5, *Contra Costa Water District Conveyance Operations Alternative with Limited Dual Conveyance Facility Capacity*), and in the BDCP Chapter 9, *Take Alternative D*, which both include only one 3,000 cfs intake. The results of the evaluation of Alternative 5 are described in Appendix 5A, *BDCP EIR/EIS Modeling Technical Appendix*. The results indicate that, because of the limited ability to divert water in the north Delta, approximately 75% of the Delta exports on a long-term average basis and 60% in the wetter years would continue to be diverted from the south Delta intakes. This level of dependence on south Delta intakes would result in lower ecological benefits in the south Delta than could be achieved in other alternatives that include more than one intake in the north Delta.

Such continued heavy reliance on the south Delta pumps would also leave the State of California comparatively vulnerable to major economic impacts from a disruption in exports associated with a major seismic event leading to widespread levee failures. (For more general information on this subject, see Appendix 3E, *Potential Seismic and Climate Change Risks to SWP/CVP Water Supplies*, Section 3E.3.4.2, *Potential Impacts to Water Quality/Supplies from Seismic Levee Failure.*) Although a single north Delta intake could allow for more water flowing south from the Delta than would occur under the No Action Alternative in the aftermath of a seismic catastrophe, the amount of water available for export would still be far less than would be available if one or more north Delta intakes are also available, and would thus only partially mitigate the severe economic consequences that could result from such a seismic event. More specifically, with only one 3,000 cfs north Delta intake available for exporting water under a post-earthquake scenario, water supplies in export areas could only be maintained at a level of 1.6 million acre-feet (MAF). This amount is substantially less than the post-earthquake level of 3.8 MAF annually that could be maintained with the 9,000 cfs facility proposed as part of Alternative 4 in the EIR/EIS. (See May 29, 2013, draft of Chapter 9 of the BDCP, Section 9.5.4.3.1.) Another consideration is the maintenance limitations of one tunnel and the impacts of potentially no north pumping during outages or repairs. A single tunnel does not provide the necessary reliability. A catastrophic failure of the single tunnel could prevent north Delta diversions from 6 months to 18 months, depending on the nature of damage. Dual tunnels, however, meet the BDCP objective by enabling the system to continue operating in the event of a catastrophic failure of one of the tunnels, though at a reduced capacity. Dual tunnels also provide additional operational flexibility by allowing continued diversions from the north Delta during scheduled maintenance of the tunnels. One tunnel could remain operational while the other is dewatered, inspected, and serviced. This directly impacts the improvement of water supply reliability as required for the BDCP and Delta Plan.

The portfolio concept leaves the state of California comparatively vulnerable to future water supply reliability in the event of a major seismic event. Subsequent construction of additional diversion facilities to recover water supply reliability would increase the duration of potential environmental impacts, possibly doubling the cost of construction, and adding complexity to future engineering.

Construction of additional intakes, pipelines, and tunnels after initial water diversions from facilities in the north Delta could take up to an extra 10–12 years. Constructing two additional intakes, connecting pipelines and tunnels, as well as a second 40-foot diameter tunnel connecting the intermediate forebay to Clifton Court Forebay would require additional environmental analysis and permitting. Further, cost escalation for the additional constructions, based upon the preliminary cost estimates and proposed schedules, could increase by about 105–115%. This "phased" type construction would increase the construction duration of Conservation Measure 1 from a projected 10 years to about 22 years.

3A.11.1.2.2 Considerations for Conveyance Operations with similar Delta Operation Criteria as the Portfolio-Based Proposal

The proposed operations of the Portfolio-Based Proposal are similar to operations described in the EIR/EIS Alternative 4 (Section 3.5.9, *Dual Conveyance with Pipeline/Tunnel and Intakes 2, 3, and 5*). The operations included within the Portfolio-Based Proposal are as summarized in a November 14, 2012, presentation (NRDC 2013). The presentation describes the development of the CS5 alternative (which examined the recovery needs of the covered fish throughout their range in the absence of habitat restoration, as previously discussed in Section 3A.10.6, *Development of DWR "Proposed Project" in 2012*). The presentation described results of analyses of different approaches to meet the CS5 objectives of increased Delta outflow in all months. These approaches assumed that water supplies would be maintained for all non-SWP and non-CVP water rights users, instream minimum flows, and regulatory obligations. The approaches in the presentation also assumed that the operations would include criteria of CS5. These same CS5 criteria were used in the development of the EIR/EIS Alternative 4 (Chapter 3, Section 3.5.9, *Dual Conveyance with Modified Pipeline/Tunnel and Intakes 2, 3, and 5*).

The presentation that was attached to the Portfolio-Based Proposal included results of a preliminary modeling analysis that indicated that operations under EIR/EIS Alternative 4 would achieve most of the Delta outflow objectives in the fall and summer months and south Delta flow objectives to reduce entrainment potential. The presentation also indicated that, in order to achieve the CS5 spring outflow objectives, Delta exports periodically would be limited to only provide health and safety water supplies, and the operations of Trinity Lake, Shasta Lake, Folsom Lake, and Lake Oroville would be modified to reduce storage volumes. The reduction in reservoir storage, especially in the summer and fall months, would result in high temperatures and periodically reduced instream flows in the rivers downstream of these reservoirs, especially the Feather and Trinity Rivers. These operational criteria would result in adverse impacts on aquatic resources and recreation use of the reservoirs and downstream rivers, and hydropower generation. For these reasons, the operation criteria considered in CS5 were modified in the development of alternative scenarios to be analyzed through the decision tree process, as described in Section 3A.10.6, *Development of DWR "Proposed Project" in 2012*.

If the conveyance operations criteria for the Portfolio-Based Proposal are developed further to minimize the potential for adverse impacts on aquatic resources related to high temperatures and reduced instream flows, especially on the Feather and Trinity Rivers, the operations associated with the Portfolio approach would become similar to those of Alternative 4 with high Delta outflow (H4), as described in Chapter 3, *Description of Alternatives* (albeit with only one north Delta intake, rather than three).

The results of the evaluation of the Alternative 4 H4 (as described in Appendix 5A, *BDCP EIR/EIS Modeling Technical Appendix*) indicate that long-term average annual Delta exports under Alternative 4 H4 would be about 4.4 million acre-feet/year. Long-term average annual Delta exports under other EIR/EIS alternatives are anticipated to range from 3.1 to 5.5 million acre-feet/year (Alternatives 8 and 1, respectively). The Portfolio-Based Proposal's anticipated range of Delta exports of 4.0 to 4.3 million acre-feet/year are 90 to 98% of 4.4 million acre-feet/year that are projected to occur under Alternative 4 H4.

3A.11.1.2.3 Considerations for Conveyance Operations with One 3,000 cfs Intake and Delta Operation Criteria similar to Alternative 4 H4

Although the total Delta exports under the Portfolio-Based Proposal are within 10% of the total Delta exports under Alternative 4 H4, the majority of the water would continue to be exported from the south Delta intakes (much as it is today) because of the availability of only one north Delta intake. Assuming similar proportional flow relationships as under Alternative 5, approximately 75% of the Delta exports under the Portfolio-Based Proposal (approximately 3 to 3.2 million acre-feet/year) would continue to be diverted from the south Delta. Therefore, the Portfolio-Based Proposal would not result in the same ecological benefits that are anticipated to result from creating the flexibility to shift a greater percentage of diversions from the south Delta to the north Delta when it is deemed ecologically advisable to do so.

In summary, although the Portfolio-Based Proposal, taken as a package, is far too comprehensive in scope to qualify as an alternative version of an HCP/NCCP, the proposal nevertheless includes some individual components that could be included in an HCP/NCCP and others that are being addressed in alternative venues. Those components that could be included in a Delta area HCP/NCCP are already being addressed within the various EIR/EIS alternatives described herein and are anticipated to result in fewer ecological benefits to the Delta ecosystem than various EIR/EIS alternatives.

3A.11.2 Congressman Garamendi's Water Plan

This Plan includes the following actions.

- Dual conveyance consisting of: (1) a new 3,000 cfs north of Delta diversion structure on the Sacramento River near West Sacramento; (2) use of the Sacramento Deep Water Ship Channel as a means of conveying water approximately 25 miles to a new intake near the southern end of the channel; (3) new boat lock near the southern end of the Deep Water Ship Channel to prevent water diverted from the Sacramento River from flowing into the Delta near Rio Vista; and (4) a new 12-mile pipeline to convey water through the western Delta and underneath the Sacramento and San Joaquin Rivers between the Deep Water Ship Channel and existing Delta channels leading to the existing SWP and CVP pumping plants in the south Delta.
- Operation criteria similar to those of the DWR Proposed Project but with more emphasis on increased Delta diversions in wet years and lower Delta diversions in drier years.
- Increase water storage capacity in areas located south of the Delta to store increased Delta diversions in wet years and to provide water supplies in drier years.
- Increase water recycling and conservation to improve water supply reliability in dry years in areas that use water diverted from the Delta. Integrate water supply operations among water

agencies that use water diverted from the Delta to coordinate benefits of water recycling and increased water storage.

- Improve Delta levees to reduce vulnerability of Delta water supplies to earthquakes, sea level rise, and climate change impacts.

Similar to the Portfolio-Based Proposal, Congressman Garamendi's Water Plan would also (1) require changes in the manner in which local and regional water managers use their supplies, (2) involve unfunded levee improvements that are unrelated to restoration of the Delta ecosystem, and (3) include new storage projects outside of the Delta that are beyond the scope of the BDCP. As with the Portfolio-Based Proposal, the Congressman's Water Plan is also akin to a statewide water plan that would treat California as a single water planning unit and include steps about how to increase water use efficiency and water supplies throughout the entire state. Although these steps are highly meritorious, they are outside the scope of an HCP/NCCP for the Delta.

This proposal, however, also includes conveyance facilities and conveyance operations that, if feasible and reasonable, could be included within an HCP/NCCP. In fact, the proposed facilities are similar to those evaluated earlier in this appendix. In particular, the conveyance facilities in Congressman Garamendi's Water Plan are similar to those described in the Initial Screening Alternative B5 (Section 3A.7, *Results of Initial Screening of Conveyance Alternatives*). As described in Section 3A.7, use of the Deep Water Ship Channel would require construction of (1) a new intake near West Sacramento to divert water from the Sacramento River into the Deep Water Ship Channel, (2) an intake along the Deep Water Ship Channel's eastern levee to divert water from the channel into a tunnel to convey water through the western Delta and under the San Joaquin River to the Clifton Court Forebay area, and (3) and a new ship lock that would serve as a "dam" near the southern end of the Deep Water Ship Channel to prevent the water diverted from the Sacramento River from flowing directly into the Delta near Rio Vista. Use of the Deep Water Ship Channel would avoid construction impacts on existing land uses that could occur along a portion of the conveyance alignments described above that include canals or pipeline/tunnels. However, the Water Plan for All of California Alternative would include construction at the Port of West Sacramento, within the Deep Water Ship Channel, and along the western edge of the Delta to convey water to the Clifton Court Forebay area. Modification of the locks at the Port of West Sacramento and construction and operation of a new lock near the southern end of the Deep Water Ship Channel would cause delays to ship transit times in the Deep Water Ship Channel due to ship handling/piloting through the modified and new locks.

The Deep Water Ship Channel levees could require reconstruction to meet the seismic and 200-year return flood and associated inundation criteria for the BDCP conveyance facility. The levees of the Deep Water Ship Channel also could require improvement in order to store larger volumes of water and higher surface water elevations than occur with current tidal flows in the channel.

As described in Section 3A.7 of this appendix, delta smelt surveys conducted in 2006, 2007, and 2008 showed the presence of over 700 delta smelt/10,000 cubic meters along the lower Deep Water Ship Channel near the potential locations for a new ship lock near Rio Vista. Construction of a new ship lock under this proposal could limit delta smelt from gaining access to areas within the Deep Water Ship Channel that they have recently been using. If delta smelt did gain access when the proposed lock is operated, the delta smelt probably would not be able to reenter the Delta during seasonal migration patterns through periodic openings of the proposed lock. The proposed lock, then, would limit the use of existing habitat by delta smelt.

This proposal, which is similar to Initial Screening Alternative B5, was eliminated from further evaluation because it could adversely affect navigation along a federal navigation corridor and the new lock near the southern end of the Deep Water Ship Channel could prevent access to areas recently used by delta smelt.

Notably, Congressman Garamendi's Water Plan for the timing of construction of new conveyance would be to wait many years before even commencing construction of new conveyance.

> Go forward carefully; start small; use science to evaluate each step; then proceed to the next step. Remember the Delta is a unique and precious environmental asset. We must take care of it. A narrowly focused plumbing system like the BDCP will not achieve progress in creating a water supply sufficient for California's future. We must prepare a holistic, comprehensive approach that will achieve a bigger bang for our buck.
>
> First, reduce demand on the Delta with steps one, two and three: water conservation, recycling, and strategic use of storage facilities. Use the "Big Gulp, Little Sip" pumping strategy. Move forward with the flood plain and fresh and saltwater marsh habitat improvements. Repair and improve the key Delta levees. Evaluate the effect on the Delta as these projects come on line. Then, and only if necessary, proceed with a conveyance system that is much smaller and with a reduced capacity to destroy.

This proposal does not express the real urgency currently facing the Delta: declining conditions for endangered and threatened aquatic species. As one of California's most invaluable natural resources, the Delta has been stretched to the breaking point. The Delta ecosystem is in steep decline, which jeopardizes native fish and wildlife species, threatens reliable water supplies for millions of Californians, and puts the state's broader economy at serious risk. DWR believes it is critical that action be taken as soon as possible to reverse the trend of habitat loss and help recover declining populations of native species. One of the major components of the BDCP's proposed water conveyance facilities is construction of new north Delta intakes. Such structures would relocate the main point of water diversion to the north, away from endangered delta smelt habitat. New operating criteria would be established to improve water volume, timing, turbidity, and salinity. North Delta intakes, along with other conservation measures, should improve native fish migratory patterns and habitat conditions and allow for greater operational flexibility.

As recognized earlier, moreover, this plan also includes components that would have to be implemented outside of the Delta, often by water retailers who have no direct involvement with BDCP. These components include increased water storage in areas located south of the Delta and increased water recycling and water conservation. As explained above, these actions, though beyond the scope of the BDCP, appear to have merit in their own right, and could be pursued independently of the BDCP. As explained previously in connection with the Portfolio-Based Proposal, considerations relating to water storage facilities located south of the Delta and increased water recycling/water conservation are described in Appendix 1B, *Water Storage* and Appendix 1C, *Water Demand Management*, respectively.

3A.11.3 Water Advisory Committee of Orange County (WACO)

The WACO Proposal includes an Isolated Conveyance facility similar to the Initial Screening Conveyance Alternative B6. This alternative includes the following.

- Dual conveyance consisting of:

1) A new 3,000 to 4,000 cfs capacity intake (expandable to 7,000 cfs in a second phase of this plan) on the Sacramento River near Fremont Weir with a 65-mile pipeline/tunnel under the Yolo Bypass, the Sacramento River near Decker Island, Sherman Island, the San Joaquin River, Jersey Island, and portions of Contra Costa County near Oakley to a location near Clifton Court Forebay.
2) Connections to the proposed pipeline/tunnel to provide water from the Sacramento River to North Bay, northern Delta cities and agencies, South Bay, Contra Costa, and East Bay Municipal Utility District.
3) Conveyance to connect the proposed pipeline/tunnel to Los Vaqueros Reservoir, which would be expanded under Phase 2 of this plan.
4) Continued use of the existing south Delta intakes.
5) A new 7,500 cfs intake on the Sacramento River near Decker Island with a pump station and a pipeline/tunnel under Sherman Island, San Joaquin River, Jersey Island, and Contra Costa County to Bethany Reservoir with connections to Clifton Court Forebay under Phase 3 of this plan.

- Reinforcement of levees on Sherman and Jersey islands, possibly using setback levees, and potentially to narrow the channels around these islands to reduce the amount of water needed to maintain freshwater conditions in the western Delta; portions of the pipeline/tunnel from near Decker Island to Sherman and Jersey Island could be constructed during Phase 1 of this plan to convey material from Montezuma Hills to these islands for levee reconstruction; and
- Connection of Colusa Drain into the Yolo Bypass to improve water quality.

Some of the components in the WACO Proposal, namely, the conveyance facilities and operations, are similar to those associated with several alternatives considered in the Initial Screening Conveyance Alternatives B4, B6, and B7(see Section 3A.7, *Results of Initial Screening of Conveyance Alternatives*).

This proposal, like Initial Screening Conveyance Alternative B6 described in Section 3A.7, would include a 65-mile long pipeline/tunnel to be constructed within the Yolo Bypass, across the western Delta, and in Contra Costa County. The approximately 35-mile long section of the pipeline/tunnel within the Yolo Bypass and Cache Slough would require major encroachments within a federal floodway. Although the pipeline/tunnel would be constructed underground, construction activities would occur above ground within the floodway. If the conveyance includes a pipeline, the construction would occur using open trenches and would require substantial amounts of hauling of suitable borrow materials to backfill over the pipeline. If the conveyance includes a tunnel, shafts would need to be installed every 6 to 7 miles to launch or retrieve the tunnel boring machines, as well as large areas for depositing tunnel muck, as described in Chapter 3 of the EIR/EIS. Because the Yolo Bypass and parts of Cache Slough are used for flood management, all construction activities would be required to receive a permit from the Central Valley Flood Protection Board, which is responsible for maintaining the integrity of existing designated floodways. To maintain existing flood management capabilities, above-ground facilities (such as access hatches to the pipeline/tunnel) during the winter would likely be disallowed, requiring potentially enormous effort and expense each winter to remove construction machinery and other impediments to flood flows and effectively prolonging the construction period by years due to reduced productivity per year.

Construction of the 65-mile proposed conveyance plus a second tunnel of approximately 20 miles as described in the WACO Proposal would be longer than the 45-mile pipeline/tunnel being considered under the EIR/EIS Alternative 1, which includes five intakes in the north Delta. Thus, the overall amount of land disturbance entailed by the WACO Proposal would be proportionally greater than CM1 in the BDCP Proposed Project.

The amount of water available for diversion from the Sacramento River would be less for intakes near Fremont Weir than for intakes located downstream of the confluence with the American River. As described in Section 3A.7, the evaluation of Initial Screening Conveyance Alternative B4 showed that available flows in the Sacramento River upstream of the American River would be approximately 10 to 20% less than flows downstream of the American River, especially in the spring months. Results of a preliminary evaluation presented on July 29, 2010, at the BDCP Steering Committee indicated that diversions upstream of American River probably would not occur until flows were greater than 5,000 cfs in the Sacramento River at Verona due to the need to provide water to diverters located between the Feather and American Rivers (including over 200,000 acre-feet/year of water rights or CVP water rights settlement contracts with Natomas Central Mutual Water Company, the Cities of West Sacramento, Davis, Woodland, and Sacramento, and several reclamation districts). The presentation to the 2010 BDCP Steering Committee indicated that this type of restriction and the inability to divert water from the American River could reduce the amount of water available for diversion from the Sacramento River by 30% as compared to the amount of water available to divert from intakes located downstream of the American River. Therefore, it may not be feasible to divert 3,000 to 7,000 cfs from the Sacramento River near the Fremont Weir for 260 days/year. As with other proposals that reduce the potential for diversion of water from the north Delta, this proposal envisions continued significant reliance on south Delta diversions and thus the ecological benefits of reducing south Delta exports would be less likely to accrue under the WACO Proposal than under other proposals with intakes on the Sacramento River downstream of the American River confluence.

The WACO Proposal also includes a diversion in the western Delta near Decker Island in a form similar to what was considered in Section 3A.7 for Initial Screening Conveyance Alternatives B6 and B7. The ability to divert water in the western Delta near Decker Island could be limited due to the presence of delta smelt in the western Delta. A recent pilot study completed by the Bay Area Regional Desalination Project in March 2010 for a desalination facility with a diversion in Mallard Slough indicated that during operations of a 25 mgd intake (approximately 40 cfs) from November 2008 through October 2009, several species of fish—prickly sculpin, bluegill, redear sunfish, longfin smelt, and delta smelt—were entrained. The longfin smelt and delta smelt were entrained during January through June. Presence of these species in the western Delta during the period when high flows would occur in the Sacramento River could reduce the effectiveness of a western Delta intake. In addition, during July through November, salinity could be too high for diversions from the western Delta, especially as sea level rise progresses through the end of the study period in 2060.

Other portions of the WACO Proposal cannot be achieved through an HCP/NCCP, but rather could only be accomplished through other water management efforts, including levee improvements on Sherman and Jersey Islands, provisions for diverting agricultural return water from the Colusa Drain into the Yolo Bypass to modify habitat conditions, providing water supplies to non-BDCP participants, and expansion of the Contra Costa Water District's Los Vaqueros Reservoir.

In summary, the WACO Proposal includes over 85 miles of new pipeline/tunnels, including 35 miles within the Yolo Bypass/Cache Slough flood management areas (as considered for Initial Screening

Conveyance Alternative B6). Construction of the these pipeline/tunnels would be conveyance components that would cause almost twice as much disturbance as the 45-mile pipeline/tunnel considered in the formal EIR/EIR alternatives and could require more than twice the construction time (and thus vastly increased costs) if the construction season is limited in the flood management areas. The WACO Proposal would include Sacramento River diversions to be located north of the American River confluence (as considered for Initial Screening Conveyance Alternative B4), which would result in up to 30% less water being diverted from north of Delta intakes as compared to diversions located downstream of the American River for intakes due to less water in the Sacramento River. The WACO Proposal includes a 7,500 cfs diversion from the Sacramento River near Decker Island (as considered for Initial Screening Conveyance Alternative B6 and B7), which could result in limited diversions during winter and spring months (when high Delta flows could be diverted) due to the presence of delta smelt in the western Delta, and limited diversions in late summer and fall months due to high salinity in the western Delta. Therefore, this alternative is not being considered for further evaluation for many of the reasons that the similar Initial Screening Conveyance Alternatives B4, B6, and B7 were not considered as formal EIR/EIS alternatives.

3A.11.4 Pyke Proposal

The Western Delta Intake Concept proposed by Robert Pyke (the Pyke Proposal) includes the following actions (Pyke 2012, Pyke 2013):

- Restoration of floodplains along the Sacramento and San Joaquin Rivers and their tributaries, including the Lower San Joaquin Bypass.
- Dual conveyance consisting of:
    1) Use of Sherman Island as an intake forebay, facilitated by removal of the peat soils and modification of the levees to allow for water to infiltrate up to 15,000 cfs into the island forebay from the surrounding rivers and sloughs (water inflow into Sherman Island would occur when water elevation in Sherman Island is lower than water elevation in the surrounding rivers and sloughs).
    2) A pumping plant and one or more tunnels to convey water from Sherman Island to a new reservoir near Clifton Court Forebay (Brushy Creek Reservoir).
    3) Continued use of existing south Delta intakes with new fish screens (water would not be conveyed from Sherman Island when salinity is high in the western Delta).
- Levees around Sherman Island along the Sacramento River, San Joaquin River, and Threemile Slough would be replaced with permeable levees to allow water from the rivers to enter Sherman Island but not flow from the island.
- Conversion of the Delta Cross Channel gates into a boat lock to prevent fish passage from the Sacramento River into the central Delta.
- New Brushy Creek Reservoir near Clifton Court Forebay (with a capacity of at least 1 million acre-feet), which could be used to store water diverted from Sherman Island when the total Delta exports exceed the 15,000 cfs capacity of the SWP and CVP pumping plants. A conveyance could be constructed between Brushy Creek Reservoir and Los Vaqueros Reservoir for additional storage capacity. If Los Vaqueros Reservoir is expanded (to a capacity of at least 1 million acre-feet), the two reservoirs could be designed with a pumped storage hydro-electric facility.

- Operation of SWP and CVP in accordance with the 2008 USFWS Biological Opinion and the 2009 NMFS Biological Opinion, as well as all existing operating criteria established by regulatory agencies.
- Construction of storage facilities south of the Delta, including additional groundwater storage and western San Joaquin Valley surface water storage facilities.[20]
- A new lined canal to convey water from the SWP California Aqueduct and the CVP Delta-Mendota Canal into the San Joaquin River upstream of Vernalis.
- Ecosystem restoration of tidal and sub-tidal habitat at the western end of Sherman Island, Lower San Joaquin River Bypass, and Franks Tract.
- Installation of fish screens along Old River at the entrance to Clifton Court Forebay.

Some of these components are already reflected in EIR/EIS alternatives that are being carried forward or in potential alternatives that have been screened out. For example, the Pyke Proposal includes portions of the western Delta conveyance analyzed under the EIR/EIS Alternatives 1C, 2C, and 6C. The proposal also includes fish screen facilities along Old River that were eliminated from further evaluation in the Initial Screening Conveyance Alternative C4.

The Pyke Proposal also raises a number of challenges and problems. For example, the proposal also could result in limited use of the western Delta intake due to the presence of high salinity waters near Sherman Island, and salinity of the water stored in the island could increase if Delta waters migrated through groundwater or the levees into the island storage facility. More specifically, Delta water quality may limit the use of the Sherman Island reservoir. Sherman Island is located at approximately 92 kilometers from the Golden Gate. The Western Delta Intake Concept Alternative (Pyke 2012) indicates that diversions would not occur unless X2 is located "well west of Sherman Island." Generally, X2 is located near Chipps Island (74 kilometers from the Golden Gate) to provide freshwater to the western Delta intakes. Under existing conditions (as described in Appendix 5A, *BDCP EIR/EIS Modeling Technical Appendix*), X2 would be located at or to the west of Chipps Island in January through June of wet water years; in January through May in below normal water years; and generally not at all in critically dry years. Also, as water would be diverted at Sherman Island, the X2 location would move eastward unless additional water is released from upstream reservoirs. Therefore, diversions of up to 15,000 cfs would be limited near Sherman Island in a similar manner as north Delta diversions of up to 15,000 cfs are limited under Alternatives 1, 2, and 6 in the EIR/EIS, (as described in Appendix 5A, *BDCP EIR/EIS Modeling Technical Appendix*).

Water quality could be difficult to maintain in the Sherman Island forebay in the summer. During the summer and fall months, western Delta salinity near Sherman Island could range from 500 to over 2,000 micromhos/centimeter. The saline water could migrate through the groundwater into the Sherman Island forebay. This would be more likely if the volume of stored water is low. The potential for migration from the Delta into Sherman Island also would be more likely under this

[20] These elements of the Pyke Proposal are beyond the purpose and scope of the BDCP, as was the case with similar elements in the Portfolio-Based Proposal, Congressman Garamendi's Water Plan, and the WACO Proposal, as described earlier. The BDCP is a permit-driven process in which DWR is seeking a long-term incidental take authorizations for the loss of endangered and threatened species in connection with the operation of the State Water Project. Proposals that seek to develop state-wide water management principles and practices will be helpful in other contexts, however. These include DWR's process for developing the Statewide Water Plan, the Delta Stewardship Council's process for creating its Delta Plan, and various water agencies' processes for preparing Integrated Regional Water Management programs.

potential alternative as compared to the existing conditions because of the removal of up to 45 feet of peat soils.

In addition to the water quality concerns described above, water quantities under the Pyke Proposal could also be limited. Diversions of up to 15,000 cfs at the south Delta intakes probably would not occur due to current limitations under State Water Board water quality and water rights decisions, the 2008 USFWS Biological Opinion, and the 2009 NMFS Biological Opinion. Under the existing conditions, diversions at the south Delta intakes rarely approach 11,000 cfs. Due to the limitations of diversions near Sherman Island and diversions at the south Delta intakes, it would be difficult to achieve the water supply reliability goals of the BDCP.

The Pyke Proposal calls for permeable levees[21] to allow water to enter Sherman Island while avoiding or reducing fish entrainment. Although, in concept, the reduction in entrainment is an excellent feature, the construction of the proposed levees would likely be impractical. Levee designs that include rock and sand to reduce fish entrainment in the facilities are of limited use and success in a project this size. A permeable embankment capable of passing 15,000 cfs at a velocity of 0.002 ft/sec (100 times less than existing approach velocity criteria) would have to be about 95 miles long (assuming 15 feet of wetted area). Sherman Island only has about 19.5 miles of existing levees.

The methodology is unclear for controlling diversions through a permeable levee during periods when diversions would not occur in summer and fall to maintain freshwater conditions in the western Delta. If Delta surface water elevations were lower than the surface water elevation within the island, water may "leak" out of the reservoir back into the Delta. If Delta surface water elevations were higher than the surface water elevation within the island, higher salinity water may move through the permeable barrier and increase the salinity of the stored water. Although not included in the Pyke Proposal, this plan may require a dual levee system with an outside permeable barrier to allow water to flow through with limited fish entrainment, as well as an inside solid levee with inlet gates to prevent water from flowing back into the Delta or Delta water mixing with the stored water during periods of higher salinity.

Inundation of Sherman Island would create its own problems. Constructing a reservoir in the western Delta on peaty soils combined with more saline water will the increase the potential formation of trihalomethanes. Alternatively, should the peat soils be removed during construction, very substantial amounts of excavation, with attendant environmental impacts, would be necessary. Although the actual size of the Sherman Island Forebay has not been described, it would need to be at least several hundred acres to provide an operational buffer and take advantage of off-peak pumping. At some locations on Sherman Island, the peat can be up to 40 feet deep. Assuming the forebay size to be 750 acres and the average depth of peat to be 20 feet, removal of over 653 million cubic yards could be required.

As noted above, the Pyke Proposal would convert the Delta Cross Channel into a boat lock, which would require removing the existing radial gate structure and replacing it with two sets of miter gates located at each end of the Cross-Channel. The lock would also include a pump system with fish screens needed to fill the locks. This structure could have a significant impact on boating traffic, especially during holiday weekends.

[21] Permeable levees can be constructed based on various designs. Those that include rock and sand as to reduce fish entrainment in the facilities are of limited use and success in a project this size.

In summary, the Pyke Proposal includes components that are similar to alternatives already being addressed within the various formal EIR/EIS alternatives described herein (including EIR/EIS Alternatives 1C, 2C, and 6C), as well as components of alternatives that have been eliminated from further evaluation, including fish screen facilities along Old River (considered in Initial Screening Conveyance Alternative C4). Those aspects of the Pyke Proposal that are not reflected in other proposals—such as the use of permeable levees at Sherman Island, and conversion of the Delta Cross Channel into a boat lock—are not workable. Therefore, the Pyke Proposal was not identified for evaluation in the EIR/EIS.

3A.11.5 DSC Staged Proposal

As noted earlier, the DSC, in correspondence dated April 2012, suggested that the "BDCP EIR/EIS *may* want to consider" staged implementation, by which the preferred alternative would be built in phases (italics added). Under this approach, "the results of performance monitoring and adaptive management" could be used "to inform its expansion." Or, alternatively, "if a 'first phase' project fails to meet its goals as a CM, then this could be learned at substantially less cost and time than more comprehensive alternatives" (Letter from DSC to Marcus Yee, DWR, April 18, 2012).

It is not entirely clear from these suggestions whether, under this proposed "staged" approach, the BDCP proponents would build only one or two new north Delta intakes as a first stage, with the option of building one or more additional intakes later, or whether the BDCP proponents would build all of the desired intakes at once except for the fish screen portions of possible "second stage" intakes. Under the latter scenario, partially constructed intakes could be walled off from the Sacramento River to prevent any in-water impacts from occurring while the results of "first stage" operations are considered. If the results were unacceptable, the partially built intakes would simply be abandoned (and possibly disassembled).

Regardless of which approach the DSC was contemplating in its letter, both suggestions would be problematic for reasons discussed below.

The viability of a phased approach to intake construction—one along the lines of the first scenario mentioned above—was considered at a one-day workshop held in October 2011. Attendees included representatives from DWR, CDFW, Reclamation, USFWS, NMFS, and water contractors, as well as consultants.

Although the conclusions from the workshop were not final, the results were clear that a staged approach would be extremely costly compared with an approach by which all approved conveyance facilities were constructed during a single phase. For example, construction of EIR/EIS Alternative 1 (with five intakes and 15,000 cfs diversion capacity) was projected to cost approximately $ 12.9 billion (in 2011 dollars) under a non-phased approach. Under various phasing or staging approaches, total costs were unknown due to the inability to assign costs to the studies that would be undertaken to assess the success of the initially constructed intakes; but it is clear that the additional construction costs would be enormous. For example, if one tunnel and two intakes were built initially and another tunnel and three intakes were built subsequently, the *additional* construction costs (on top of the initial $12.9 billion) could range from $9.6 to $17.2 billion (see *Workshop Summary: Phased Construction of North Delta Intake Facilities*, p. 6). Under another scenario in which the first phase included both tunnels and the second phase still involved three intakes, the additional construction costs could range from $2.5 billion to $4.5 billion. (*Ibid*.)

These additional costs could well be prohibitive. One of the greatest challenges in making the BDCP work has been to identify scenarios involving new conveyance facilities that can be financed through costs passed on to the ultimate users of water in geographic areas south of the Delta served by the SWP and CVP. If water supplied through new conveyance facilities is not prohibitively expensive, then financing should be available. If water is prohibitively expensive, however, new conveyance will not get built, and the existing environmental problems associated with exclusive reliance on south Delta pumps will persist. The current preferred CEQA alternative, EIR/EIS Alternative 4, already represents a comparatively expensive source of relatively limited amounts of exported water. If the costs of the same facilities were to increase by many *billions* of dollars, the result could well be abandonment of the BDCP by the water contractors who are proposing to fund the new conveyance. Even if the water contractors could fund increased costs, the result would still be additional enormous expenditures of public money and significantly increased water costs in export service areas, with the potential for adverse effects in agricultural areas in which particular crop types may become cost-prohibitive when water costs become too high. Although the idea behind a phased or staged approach is that experience with new intakes will inform agency decision makers regarding the sustainability of various levels of exports and outflows, future adjustments to operations based on disappointing results could also be made under a non-phased approach, though such adjustments would take the form of reduced diversions amongst multiple existing intakes as opposed to the abandonment of plans for additional tunnels or intakes.

In addition to increased costs, and perhaps more importantly, phasing would greatly increase the number of years during which Delta residents would have to endure construction activities in their midst. Under the non-phased approach, it is anticipated that many of the facilities will be constructed concurrently, maximizing construction efficiency and minimizing the total construction period. Under a phased approach, construction efficiencies would be lost, resulting in a substantially longer construction period. Although, under a phased approach, the areas of disturbance during each construction phase would be smaller than those that would be created under a non-phased approach, the total cumulative amount of disturbance could be greater because some facilities, such as staging areas, access roads or temporary power facilities, would have to be constructed multiple times over the project period.

Not only would Delta residents be affected by longer construction periods, sensitive species and habitats would experience negative impacts. Areas that will be restored after construction would be affected a second or third time as subsequent phases are constructed. Restoration that will occur under the BDCP will likely increase populations of sensitive species in the Delta, so later phases of construction will have greater impacts on species as work may occur adjacent to restored areas. Sensitive species would also be exposed to much longer periods of disturbance, which could have substantial indirect effects.

The second potential approach to phasing (or "staging")—one in which everything but fish screens for "second stage" intakes are built initially—raises similar, if somewhat different, issues. Notably, neither USFWS nor NMFS has advocated this approach. Although, under this approach, Delta residents would not be at risk of a second lengthy round of disruptive *construction* activities, this approach could ultimately entail a huge waste of public financial resources. If, after the accumulation of data regarding the performance of the first set of operational intakes, the permitting agencies decide that DWR may not place fish screens on the second-stage intakes and then use them for diverting water, the money spent on building the not-quite-completed intakes will have been spent in vain. Such wasted costs will still have to be borne by water users in export areas,

despite the lack of any ability to divert more water from the abandoned intakes. Under this second possible staging scenario, moreover, there might also be pressure to demolish abandoned intakes because of both their visual impacts and the sheer amount of physical space they consume. Such demolition would convert the localized areas in question to *demolition* zones in which nearby residents would be inconvenienced—for a second time—for a prolonged period. The costs of demolition would also be quite considerable.

For all of these reasons, a "staged" or "phased" alternative of either of the two kinds discussed above has not been carried forward for full analysis in the EIR/EIS. Notably, however, the absence of such an alternative will not prevent final agency decision makers from permitting the number of intakes and other related facilities that the agencies determine to be appropriate in order to meet the standards of the ESA and NCCPA. And should the initial approved project be more modest than the current preferred CEQA Alternative, neither DWR nor the CVP and SWP Contractors would be prevented in the future from pursuing an expanded project should the economics of such an undertaking become favorable at some point. The Lead Agencies have determined, however, that it would be financially imprudent to plan from the outset to knowingly embark on a two-phase or two-stage process. Such an approach could also result in needless environmental impacts and inconveniences to Delta residents.

3A.12 Selection of New Sub-Alternatives for Partially Recirculated Draft EIR/Supplement to Draft EIS

Among the comments received on the Draft EIR/EIS were suggestions that DWR should pursue permit terms shorter than 50 years, and that the proposed conveyance facilities should be untethered from the habitat restoration components of the BDCP, with the latter to be pursued separately. These comments highlighted two major challenges associated with the original 50-year term for the proposed Bay Delta Conservation Plan, which would be a habitat conservation plan (HCP) under the federal Endangered Species Act and a natural community conservation plan (NCCP) under California law. The first such challenge related to the inherent difficulties in trying to predict the future status of the target aquatic species and other future environmental conditions over a 50-year period in light of climate change and other variables. The second challenge related to the difficulties, over such a long period, in trying to accurately predict the benefits of long-term conservation in contributing to the recovery of such species. Other comments questioned DWR's ability to implement large-scale habitat restoration, or expressed interest in exploring multiple regulatory approaches that could facilitate expeditious progress on Delta solutions.

To address these concerns, and due to the Lead Agencies' desire to explore alternative regulatory approaches that could facilitate expeditious progress on solutions to problems such as reverse flows in the South Delta, DWR revised its proposed project to allow for an alternative implementation strategy. Reclamation also embraced this new approach as its NEPA preferred alternative. Under the new strategy, DWR would not seek 50-year permits under the federal and state endangered species laws, and would focus solely on the construction and operation of new conveyance facilities. DWR and Reclamation would achieve federal ESA compliance for a shorter time period through the "Section 7" process, and DWR would satisfy the California Endangered Species Act (CESA) through the "Section 2081" process. No HCP or NCCP would be pursued. Thus, the originally proposed BDCP habitat restoration measures and related Conservation Measures (CMs) (i.e., CM2 through CM21)

would *not* be included as part of the proposed project, except to the extent required to mitigate significant environmental effects under CEQA and meet the regulatory standards of ESA Section 7 and CESA Section 2081(b). The alternative implementation strategy would allow for other state and federal programs to address the long term conservation efforts for species recovery in programs separate from the proposed project.

Although in publishing the Partially Recirculated Draft EIR/Supplement to Draft EIS (RDEIS/SDEIS), DWR came up with a new proposed project (or preferred alternative) (which Reclamation embraced as well), the Lead Agencies did not intend to abandon their continuing consideration of the original alternatives found in the Draft EIR/EIS. Indeed, although DWR no longer identified Alternative 4, the BDCP (an HCP/NCCP), as its proposed project for CEQA purposes, the Lead Agencies did not reject further consideration of the HCP/NCCP alternatives from the Draft EIR/EIS, despite the challenges identified above. Rather, the alternative implementation strategy, as set forth in the RDEIR/SDEIS, was intended to provide *additional* options, increasing the number of alternatives and sub-alternatives under consideration. Thus, the RDEIS/SDEIS was clear that the original DEIR/EIS alternatives were still under active consideration. The new approach was merely a logical outgrowth of the lessons learned through the public review process on the Draft EIR/EIS.

Maintaining the original alternatives while coming up with new options is entirely consistent with long-standing CEQA and NEPA principles. At their cores, both CEQA and NEPA are intended to allow agency decision makers and members of the public to consider the environmental consequences of proposed actions and to consider ways of reducing or avoiding adverse impacts. The statutory schemes function best when lead agencies use the information they acquire through the environmental review process to modify their proposed actions or alternatives to make them more environmentally benign and more acceptable to the public and other agencies.

California courts have recognized that project changes are a desirable and foreseeable byproduct of the CEQA process. In fact, courts have noted that CEQA "encourages" public agencies to revise projects in light of new information revealed during the CEQA process.[22] Indeed, as the courts have emphasized, "one of the major objectives of the CEQA process …[is] to foster better (more environmentally sensitive) projects through revisions which are precipitated by the preparation of EIRs."[23] It is thus "the very nature of CEQA" that "projects will be 'modified' to protect the environment."[24]

As further noted by the California courts, "[t]he CEQA reporting process is not designed to freeze the ultimate proposal in the precise mold of the initial project; indeed, new and unforeseen insights may emerge during investigation, evoking revision of the original proposal."[25] Project reductions, in particular, are encouraged to the extent that they address environmental needs and facilitate the goals of CEQA. In certain situations, for example, an agency may approve only a portion of the project analyzed in an EIR.[26] As one state court summarized these points, "'CEQA compels an

[22] *Citizens for a Sustainable Treasure Island v. City and County of San Francisco* (2014) 227 Cal.App.4th 1036, 1062.

[23] *County of Orange v. Superior Court* (2003) 113 Cal.App.4th 1, 10.

[24] *Ibid.*

[25] *Kings County Farm Bureau v. City of Hanford* (1990) 221 Cal.App.3d 692, 736–737, quoting *County of Inyo v. City of Los Angeles* (1977) 71 Cal.App.3d 185, 199; see also *River Valley Preservation Project v. Metropolitan Transit Development Bd.* (1995) 37 Cal. App. 4th 154, 168, fn. 11.

[26] See *Dusek v. Anaheim Redevelopment Agency* (1985) 173 Cal.App.3d 1029, 1041 [decisionmakers have "the flexibility to implement that portion of a project which satisfies their environmental concerns"].

interactive process of assessment of environmental impacts and responsive project modification which must be genuine. It must be open to the public, premised upon a full and meaningful disclosure of the scope, purposes, and effect of a consistently described project, with flexibility to respond to unforeseen insights that emerge from the process.' In short, a project must be open for public discussion and subject to agency modification during the CEQA process."[27]

NEPA imposes similar obligations on federal agencies and, like CEQA, encourages project revisions based on environmental concerns brought to light during the environmental review process. Although NEPA, unlike CEQA, is considered a "purely procedural statue" (meaning that it does not mandate particular results), it provides the necessary process to ensure that federal agencies take a "hard look" at the environmental consequences of their actions.[28]

NEPA and its implementing regulations specifically require federal officials to consider the recommendations of other government entities and the public who present reasonable solutions or alternative approaches that may improve a proposed action. When preparing a Final EIS, a federal lead agency must respond to comments on a Draft EIS in one of several ways, "including by modifying alternatives including the proposed action and by developing and evaluating alternatives not previously given serious consideration by the agency."[29] As stated in the NEPA regulations, "[u]ltimately, of course, it is not better documents but better decisions that count. NEPA's purpose is not to generate paperwork—even excellent paperwork—but to foster excellent action. The NEPA process is intended to help public officials make decisions that are based on understanding of environmental consequences, and take actions that protect, restore, and enhance the environment."[30]

Accordingly, like CEQA, NEPA encourages agencies to make changes to proposed projects based on information gathered during the environmental review process and based on public comments received on a Draft EIS. The NEPA regulations note that "[a]n agency can modify a proposed action in light of public comments received in response to a draft EIS."[31] Moreover, federal courts have long recognized that "agencies must have some flexibility to modify alternatives canvassed in the Draft EIS to reflect public input."[32] Indeed, the very purpose of a Draft EIS and the ensuing comment period is to elicit suggestions and criticisms to enhance the proposed project.[33]

Consistent with the alternative implementation strategy, the RDEIR/SDEIS added three new alternatives to the RDEIR/SDEIS analysis. The three alternatives, Alternatives 4A, 2D, and 5A, were included to ensure that a reasonable range of sub-alternatives are considered. They represent a range of choices similar to that embodied in the alternatives in the Draft EIR/EIS insofar as Alternative 4A would include three new intakes, Alternative 2D would include five, and Alternative

[27] *Concerned Citizens of Costa Mesa, Inc. v. 32nd District Agricultural Association* (1986) 42 Cal.3d 929, 936.

[28] *Muckleshoot Indian Tribe v. U.S. Forest Serv.* (9th Cir.1999) 177 F.3d 800, 814 (quoting *Robertson v. Methow Valley Citizens Council* (1989) 490 U.S. 332, 350) (quotation marks omitted).

[29] 40 C.F.R. § 1503.4(a).

[30] 40 C.F.R. § 1500.1(c).

[31] See 40 C.F.R. § 1503.4(a).

[32] *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.)

[33] *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.

5A would include only one. These new alternatives are considered "sub-alternatives" to Draft EIR/EIS alternatives 4, 2A, and 5 because they generally adopt the same conveyance facility features as the original Draft EIR/EIS alternatives but with different implementation characteristics. The new sub-alternatives incorporate an alternative implementation strategy to achieve the project goals and objectives, focusing on the conveyance facility improvements necessary for the SWP and CVP to address more immediate water supply reliability needs in conjunction with ecosystem improvements to significantly reduce reverse flows and direct fish species impacts associated with the existing south Delta intakes. The alternative implementation strategy allows for other state and federal programs to address the long term conservation efforts for species recovery in programs separate from the proposed project.

The operational assumptions of Alternatives 2D and 4A are consistent with the assumptions presented in Table 3A-6 (which were used to describe assumptions for Alternatives 2 and 4); except for the assumptions under Item 8, In-Delta Agricultural and Municipal & Industrial Water Quality Requirements. Under Alternatives 2D and 4A, the salinity compliance point would remain at Three-mile Slough, as specified under D-1641 instead of moving to Emmaton. The operational assumptions of Alternative 5A are consistent with the assumptions presented in Table 3A-4 (which were used to describe assumptions for Alternative 5); except for the assumptions under Item 8, In-Delta Agricultural and Municipal & Industrial Water Quality Requirements. Under Alternatives 2D, 4A, and 5A, the salinity compliance point would remain at Three-mile Slough, as specified under D-1641 instead of moving to Emmaton.

The new alternatives are not presented as habitat conservation /natural community conservation plans according to ESA Section 10 and the NCCPA. The proposed BDCP habitat restoration and stressor reduction measures (i.e., CM2 through CM21) that are presented in the Draft BDCP were not carried forward fully for new sub-alternatives 4A, 2D, and 5A, except where elements of the former conservation measures were retained to mitigate the potential impacts of the proposed project in compliance with CEQA, NEPA, and other environmental regulatory permitting requirements. Many of these original BDCP conservation measures may, however, be implemented through the (separate) California EcoRestore (EcoRestore) program. The sub-alternatives would achieve federal and state endangered species act compliance using a shorter duration through the "Section 7" process under the ESA, and the "Section 2081" process under the CESA.

As the CEQA and NEPA Preferred Alternative, Alternative 4A entails the construction and operation of north Delta intakes and associated tunnel conveyance facilities, and the operation of the SWP, as a dual conveyance facility consistent with those proposed under the updated Alternative 4, as identified in RDEIR/SDEIS Appendix A. Alternatives 2D and 5A entail similar conveyance facilities as proposed under Draft EIR/EIS Alternatives 2A and 5 but with alignment and other improvements proposed under Alternatives 4 and 4A. Proposed facility operations and other actions reflect that revised approach: Alternatives 4A, 2D, and 5A do not include CM2 through CM21 as they are described for proposed BDCP alternatives.

Compliance with the ESA would be achieved by Reclamation as the federal lead action agency under Section 7 of that act. Pursuant to the Coordinated Operations Agreement (COA), by which DWR and Reclamation coordinate their operations of the SWP and CVP, Reclamation; and DWR, as the project applicant, would consult with both the USFWS and NMFS. This consultation also is intended to cover the U.S. Army Corps of Engineers' (USACE's) issuance of permits under the Clean Water Act (CWA) and Rivers and Harbors Act for the construction of the necessary diversion and conveyance facilities. Under the other action alternatives in the Draft EIR/EIS, in contrast, DWR would submit an HCP in a

request for a 50-year incidental take permit and appropriate assurances from NMFS and the USFWS under ESA Section 10, while Reclamation would separately consult with USFWS and NMFS under Section 7. Compliance with state endangered species laws under Alternatives 4A, 2D, or 5A would be through a request for authorization of the incidental take of species listed under the CESA in the form of an incidental take permit issued by CDFW under Section 2081(b) of the CESA.

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3A.14 Attachments

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Table 3A-1. Initial Screening: Comparison of Potential Conveyance Alignment Alternatives with First Level Screening Criteria that Reflect CEQA and NEPA Requirements with Project Objectives and Purpose Statements in the NOP and NOI

Under CEQA, the answers to <u>most</u> of these questions should be "Possibly" or "Unknown" to continue to be considered under the Second Level Screening Criteria. If the answers to most of these questions are "No" or "Not Likely," the alternative need not be considered in the Second Level Screening Criteria.

Under general NEPA principles, the answers to <u>all</u> of these questions should be "Possibly" or "Unknown" if an alternative is to continue to be considered under the Second Level Screening Criteria. However, because the EIR/EIS is a joint document and the project/action will be a joint state/federal undertaking, alternative with "Possibly" or "Unknown" answers to <u>most</u> of these questions is adequate to continue consideration under the Second Level Screening Criteria. If the answers to most of the questions are "Not Likely," the alternative would not be considered under subsequent screening criteria.

Potential Alternative	Could the potential alternative provide for the conservation and management of covered species through actions within the BDCP Planning Area that will contribute to the recovery of the species?	Could the potential alternative protect, restore, and enhance certain aquatic, riparian, and associated terrestrial natural communities and ecosystems?	Could the potential alternative reduce the adverse effects to certain listed species of diverting water by relocating the intakes of the SWP and CVP?	Could the potential alternative restore and protect the ability of the SWP and CVP to deliver up to full contract amounts, when hydrologic conditions result in the availability of sufficient water, consistent with the requirements of state and federal law and the terms and conditions of water delivery contracts held by SWP contractors and certain members of San Luis Delta Mendota Water Authority, and other existing applicable agreements?	Results of First Level Screening
1. Initial Screening Conveyance Alternative AI–*Dual Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
2. Initial Screening Conveyance Alternative A2–*Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
3. Initial Screening Conveyance Alternative A3–*Dual Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
4. Initial Screening Conveyance Alternative A4–*Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the Lower San Joaquin River, and Continued Use of Existing South Delta Intakes*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
5. Initial Screening Conveyance Alternative B1– *Isolated Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
6. Initial Screening Conveyance Alternative B2– *Isolated Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
7. Initial Screening Conveyance Alternative B3– *Isolated Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
8. Initial Screening Conveyance Alternative B4– *Isolated Conveyance with a Lined or Unlined East Canal between the Sacramento River near the Confluence with the Feather River and the and Lower San Joaquin River, and Abandonment of Existing South Delta Intakes*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening

Table 3A-1. Initial Screening: Comparison of Potential Conveyance Alignment Alternatives with First Level Screening Criteria that Reflect CEQA and NEPA Requirements with Project Objectives and Purpose Statements in the NOP and NOI

Under CEQA, the answers to most of these questions should be "Possibly" or "Unknown" to continue to be considered under the Second Level Screening Criteria. If the answers to most of these questions are "No" or "Not Likely," the alternative need not be considered in the Second Level Screening Criteria.

Under general NEPA principles, the answers to all of these questions should be "Possibly" or "Unknown" if an alternative is to continue to be considered under the Second Level Screening Criteria. However, because the EIR/EIS is a joint document and the project/action will be a joint state/federal undertaking, alternative with "Possibly" or "Unknown" answers to most of these questions is adequate to continue consideration under the Second Level Screening Criteria. If the answers to most of the questions are "Not Likely," the alternative would not be considered under subsequent screening criteria.

Potential Alternative	Could the potential alternative provide for the conservation and management of covered species through actions within the BDCP Planning Area that will contribute to the recovery of the species?	Could the potential alternative protect, restore, and enhance certain aquatic, riparian, and associated terrestrial natural communities and ecosystems?	Could the potential alternative reduce the adverse effects to certain listed species of diverting water by relocating the intakes of the SWP and CVP?	Could the potential alternative restore and protect the ability of the SWP and CVP to deliver up to full contract amounts, when hydrologic conditions result in the availability of sufficient water, consistent with the requirements of state and federal law and the terms and conditions of water delivery contracts held by SWP contractors and certain members of San Luis Delta Mendota Water Authority, and other existing applicable agreements?	Results of First Level Screening
9. Initial Screening Conveyance Alternative B5– *Isolated Conveyance with Diversion from the Sacramento River near West Sacramento into the Sacramento Deep Water Ship Channel and a Tunnel between the Deep Water Ship Channel and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
10. Initial Screening Conveyance Alternative B6– *Isolated Conveyance with a Tunnel between the Sacramento River near Fremont Weir and the SWP and CVP Pumping Plants, Isolated Conveyance with a Tunnel between the Sacramento River near Decker Island to Clifton Court Forebay and Bethany Reservoir, and Continued Use of the South Delta Intakes*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
11. Initial Screening Conveyance Alternative B7– *Isolated Conveyance with Diversion from the San Joaquin River near Antioch and Desalination Facilities, a Tunnel between the Desalination Facilities and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
12. Initial Screening Conveyance Alternative C1– *Separate Corridors*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
13. Initial Screening Conveyance Alternative C2– *Through Delta Conveyance with Armored Corridors*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening
14. Initial Screening Conveyance Alternative C3– *Through Delta Conveyance with West Delta Salinity Barrier*	Not likely because Delta would become a freshwater lake that would not support an estuarine habitat and the barrier would reduce fish passage for anadromous fish. This alternative would not support project objectives and aspects of the project purpose and need that focus on creating ecological improvements in the Delta ecosystem and contributing to recovery of declining listed species. Nor would this alternative meet the coequal goal under the 2009 Delta Reform Act of "protecting, restoring, and enhancing the Delta ecosystem."	Not likely because Delta would become a freshwater lake that would not support an estuarine habitat and the barrier would reduce fish passage for anadromous fish. This alternative would not support project objectives and aspects of the project purpose and need that focus on creating ecological improvements in the Delta ecosystem and contributing to recovery of declining listed species. Nor would this alternative meet the coequal goal under the 2009 Delta Reform Act of "protecting, restoring, and enhancing the Delta ecosystem."	Not likely because Delta would become a freshwater lake that would not support an estuarine habitat and the barrier would reduce fish passage for anadromous fish. This alternative would not support project objectives and aspects of the project purpose and need that focus on creating ecological improvements in the Delta ecosystem and contributing to recovery of declining listed species. Nor would this alternative meet the coequal goal under the 2009 Delta Reform Act of "protecting, restoring, and enhancing the Delta ecosystem."	Possibly	Eliminate from further evaluation
15. Initial Screening Conveyance Alternative C4– *Through Delta Conveyance with Fish Screens at Clifton Court Forebay*	Unknown at this time because the analysis is focused on conveyance facilities	Unknown at this time because the analysis is focused on conveyance facilities	Possibly	Possibly	Continue to Second Level Screening

Table 3A-2. Initial Screening: Comparison of Potential Conveyance Alignment Alternatives with Second Level Screening Criteria Related to CEQA and NEPA

If the answer to the CEQA Criteria and/or the NEPA Criteria question is "Possibly" or "Unknown," the alternative would be considered in the Third Level Screening. If the answers to both questions are "No" or "Not Likely," the alternative would not be considered under subsequent screening criteria.

Potential Alternative	CEQA Criteria: Would the potential alternative avoid or substantially lessen any of the expected significant environmental effects of the "proposed project"?	NEPA Criteria: Would the potential alternative "address one or more significant issues" related to the proposed action?	Results of Second Level Screening
1. Initial Screening Conveyance Alternative AI–*Dual Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	Unknown at this Time	Possibly	Continue to Third Level Screening
2. Initial Screening Conveyance Alternative A2–*Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	Unknown at this Time	Possibly	Continue to Third Level Screening
3. Initial Screening Conveyance Alternative A3–*Dual Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	Unknown at this Time	Possibly	Continue to Third Level Screening
4. Initial Screening Conveyance Alternative A4–*Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the Lower San Joaquin River, and Continued Use of Existing South Delta Intakes*	Unknown at this time. Discharge of Sacramento River water directly into the San Joaquin River would improve water quality. However, discharge of Sacramento River water directly into the Lower San Joaquin River could cause false attraction flows for sturgeon and salmonids upstream of the area currently affected by reverse flows from the Delta and Sacramento River.	Possibly	Continue to Third Level Screening
5. Initial Screening Conveyance Alternative B1–*Isolated Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Unknown at this Time	Possibly	Continue to Third Level Screening
6. Initial Screening Conveyance Alternative B2–*Isolated Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Unknown at this Time	Possibly	Continue to Third Level Screening
7. Initial Screening Conveyance Alternative B3–*Isolated Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Unknown at this Time	Possibly	Continue to Third Level Screening
8. Initial Screening Conveyance Alternative B4–*Isolated Conveyance with a Lined or Unlined East Canal between the Sacramento River near the Confluence with the Feather River and the and Lower San Joaquin River, and Abandonment of Existing South Delta Intakes*	Not Likely. This conveyance alignment would be at least three times longer than most other isolated conveyance alignments considered and would increase the extent of disturbance to communities and habitat along this conveyance alignment.	Possibly	Continue to Third Level Screening
9. Initial Screening Conveyance Alternative B5–*Isolated Conveyance with Diversion from the Sacramento River near West Sacramento into the Sacramento Deep Water Ship Channel and a Tunnel between the Deep Water Ship Channel and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Yes. The area of disturbance of the intake along the Sacramento River near West Sacramento could be 2 to 3 miles in length. In addition, construction of a barrier and an additional ship lock in the Sacramento Deep Water Ship Channel could adversely impact navigation along a federal navigation corridor. Initial discussions with CDFW have indicated that delta smelt use portions of the Sacramento Deep Water Ship Channel and therefore, construction of a barrier and use of the channel for freshwater conveyance could affect delta smelt populations (DWR, Sacramento River Deep Water Ship Channel Conveyance Presentation to BDCP Steering Committee January 14, 2009)	Possibly	Continue to Third Level Screening
10. Initial Screening Conveyance Alternative B6–*Isolated Conveyance with a Tunnel between the Sacramento River near Fremont Weir and the SWP and CVP Pumping Plants, Isolated Conveyance with a Tunnel between the Sacramento River near Decker Island to Clifton Court Forebay and Bethany Reservoir, and Continued Use of the South Delta Intakes*	Not Likely. This conveyance alignment would be at least two times longer than most other isolated conveyance alignments considered and would increase the extent of disturbance to communities and habitat along this conveyance alignment. Not Likely. The western Delta intake could affect delta smelt populations through entrainment, or use of the intake would be limited during many months when freshwater would be present near the intake.	Possibly	Continue to Third Level Screening
11. Initial Screening Conveyance Alternative B7–*Isolated Conveyance with Diversion from the San Joaquin River near Antioch and Desalination Facilities, a Tunnel between the Desalination Facilities and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Not Likely. Depending upon the capacity of the desalination facility, the intake along the San Joaquin River shoreline could extend over three miles for a 15,000 cfs intake and the desalination facility could be several square miles in size. This could result in substantial impacts to land use existing development in the affected areas. In addition, desalination of up to 15,000 cfs of flow could result in substantial energy use and related greenhouse gas emissions. Such emissions could undermine California's ability to meet its legislative mandate under the California Global Warming Solutions Act of 2006 to reduce the State's 2020 greenhouse gas emissions to 1990 levels. Not Likely. The western Delta intake could affect delta smelt populations through entrainment, or use of the intake would be limited during many months when freshwater would be present near the intake.	Possibly	Continue to Third Level Screening
12. Initial Screening Conveyance Alternative C1–*Separate Corridors*	Unknown at this Time	Possibly	Continue to Third Level Screening
13. Initial Screening Conveyance Alternative C2–*Through Delta Conveyance with Armored Corridors*	Not Likely. This conveyance alignment would result in substantial disturbance and either removal or placement of extensive amounts of materials for levee construction along Middle River and Victoria Canal, and possibly along the Mokelumne River or throughout the Delta, depending upon the extent of the armoring. This could result in substantial adverse impacts to aquatic habitat, land use, air quality, and transportation in the area during construction.	Possibly	Continue to Third Level Screening
14. Initial Screening Conveyance Alternative C3–*Through Delta Conveyance with West Delta Salinity Barrier*	This alternative was eliminated from consideration under the First Screening Criteria.	This alternative was eliminated from consideration under the First Screening Criteria.	This alternative was eliminated from consideration under the First Screening Criteria.
15. Initial Screening Conveyance Alternative C4–*Through Delta Conveyance with Fish Screens at Clifton Court Forebay*	Unknown at this Time.	Possibly	Continue to Third Level Screening

Table 3A-3. Initial Screening: Comparison of Potential Conveyance Alignment Alternatives with Third Level Screening Criteria Related to Economically Feasibility under CEQA and Reasonableness under NEPA

If the answers to all of these questions are "Not Likely" or "Unknown," the alternative would be considered in the EIR/EIS. If the answers to any of these questions are "LIKELY" or "YES," the alternative would not be considered in the EIR/EIS.

	Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that a reasonably prudent public agency would not proceed with the alternative?	**Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that it would be impractical to proceed with the alternative?**	**Would the potential alternative take so long to implement, as compared with the proposed project or action, that it would not meet the project objectives or purpose within an acceptable time frame?**	**Would the potential alternative require technology or physical components that are clearly technically infeasible based on currently available science and engineering criteria for the scope of the potential alternative?**	**Would construction, operation, and/or maintenance of the potential alternative violate any federal or state statutes or regulations (other than sources of law that would be amended or eliminated as part of the alternative)?**	**Would the potential alternative involve an outcome that is clearly undesirable from a policy standpoint in that the outcome could not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors?**	**Results of Third Level Screening**
1. Initial Screening Conveyance Alternative AI– *Dual Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative in the Second Screening Process
2. Initial Screening Conveyance Alternative A2– *Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative in the Second Screening Process
3. Initial Screening Conveyance Alternative A3– *Dual Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative in the Second Screening Process
4. Initial Screening Conveyance Alternative A4– *Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the Lower San Joaquin River, and Continued Use of Existing South Delta Intakes*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Likely. Discharge of Sacramento River water directly into the San Joaquin River would improve water quality. However, discharge of Sacramento River water directly into the Lower San Joaquin River could cause false attraction flows for sturgeon and salmonids upstream of the area currently affected by reverse flows from the Delta and Sacramento River.	Eliminate from further evaluation
5. Initial Screening Conveyance Alternative B1– *Isolated Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative in the Second Screening Process
6. Initial Screening Conveyance Alternative B2– *Isolated Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative in the Second Screening Process
7. Initial Screening Conveyance Alternative B3– *Isolated Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative in the Second Screening Process

Table 3A-3. Initial Screening: Comparison of Potential Conveyance Alignment Alternatives with Third Level Screening Criteria Related to Economically Feasibility under CEQA and Reasonableness under NEPA

If the answers to all of these questions are "Not Likely" or "Unknown," the alternative would be considered in the EIR/EIS. If the answers to any of these questions are "LIKELY" or "YES," the alternative would not be considered in the EIR/EIS.

	Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that a reasonably prudent public agency would not proceed with the alternative?	Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that it would be impractical to proceed with the alternative?	Would the potential alternative take so long to implement, as compared with the proposed project or action, that it would not meet the project objectives or purpose within an acceptable time frame?	Would the potential alternative require technology or physical components that are clearly technically infeasible based on currently available science and engineering criteria for the scope of the potential alternative?	Would construction, operation, and/or maintenance of the potential alternative violate any federal or state statutes or regulations (other than sources of law that would be amended or eliminated as part of the alternative)?	Would the potential alternative involve an outcome that is clearly undesirable from a policy standpoint in that the outcome could not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors?	Results of Third Level Screening
8. Initial Screening Conveyance Alternative B4– *Isolated Conveyance with a Lined or Unlined East Canal between the Sacramento River near the Confluence with the Feather River and the and Lower San Joaquin River, and Abandonment of Existing South Delta Intakes*	Yes. The area of disturbance along conveyance alignment is approximately three times as long as most other Isolated Conveyance alignments. This alternative would also be drastically more expensive to construct than substantially shorter alignments.	Yes. The area of disturbance along conveyance alignment is approximately three times as long as most other Isolated Conveyance alignments. This alternative would also be drastically more expensive to construct than substantially shorter alignments.	Yes. The area of disturbance along conveyance alignment is approximately three times as long as most other Isolated Conveyance alignments.	Not Likely	Not Likely	Yes. The extent of disturbance to communities and habitat along the conveyance alignment is substantially more than most other isolated conveyance alternatives because the length of the conveyance would be approximately three times as long. Because the intakes would be located along the Sacramento River upstream of the American River, the ability to divert water would be less than for other isolated conveyance alternatives due to limited availability of water in the Sacramento River at this location.	Eliminated from further evaluation
9. Initial Screening Conveyance Alternative B5– *Isolated Conveyance with Diversion from the Sacramento River near West Sacramento into the Sacramento Deep Water Ship Channel and a Tunnel between the Deep Water Ship Channel and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Yes. The area of disturbance of the intake along the Sacramento River near West Sacramento could be 2 to 3 miles in length. This could result in substantial impacts to land use. In addition, construction of a barrier and an additional ship lock in the Sacramento Deep Water Ship Channel could adversely impact navigation along a federal navigation corridor.	Yes. The area of disturbance of the intake along the Sacramento River near West Sacramento could be 2 to 3 miles in length. This could result in substantial impacts to land use. In addition, construction of a barrier and an additional ship lock in the Sacramento Deep Water Ship Channel could adversely impact navigation along a federal navigation corridor.	Yes. The area of disturbance of the intake along the Sacramento River near West Sacramento could be 2 to 3 miles in length. This could result in substantial impacts to land use. In addition, construction of a barrier and an additional ship lock in the Sacramento Deep Water Ship Channel could adversely impact navigation along a federal navigation corridor.	Not Likely	Likely. This alternative would require Congressional action to modify the authorization for the Sacramento Deep Water Ship Channel to include water supply functions	Not Likely	Eliminated from further evaluation
10. Initial Screening Conveyance Alternative B6–*Isolated Conveyance with a Tunnel between the Sacramento River near Fremont Weir and the SWP and CVP Pumping Plants, Isolated Conveyance with a Tunnel between the Sacramento River near Decker Island to Clifton Court Forebay and Bethany Reservoir, and Continued Use of the South Delta Intakes*	Yes. The area of disturbance along conveyance alignment is approximately two times as long as most other Isolated Conveyance alignments. This alternative would also be drastically more expensive to construct than substantially shorter alignments.	Yes. The area of disturbance along conveyance alignment is approximately two times as long as most other Isolated Conveyance alignments. This alternative would also be drastically more expensive to construct than substantially shorter alignments.	Yes. The area of disturbance along conveyance alignment is approximately two times as long as most other Isolated Conveyance alignments.	Not Likely	Not Likely	Yes. The extent of disturbance to communities and habitat along the conveyance alignment is substantially more than most other isolated conveyance alternatives because the length of the conveyance would be approximately two times as long. Because the intakes would be located along the Sacramento River upstream of the American River, the ability to divert water in the isolated conveyance would be less than for other isolated conveyance alternatives due to limited availability of water in the Sacramento River at this location. The ability to divert water in the western Delta would be less than for other isolated conveyance alternatives due to presence of delta smelt.	Eliminated from further evaluation

Table 3A-3. Initial Screening: Comparison of Potential Conveyance Alignment Alternatives with Third Level Screening Criteria Related to Economically Feasibility under CEQA and Reasonableness under NEPA

If the answers to <u>all</u> of these questions are "Not Likely" or "Unknown," the alternative would be considered in the EIR/EIS. If the answers to <u>any</u> of these questions are "LIKELY" or "YES," the alternative would not be considered in the EIR/EIS.							
	Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that a reasonably prudent public agency would not proceed with the alternative?	**Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that it would be impractical to proceed with the alternative?**	**Would the potential alternative take so long to implement, as compared with the proposed project or action, that it would not meet the project objectives or purpose within an acceptable time frame?**	**Would the potential alternative require technology or physical components that are clearly technically infeasible based on currently available science and engineering criteria for the scope of the potential alternative?**	**Would construction, operation, and/or maintenance of the potential alternative violate any federal or state statutes or regulations (other than sources of law that would be amended or eliminated as part of the alternative)?**	**Would the potential alternative involve an outcome that is clearly undesirable from a policy standpoint in that the outcome could not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors?**	**Results of Third Level Screening**
11. Initial Screening Conveyance Alternative B7–*Isolated Conveyance with Diversion from the San Joaquin River near Antioch and Desalination Facilities, a Tunnel between the Desalination Facilities and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Yes. Depending upon the capacity of the desalination facility, the intake along the San Joaquin River shoreline could extend over three miles for a 15,000 cfs intake and the desalination facility could be several square miles in size. This could result in substantial impacts to land use, given the generally dense existing development in the affected areas. In addition, desalination of up to 15,000 cfs of flow would add an enormous ongoing cost not required for other options and would result in substantial energy use and related substantial greenhouse gas emissions. Such emissions could undermine California's ability to meet its legislative mandate under the California Global Warming Solutions Act of 2006 to reduce the State's 2020 greenhouse gas emissions to 1990 levels. The costs for desalination also could be greater than what could be affordable for agricultural water users.	Yes. Depending upon the capacity of the desalination facility, the intake along the San Joaquin River shoreline could extend over three miles for a 15,000 cfs intake and the desalination facility could be several square miles in size. This could result in substantial impacts to land use given the generally dense existing development in the affected areas. In addition, desalination of up to 15,000 cfs of flow would add an enormous ongoing cost not required for other options and would result in substantial energy use and related substantial greenhouse gas emissions. Such emissions could undermine California's ability to meet its legislative mandate under the California Global Warming Solutions Act of 2006 to reduce the State's 2020 greenhouse gas emissions to 1990 levels. The costs for desalination also could be greater than what could be affordable for agricultural water users.	Not Likely	Not Likely	Not Likely	Likely. Desalination of up to 15,000 cfs of flow would add an enormous ongoing cost not required for other options and would result in substantial energy use and related substantial greenhouse gas emissions. Such emissions could undermine California's ability to meet its legislative mandate under the California Global Warming Solutions Act of 2006 to reduce the State's 2020 greenhouse gas emissions to 1990 levels. The costs for desalination also could be greater than what could be affordable for agricultural water users. Because the intakes would be located along the Sacramento River upstream of the American River and in the western Delta, the ability to divert water in the isolated conveyance would be less than for other isolated conveyance alternatives.	Eliminated from further evaluation
12. Initial Screening Conveyance Alternative C1–*Separate Corridors*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative the Second Screening

Table 3A-3. Initial Screening: Comparison of Potential Conveyance Alignment Alternatives with Third Level Screening Criteria Related to Economically Feasibility under CEQA and Reasonableness under NEPA

If the answers to all of these questions are "Not Likely" or "Unknown," the alternative would be considered in the EIR/EIS. If the answers to any of these questions are "LIKELY" or "YES," the alternative would not be considered in the EIR/EIS.

	Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that a reasonably prudent public agency would not proceed with the alternative?	**Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that it would be impractical to proceed with the alternative?**	**Would the potential alternative take so long to implement, as compared with the proposed project or action, that it would not meet the project objectives or purpose within an acceptable time frame?**	**Would the potential alternative require technology or physical components that are clearly technically infeasible based on currently available science and engineering criteria for the scope of the potential alternative?**	**Would construction, operation, and/or maintenance of the potential alternative violate any federal or state statutes or regulations (other than sources of law that would be amended or eliminated as part of the alternative)?**	**Would the potential alternative involve an outcome that is clearly undesirable from a policy standpoint in that the outcome could not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors?**	**Results of Third Level Screening**
13. Initial Screening Conveyance Alternative C2–*Through Delta Conveyance with Armored Corridors*	Yes. This conveyance alignment would result in substantial disturbance and either removal or placement of extensive amounts of materials for levee construction along Middle River and Victoria Canal, and possibly along the Mokelumne River or throughout the Delta, depending upon the extent of the armoring. This could result in substantial adverse impacts to aquatic habitat, land use, and transportation in the area during construction.	Yes. This conveyance alignment would result in substantial disturbance and either removal or placement of extensive amounts of materials for levee construction along Middle River and Victoria Canal, and possibly along the Mokelumne River or throughout the Delta, depending upon the extent of the armoring. This could result in substantial adverse impacts to aquatic habitat, land use, air quality, and transportation in the area during construction.	Yes. This conveyance alignment would result in substantial disturbance and either removal or placement of extensive amounts of materials for levee construction along Middle River and Victoria Canal, and possibly along the Mokelumne River or throughout the Delta, depending upon the extent of the armoring. This could result in substantial adverse impacts to aquatic habitat, land use, air quality, and transportation in the area during construction.	Not Likely	Not Likely	Yes. This conveyance alignment would result in substantial disturbance and either removal or placement of extensive amounts of materials for levee construction along Middle River and Victoria Canal, and possibly along the Mokelumne River or throughout the Delta, depending upon the extent of the armoring. This could result in substantial adverse impacts to aquatic habitat, land use, air quality, and transportation in the area during construction. In particular, concentrated air quality effects from the huge number of diesel-powered truck trips or barges could create hotspots of toxic air contaminants that would not exist with other alternatives. This alternative would also take substantially longer to construct, again given the huge number of truck trips associated with importing approximately 50 to more than 120 million cubic yards of materials as compared to other alternatives considered to improve water supply reliability and ecosystem restoration.	Eliminated from further evaluation
14. Initial Screening Conveyance Alternative C3–*Through Delta Conveyance with West Delta Salinity Barrier*	This alternative was eliminated from consideration under the First Screening Criteria.	This alternative was eliminated from consideration under the First Screening Criteria.	This alternative was eliminated from consideration under the First Screening Criteria.	This alternative was eliminated from consideration under the First Screening Criteria.	This alternative was eliminated from consideration under the First Screening Criteria.	This alternative was eliminated from consideration under the First Screening Criteria.	This alternative was eliminated from consideration under the First Screening Criteria.
15. Initial Screening Conveyance Alternative C4–*Through Delta Conveyance with Fish Screens at Clifton Court Forebay*	Unknown at this time	Unknown at this time	Not Likely	Not Likely	Unknown at this time	Likely. This alternative was eliminated from further evaluation because initial results of recent studies, including information included in recent NMFS biological opinions, supported a phased approach that would emphasize improvements to operations of fish handling facilities and reduced predator potential within Clifton Court Forebay prior to further analysis of installation of fish screens.	Eliminate from further evaluation

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Table 3A-4. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "January 2010 BDCP Steering Committee Presentation" for Dual Conveyance (revised February 2010)

North Delta Diversion Bypass Flows

1. North Delta Diversion Bypass Flows

Objectives include flows of the functional equivalent thereof to (1) maintain fish screen sweeping velocities, (2) reduce upstream transport from downstream channels, (3) support salmonid and pelagic fish transport to regions of suitable habitat, (4) reduce predation effects downstream, and (5) maintain or improve rearing habitat in the north Delta.

Constant Low-Level Pumping (Dec–Jun):

Diversions up to 6% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.

Initial Pulse Protection:

Low level pumping maintained through the initial pulse period. For the purpose of monitoring, the initiation of the pulse is defined by the following criteria: (1) Wilkins Slough flow changing by more than 45% over a five day period and (2) flow greater than 12,000 cfs. Low-level pumping continues until (1) Wilkins Slough returns to prepulse flows (flow on first day of 5-day increase), (2) flows decrease for 5 consecutive days, or (3) flows are greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flow table (Sub-Table A). These parameters are for modeling purposes. Actual operations will be based on real-time monitoring of fish movement.

If the first flush begins before Dec 1, May bypass criteria must be initiated following first flush and the second pulse period will have the same protective operation.

Post-Pulse Operations:

After initial flush(es), go to Level I post-pulse bypass rule (see Sub-Table A) until 15 total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass rule until 30 total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule.

Sub-Table A. Post-Pulse Operations for North Delta Diversion Bypass Flows

Level I Post-Pulse Operations			**Level II Post-Pulse Operations**			**Level III Post Pulse Operations**		
Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.			Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.			Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.		
Dec–Apr			**Dec–Apr**			**Dec–Apr**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)

Table 3A-4. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "January 2010 BDCP Steering Committee Presentation" for Dual Conveyance (revised February 2010)

15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	18,400 cfs plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs
May			**May**			**May**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs

Table 3A-4. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "January 2010 BDCP Steering Committee Presentation" for Dual Conveyance (revised February 2010)

Jun			Jun			Jun		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,400 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs
Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs		

South Delta Channel Flows

2. South Delta Channel Flows

Minimize take at south Delta pumps by reducing incidence and magnitude of reverse flows during critical periods for pelagic species.

OMR Flows

• FWS smelt and NMFS BO's model of adaptive restrictions (temperature, turbidity, salinity, smelt presence)

Table below provides a rough representation of the current estimate of "most likely" operation under FWS and NMFS BO's for modeling purposes.

Combined Old and Middle River flows no less than values below* (cfs)

Month	W	AN	BN	D	C
Jan	-4,000	-4,000	-4,000	-5,000	-5,000
Feb	-5,000	-4,000	-4,000	-4,000	-4,000
Mar	-5,000	-4,000	-4,000	-3,500	-3,000
Apr	-5,000	-4,000	-4,000	-3,500	-2,000

Table 3A-4. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "January 2010 BDCP Steering Committee Presentation" for Dual Conveyance (revised February 2010)

May	-5,000	-4,000	-4,000	-3,500	-2,000
Jun	-5,000	-5,000	-5,000	-5,000	-2,000
Jul	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A
Oct	N/A	N/A	N/A	N/A	N/A
Nov	N/A	N/A	N/A	N/A	N/A
Dec	-6,800	-6,800	-6,300	-6,300	-6,100
* Values are monthly average for use in modeling. December 20–31 targets are–5,000 cfs (W, AN),–3,500 cfs (BN, D), and–3,000 cfs (C), and are averaged with an assumed background of–8,000 cfs for December 1–19. Values are reflective of the "most likely" operation under the FWS Delta Smelt Biological Opinion. Values for modeling may be updated based on review by fishery agencies.					
South Delta Export–San Joaquin Inflow Ratio: –Sliding scale for flows above the established OMR to share additional SJR flows between export and environment; export share would increase at higher flows –Time value of benefit; crediting outside of period in which flows are acquired					
Fremont Weir/Yolo Bypass					
3. Fremont Weir/Yolo Bypass *Considerations include (1) increasing spawning and rearing habitat for splittail and rearing habitat for salmonids for >30 days, (2) providing alternate migration corridor to the mainstem Sacramento River, and (3) increasing effectiveness of habitat and food transport in Cache Slough.*					
Sacramento Weir–No change in operations; improve upstream fish passage facilities					
Lisbon Weir–No change in operations; improve upstream fish passage facilities					
Fremont Weir–Improve fish passage at existing weir elevation; construct opening and operable gates at elevation 17.5 feet with fish passage facilities; construct opening and operable gates at a smaller opening with fish passage enhancement at elevation 11.5 feet					
Fremont Weir Gate Operations–					
December 1–March 30 (extend to May 15, depending on hydrologic conditions and measures to minimize land use and ecological conflicts) open the 17.5 foot and 11.5 foot elevation gates when Sacramento River flow at Freeport is greater than 25,000 cfs (provides local and regional flood control benefit and coincides with pulse flows and juvenile salmonid migration cues, provides seasonal floodplain inundation for food production, juvenile rearing, and spawning) to provide Yolo Bypass inundation of 3,000 to 6,000 cfs depending on river stage. Operating the gates to allow Yolo Bypass inundation when Sacramento River flow is greater than 25,000 cfs will reduce impacts to water supply associated with Hood bypass flow constraints. Potential impacts to water supply would be avoided or minimized through an operations plan.					
Close the 17.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 20,000 cfs but keep 11.5 foot elevation gates open to provide greater opportunity for fish within the bypass to migrate upstream into the Sacramento River; close 11.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 15,000 cfs					
Delta Cross Channel Gate Operations					
4. Delta Cross Channel Gate Operations Considerations include (1) reduce transport of outmigrating Sacramento River fish into central Delta, (2) maintain flows downstream on Sacramento River, (3) and providing sufficient Sacramento River flow into interior Delta when water quality for M&I and AG may be of concern.					

Table 3A-4. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "January 2010 BDCP Steering Committee Presentation" for Dual Conveyance (revised February 2010)

Oct–Nov: DCC gate closed if fish are present (assume 15 days per month; may be open longer depending on presence of fish) Dec–Jun: DCC gate closed Jul–Sep: DCC gate open
Rio Vista Minimum Instream Flows
5. Rio Vista Minimum Instream Flows Maintain minimum flows for outmigrating salmonids and smelt.
Sep–Dec: Per D-1641 Jan–Aug: Minimum of 3,000 cfs
Delta Inflow & Outflow
6. Delta Inflow & Outflow Considerations include (1) Provide sufficient outflow to maintain desirable salinity regime downstream of Collinsville during the spring, (2) explore range of approaches toward providing additional variability to Delta inflow and outflow.
Delta Outflow: Jul–Jan: Per D-1641 Feb–Jun: Per D-1641 –Proportional Reservoir Releases will continue to be evaluated to the extent that it provides similar response to outflow, inflow, and upstream storage conditions
Operations for Delta Water Quality and Residence Time
7. Operations for Delta Water Quality and Residence Time Considerations include (1) maintain a minimum level of pumping from the south Delta during summer to provide limited flushing for general water quality conditions (reduce residence times), (2) for M&I and AG salinity improvements, and (3) to allow operational flexibility during other periods to operate either north or south diversions based on real-time assessments of benefits to fish and water quality.
Assumptions: Jul–Sep: Prefer south delta pumping up to 3,000 cfs before diverting from north Oct–Jun: Prefer north delta pumping (real-time operational flexibility)
In-Delta Agricultural and Municipal & Industrial Water Quality Requirements
8. In-Delta Agricultural and Municipal & Industrial Water Quality Requirements Existing M&I and AG salinity requirements
Assumptions: Existing D-1641 North and Western Delta AG and MI standards EXCEPT move compliance point from Emmaton to Threemile Slough juncture. Maintain all water quality requirements contained in the NDWA/ DWR Contract and other DWR contractual obligations.

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Table 3A-5. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "January 2010 BDCP Steering Committee Presentation" for Isolated Conveyance

North Delta Diversion Bypass Flows

1. North Delta Diversion Bypass Flows

Objectives include flows or the functional equivalent thereof to (1) maintain fish screen sweeping velocities, (2) reduce upstream transport from downstream channels, (3) support salmonid and pelagic fish transport to regions of suitable habitat, (4) reduce predation effects downstream, and (5) maintain or improve rearing habitat in the north Delta.

Constant Low-Level Pumping (Dec–Jun):

Diversions up to 6% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.

Initial Pulse Protection:

Low level pumping maintained through the initial pulse period. For the purpose of monitoring, the initiation of the pulse is defined by the following criteria: (1) Wilkins Slough flow changing by more than 45% over a five day period and (2) flow greater than 12,000 cfs. Low-level pumping continues until (1) Wilkins Slough returns to prepulse flows (flow on first day of 5-day increase), (2) flows decrease for 5 consecutive days, or (3) flows are greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flow table (Sub-Table A). These parameters are for modeling purposes. Actual operations will be based on real-time monitoring of fish movement.

If the first flush begins before Dec 1, May bypass criteria must be initiated following first flush and the second pulse period will have the same protective operation.

Post-Pulse Operations:

After initial flush(es), go to Level I post-pulse bypass rule (see Sub-Table A) until 15 total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass rule until 30 total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule.

Sub-Table A. Post-Pulse Operations for North Delta Diversion Bypass Flows

Level I Post-Pulse Operations			**Level II Post-Pulse Operations**			**Level III Post Pulse Operations**		
Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.			Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.			Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.		
Dec–Apr			**Dec–Apr**			**Dec–Apr**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)

Table 3A-5. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "January 2010 BDCP Steering Committee Presentation" for Isolated Conveyance

15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	18,400 cfs plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs
May			**May**			**May**		
If Sacramento River flow is over…	**But not over**…	**The bypass is**…	**If Sacramento River flow is over**…	**But not over**…	**The bypass is**…	**If Sacramento River flow is over**…	**But not over**…	**The bypass is**…
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs

Table 3A-5. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "January 2010 BDCP Steering Committee Presentation" for Isolated Conveyance

Jun			Jun			Jun		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,400 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs
Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs		
South Delta Channel Flows–not included due to no operations of South Delta Intakes								
Fremont Weir/Yolo Bypass								
2. Fremont Weir/Yolo Bypass *Considerations include (1) increasing spawning and rearing habitat for splittail and rearing habitat for salmonids for >30 days, (2) providing alternate migration corridor to the mainstem Sacramento River, and (3) increasing effectiveness of habitat and food transport in Cache Slough.*								
Sacramento Weir–No change in operations; improve upstream fish passage facilities								
Lisbon Weir–No change in operations; improve upstream fish passage facilities								
Fremont Weir–Improve fish passage at existing weir elevation; construct opening and operable gates at elevation 17.5 feet with fish passage facilities; construct opening and operable gates at a smaller opening with fish passage enhancement at elevation 11.5 feet								

Table 3A-5. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "January 2010 BDCP Steering Committee Presentation" for Isolated Conveyance

Fremont Weir Gate Operations–
December 1–March 30 (extend to May 15, depending on hydrologic conditions and measures to minimize land use and ecological conflicts) open the 17.5 foot and 11.5 foot elevation gates when Sacramento River flow at Freeport is greater than 25,000 cfs (provides local and regional flood control benefit and coincides with pulse flows and juvenile salmonid migration cues, provides seasonal floodplain inundation for food production, juvenile rearing, and spawning) to provide Yolo Bypass inundation of 3,000 to 6,000 cfs depending on river stage. Operating the gates to allow Yolo Bypass inundation when Sacramento River flow is greater than 25,000 cfs will reduce impacts to water supply associated with Hood bypass flow constraints. Potential impacts to water supply would be avoided or minimized through an operations plan.
Close the 17.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 20,000 cfs but keep 11.5 foot elevation gates open to provide greater opportunity for fish within the bypass to migrate upstream into the Sacramento River; close 11.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 15,000 cfs
Delta Cross Channel Gate Operations
3. Delta Cross Channel Gate Operations Considerations include (1) reduce transport of outmigrating Sacramento River fish into central Delta, (2) maintain flows downstream on Sacramento River, (3) and providing sufficient Sacramento River flow into interior Delta when water quality for M&I and AG may be of concern.
Oct–Nov: DCC gate closed if fish are present (assume 15 days per month; may be open longer depending on presence of fish) Dec–Jun: DCC gate closed Jul–Sep: DCC gate open
Rio Vista Minimum Instream Flows
4. Rio Vista Minimum Instream Flows Maintain minimum flows for outmigrating salmonids and smelt.
Sep–Dec: Per D-1641 Jan–Aug: Minimum of 3,000 cfs
Delta Inflow & Outflow
5. Delta Inflow & Outflow Considerations include (1) Provide sufficient outflow to maintain desirable salinity regime downstream of Collinsville during the spring, (2) explore range of approaches toward providing additional variability to Delta inflow and outflow.
Delta Outflow: Jul–Aug & Dec–Jan: Per D-1641 Sep–Nov: Fall X2 per FWS Smelt BO
Operations for Delta Water Quality and Residence Time–not included due to no operations of South Delta Intakes
In-Delta Agricultural and Municipal & Industrial Water Quality Requirements
6. In-Delta Agricultural and Municipal & Industrial Water Quality Requirements Existing M&I and AG salinity requirements
Assumptions: Existing D-1641 North and Western Delta AG and MI standards EXCEPT move compliance point from Emmaton to Threemile Slough juncture. Maintain all water quality requirements contained in the NDWA/ DWR Contract and other DWR contractual obligations.

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Table 3A-6. Long-Term BDCP Water Operations Proposal for Scenario 6 for Dual Conveyance (DWR, CDFW, Reclamation, USFWS, and NMFS 2011)

North Delta Diversion Bypass Flows

1. North Delta Diversion Bypass Flows

Objectives include flows or the functional equivalent thereof to (1) provide north Delta bypass criteria with adaptive limits, (2) provide for Fall X2, (3) support salmonid and pelagic fish transport to regions of suitable habitat, (4) reduce predation effects downstream, and (5) maintain or improve rearing habitat in the north Delta.

Constant Low-Level Pumping (Dec–Jun)

Diversions up to 6% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.

Initial Pulse Protection

Low level pumping maintained through the initial pulse period. For the purpose of modeling, the initiation of the pulse is defined by the following criteria: (1) Wilkins Slough flow changing by more than 45% over a five day period and (2) flow greater than 12,000 cfs. Low-level pumping continues until (1) Wilkins Slough returns to pre-pulse flows (flow on first day of 5-day increase), (2) flows decrease for 5 consecutive days, or (3) flows are greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flow table (Sub-Table A). These parameters are for modeling purposes. Actual operations will be based on real-time monitoring of fish movement.

If the first flush begins before Dec 1, May bypass criteria must be initiated following first flush and the second pulse period will have the same protective operation.

Post-Pulse Operations

After initial flush(es), go to Level I post-pulse bypass rule (see Sub-Table A) until 15 total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass rule until 30 total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule.

Sub-Table A. Post-Pulse Operations for North Delta Diversion Bypass Flows

Level I Post-Pulse Operations			**Level II Post-Pulse Operations**			**Level III Post Pulse Operations**		
Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.			Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.			Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.		
Dec–Apr			**Dec–Apr**			**Dec–Apr**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)

Table 3A-6. Long-Term BDCP Water Operations Proposal for Scenario 6 for Dual Conveyance (DWR, CDFW, Reclamation, USFWS, and NMFS 2011)

15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	18,400 cfs plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs
May			**May**			**May**		
If Sacramento River flow is over…	**But not over**…	**The bypass is**…	**If Sacramento River flow is over**…	**But not over**…	**The bypass is**…	**If Sacramento River flow is over**…	**But not over**…	**The bypass is**…
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs

Table 3A-6. Long-Term BDCP Water Operations Proposal for Scenario 6 for Dual Conveyance (DWR, CDFW, Reclamation, USFWS, and NMFS 2011)

Jun			Jun			Jun		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,400 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs
Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs		

Sub-Table B. San Joaquin Inflow Relationship to OMR

April and May	June	April and May	June
If San Joaquin flow at Vernalis is the following	Average OMR flows would be at least the following (interpolated linearly between values)	If San Joaquin flow at Vernalis is the following	Average OMR flows would be at least the following (interpolated linearly between values)
≤ 5,000 cfs	-2,000 cfs	≤ 5,000 cfs	-2,000 cfs
6,000 cfs	+1,000 cfs	3,501 to 10,000 cfs	3,501 to 10,000 cfs
10,000 cfs	+2,000 cfs		
15,000 cfs	+3,000 cfs	10,001 to 15,000 cfs	+1,000 cfs
≥30,000 cfs	+6,000 cfs	>15,000 cfs	+2,000 cfs

Table 3A-6. Long-Term BDCP Water Operations Proposal for Scenario 6 for Dual Conveyance (DWR, CDFW, Reclamation, USFWS, and NMFS 2011)

South Delta Channel Flows

2. South Delta Channel Flows

Minimize take at south Delta pumps by reducing incidence and magnitude of reverse flows during critical periods for pelagic species.

OMR Flows

All OMR criteria required by the various fish protection triggers (density, calendar, and flow based triggers) described in FWS and NMFS OCAP BOs were incorporated into the modeling of the baseline and the January, 2010 proposed project, as well as these newly proposed operational criteria. Whenever those triggers would result in OMRs higher than those shown below, the higher OMR requirements would be met.

Combined Old and Middle River flows no less than values below[1] (cfs)

Month	W	AN	BN	D	C
Jan	0	-3,500	-4,000	-5,000	-5,000
Feb	0	-3,500	-4,000	-4,000	-4,000
Mar	0	0	-3,500	-3,500	-3,000
Apr	varies[2]	varies[2]	varies[2]	varies varies[2]	varies varies[2]
May	varies[2]	varies[2]	varies[2]	varies[2]	varies[2]
Jun	varies[2]	varies[2]	varies[2]	varies[2]	varies[2]
Jul	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A
Oct	varies[3]	varies[3]	varies[3]	varies[3]	varies[3]
Nov	varies[3]	varies[3]	varies[3]	varies[3]	varies[3]
Dec	-5,000[4]	-5,000[4]	-5,000[4]	-5,000[4]	-5,000[4]

[1] These numbers represent the resulting average values based on the implementation of RPA-based triggers for the "most likely" scenario. OMR values assume the proposed OMR or the Reasonable and Prudent Alternative (RPA) (as modeled in the No Action Alternative), whichever provides higher OMR. Resulting operations are expected to be more positive than depicted in this table.

[2] Based on San Joaquin inflow relationship to OMR provided below in Sub-Table B.

[3] Before the D-1641 pulse = HORB open, no OMR restrictions

During the D-1641 pulse = no south Delta exports (two weeks); HORB closed

After the D-1641 pulse =–5,000 cfs OMR (through November); HORB open 50% for 2 weeks

[4] OMR restriction of–5,000 cfs for Sacramento River winter-run Chinook salmon when North Delta initial pulse flows are triggered or OMR restriction of–2,000 cfs for delta smelt when triggered.

Head of Old River Operable Barrier (HORB) Operations/Modeling assumptions (% OPEN)

MONTH	HORB[1]	MONTH	HORB[1]
Oct	50%	May	50%
Nov	100%[2]	Jun 1–15	50%

Table 3A-6. Long-Term BDCP Water Operations Proposal for Scenario 6 for Dual Conveyance (DWR, CDFW, Reclamation, USFWS, and NMFS 2011)

Dec	100%	Jun 16-30	100%
Jan	50%[3]	Jul	100%
Feb	50%	Aug	100%
Mar	50%	Sep	100%
April	50%		

[1] Percent of time the HORB is open. Agricultural barriers are in and operated consistent with current practices. HORB would be open 100% whenever flows are greater than 10,000 cfs at Vernalis.

[2] For modeling assumption only. Action proposed:

Before the D-1641 pulse = no OMR restrictions (HORB open)

During the D-1641 pulse = no south Delta exports for two weeks (HORB closed)

After the D-1641 pulse =–5,000 cfs OMR through November (HORB open 50% for 2 weeks)

Exact timing of the action will be based on hydrologic conditions

[3] The HORB becomes operational at 50% when salmon fry are immigrating (based on real time monitoring). This generally occurs when flood flow releases are being made.

Fremont Weir/Yolo Bypass

3. Fremont Weir/Yolo Bypass

Considerations include (1) increasing spawning and rearing habitat for splittail and rearing habitat for salmonids for >30 days, (2) providing alternate migration corridor to the mainstem Sacramento River, and (3) increasing effectiveness of habitat and food transport in Cache Slough.

Weir Improvements

Sacramento Weir–No change in operations; improve upstream fish passage facilities

Lisbon Weir–No change in operations; improve upstream fish passage facilities

Fremont Weir–Improve fish passage at existing weir elevation; construct opening and operable gates at elevation 17.5 feet with fish passage facilities; construct opening and operable gates at a smaller opening with fish passage enhancement at elevation 11.5 feet

Fremont Weir Gate Operations

To provide seasonal floodplain inundation in the Yolo Bypass, the 17.5 foot and the 11.5 foot elevation gates are assumed to be opened between December 1st and March 31st. This may extend to May 15th, depending on the hydrologic conditions and the measures to minimize land use and ecological conflicts in the bypass. As a simplification for modeling, the gates are assumed opened until April 30th in all years. The gates are operated to limit maximum spill to 6,000 cfs until the Sacramento River stage reaches the existing Fremont Weir elevation. While desired inundation period is on the order of 30 to 45 days, gates are not managed to limit to this range, instead the duration of the event is governed by the Sacramento River flow conditions. To provide greater opportunity for the fish in the bypass to migrate upstream into the Sacramento River, the 11.5 foot elevation gate is assumed to be open for an extended period between September 15th and June 30th. As a simplification for modeling, the period of operation for this gate is assumed to be September 1st to June 30th. The spills through the 11.5 ft elevation gate are limited to 100 cfs to support fish passage.

Delta Cross Channel Gate Operations

4. Delta Cross Channel Gate Operations

Considerations include (1) reduce transport of outmigrating Sacramento River fish into central Delta, (2) maintain flows downstream on Sacramento River, (3) and providing sufficient Sacramento River flow into interior Delta when water quality for M&I and AG may be of concern.

Table 3A-6. Long-Term BDCP Water Operations Proposal for Scenario 6 for Dual Conveyance (DWR, CDFW, Reclamation, USFWS, and NMFS 2011)

Assumptions Per SRWCB D-1641 with additional days closed from Oct 1–Jan 31 based on NMFS BO (Jun 2009) Action IV.1.2v (closed during flushing flows from Oct 1–Dec 14 unless adverse water quality conditions).
Rio Vista Minimum Instream Flows
5. Rio Vista Minimum Instream Flows Maintain minimum flows for outmigrating salmonids and smelt.
Assumptions Sep–Dec: Per D-1641 Jan–Aug: Minimum of 3,000 cfs
Delta Inflow & Outflow
6. Delta Inflow & Outflow Considerations include (1) Provide sufficient outflow to maintain desirable salinity regime downstream of Collinsville during the spring and fall, and (2) explore range of approaches toward providing additional variability to Delta inflow and outflow.
Delta Outflow Feb–Jun: Per D-1641 Sep–Nov: Implement Fall X2 experiment (not included in modeling for Scenario 6)
Operations for Delta Water Quality and Residence Time
7. Operations for Delta Water Quality and Residence Time Considerations include (1) maintain a minimum level of pumping from the south Delta during summer to provide limited flushing for general water quality conditions (reduce residence times), (2) for M&I and AG salinity improvements, and (3) to allow operational flexibility during other periods to operate either north or south diversions based on real-time assessments of benefits to fish and water quality.
Assumptions Jul–Sep: Prefer south delta pumping up to 3,000 cfs before diverting from north Oct–Jun: Prefer north delta pumping (real-time operational flexibility)
In-Delta Agricultural and Municipal & Industrial Water Quality Requirements
8. In-Delta Agricultural and Municipal & Industrial Water Quality Requirements Existing M&I and AG salinity requirements
Assumptions Existing D-1641 North and Western Delta AG and MI standards EXCEPT move compliance point from Emmaton to Threemile Slough juncture. Maintain all water quality requirements contained in the NDWA/DWR Contract and other DWR contractual obligations.

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Table 3A-7. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Enhanced Ecosystem Operations" for Dual Conveyance

North Delta Diversion Bypass Flows

1. North Delta Diversion Bypass Flows

Objectives include flows to (1) maintain fish screen sweeping velocities, (2) minimize upstream transport from downstream channels, (3) support salmonid and pelagic fish transport to regions of suitable habitat, (4) minimize predation effects downstream, and (5) maintain or improve rearing habitat in the north Delta.

Constant Low-Level Pumping (Dec–Jun):

Diversions up to 5% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.

Initial Pulse Protection:

Low level pumping maintained through the initial pulse period. For the purpose of monitoring, the initiation of the pulse is defined by the following criteria: (1) Wilkins Slough flow changing by more than 45% over a five day period and (2) flow greater than 12,000 cfs. Low-level pumping continues until (1) Wilkins Slough returns to prepulse flows (flow on first day of 5-day increase), (2) flows decrease for 5 consecutive days, or (3) flows are greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flow table (Sub-Table A for Level 1). These parameters are for modeling purposes. Actual operations will be based on real-time monitoring of fish movement.

If the first flush begins before Dec 1, May bypass criteria must be initiated following first flush and the second pulse period will have the same protective operation.

Post-Pulse Operations:

After initial flush(es), go to Level I post-pulse bypass rule (see Sub-Table A for Level 1) until 20 total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass rule (Sub-Table A for Level II) until 45 total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule (Sub-Table A for Level III).

Sub-Table A. Post-Pulse Operations for North Delta Diversion Bypass Flows

Level I Post-Pulse Operations			**Level II Post-Pulse Operations**			**Level III Post Pulse Operations**		
Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough. **Percentages will vary linearly over a 10-day period when transitioning between months.								
Dec–Apr			**Dec–Apr**			**Dec–Apr**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000 cfs

Table 3A-7. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Enhanced Ecosystem Operations" for Dual Conveyance

17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	18,400 cfs plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs
May			**May**			**May**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs
Jun			**Jun**			**Jun**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs

Table 3A-7. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Enhanced Ecosystem Operations" for Dual Conveyance

5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,400 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs
Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs		
South Delta Channel Flows								
2. South Delta Channel Flows *Minimize mortality, including take at south Delta pumps, by reducing incidence and magnitude of reverse flows during critical periods for pelagic and anadromous species.*								
OMR Flows • South Delta exports cannot cause OMR to fall below +1,000 cfs during Dec-Mar. • South Delta exports cannot cause OMR to fall below +3,000 cfs during Jun. • South Delta pumping is not allowed during April, May, Oct, and Nov								
South Delta Export–San Joaquin Inflow Ratio: –50% Dec–Mar & Jun								
Fremont Weir/Yolo Bypass								
3. Fremont Weir/Yolo Bypass *Considerations include (1) increasing spawning and rearing habitat for splittail and rearing habitat for salmonids for >30 days, (2) providing alternate migration corridor to the mainstem Sacramento River, and (3) increasing effectiveness of habitat and food transport in Cache Slough.*								
• Spills into Yolo Bypass enabled at water surface elevation 17.5 ft NAVD88 (~15,000 cfs Sac R at Fremont flow) by notch and new gates, as compared to current weir elevation of 33.5 ft (~56,000 cfs Fremont flow). • Flows: 3,000-8,000 cfs* depending on hydrology • Duration: 30-45 days • Period: Gates operable December–April 15 (occasionally April 16–May 15 depending on hydrologic conditions). * Flows less than 3,000 cfs may require physical modifications to the Yolo Bypass and toe drain to achieve levels of desired floodplain habitat.								

Table 3A-7. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Enhanced Ecosystem Operations" for Dual Conveyance

Delta Cross Channel Gate Operations
4. Delta Cross Channel Gate Operations Considerations include (1) reduce transport of outmigrating Sacramento River fish into central Delta, (2) maintain flows downstream on Sacramento River, (3) and providing sufficient Sacramento River flow into interior Delta when water quality for M&I and AG may be of concern.
Oct–Nov: DCC gate closed if fish are present (assume 15 days per month; may be open longer depending on presence of fish) Dec–Jun: DCC gate closed Jul–Sep: DCC gate open
Rio Vista Minimum Instream Flows
5. Rio Vista Minimum Instream Flows Maintain minimum flows for outmigrating salmonids and smelt.
Sep–Dec: Per D-1641 Jan–Aug: Minimum of 5,000 cfs
Delta Inflow & Outflow
6. Delta Inflow & Outflow Considerations include (1) Provide sufficient outflow to maintain desirable salinity regime downstream of Collinsville during the spring, (2) explore range of approaches toward providing additional variability to Delta inflow and outflow.
Delta Outflow: Feb–Aug & Dec–Jan: Per D-1641 Sep–Nov: Fall X2 per FWS Smelt BO
Operations for Delta Water Quality and Residence Time
7. Operations for Delta Water Quality and Residence Time Considerations include (1) maintain a minimum level of pumping from the south Delta during summer to provide limited flushing for general water quality conditions (reduce residence times), (2) for M&I and AG salinity improvements, and (3) to allow operational flexibility during other periods to operate either north or south diversions based on real-time assessments of benefits to fish and water quality.
Assumptions: Jul–Sep: Prefer south delta pumping up to 3,000 cfs before diverting from north Oct–Jun: Prefer north delta pumping (real-time operational flexibility)
In-Delta Agricultural and Municipal & Industrial Water Quality Requirements
8. In-Delta Agricultural and Municipal & Industrial Water Quality Requirements Existing M&I and AG salinity requirements
Assumptions: Existing D-1641 North and Western Delta AG and MI standards EXCEPT move compliance point from Emmaton to Threemile Slough juncture. Maintain all water quality requirements contained in the NDWA/DWR Contract and other DWR contractual obligations.

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Table 3A-8. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Enhanced Spring Delta Outflow" for Dual Conveyance

North Delta Diversion Bypass Flows

1. North Delta Diversion Bypass Flows

Objectives include flows to (1) maintain fish screen sweeping velocities, (2) minimize upstream transport from downstream channels, (3) support salmonid and pelagic fish transport to regions of suitable habitat, (4) minimize predation effects downstream, and (5) maintain or improve rearing habitat in the north Delta.

Constant Low-Level Pumping (Dec-Jun):

Diversions up to 5% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.

Initial Pulse Protection:

Low level pumping maintained through the initial pulse period. For the purpose of monitoring, the initiation of the pulse is defined by the following criteria: (1) Wilkins Slough flow changing by more than 45% over a five day period and (2) flow greater than 12,000 cfs. Low-level pumping continues until (1) Wilkins Slough returns to prepulse flows (flow on first day of 5-day increase), (2) flows decrease for 5 consecutive days, or (3) flows are greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flow table (Sub-Table A for Level 1). These parameters are for modeling purposes. Actual operations will be based on real-time monitoring of fish movement.

If the first flush begins before Dec 1, May bypass criteria must be initiated following first flush and the second pulse period will have the same protective operation.

Post-Pulse Operations:

After initial flush(es), go to Level I post-pulse bypass rule (see Sub-Table A for Level 1) until 20 total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass rule (Sub-Table A for Level II) until 45 total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule (Sub-Table Level III).

Sub-Table A. Post-Pulse Operations for North Delta Diversion Bypass Flows

Level I Post-Pulse Operations			**Level II Post-Pulse Operations**			**Level III Post Pulse Operations**		
Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough. **Percentages will vary linearly over a 10-day period when transitioning between months.								
Dec–Apr			**Dec–Apr**			**Dec–Apr**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs

Table 3A-8. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Enhanced Spring Delta Outflow" for Dual Conveyance

20,000 cfs	no limit	18,400 cfs plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs
May			**May**			**May**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs
Jun			**Jun**			**Jun**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000 cfs

Table 3A-8. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Enhanced Spring Delta Outflow" for Dual Conveyance

17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,400 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs
Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs		
South Delta Channel Flows								
2. South Delta Channel Flows *Minimize mortality, including take at south Delta pumps, by reducing incidence and magnitude of reverse flows during critical periods for pelagic and anadromous species.*								
OMR Flows • South Delta exports cannot cause OMR to fall below +1,000 cfs during Dec–Mar. • South Delta exports cannot cause OMR to fall below +3,000 cfs during Jun. • South Delta pumping is not allowed during April, May, Oct, and Nov								
South Delta Export–San Joaquin Inflow Ratio: –50% Dec–Mar & Jun								
Fremont Weir/Yolo Bypass								
3. Fremont Weir/Yolo Bypass *Considerations include (1) increasing spawning and rearing habitat for splittail and rearing habitat for salmonids, (2) providing alternate migration corridor to the mainstem Sacramento River, and (3) increasing effectiveness of habitat and food transport in Cache Slough.*								
• Spills into Yolo Bypass enabled at water surface elevation 17.5 ft NAVD88 (~15,000 cfs Sac R at Fremont flow) by notch and new gates, as compared to current weir elevation of 33.5 ft (~56,000 cfs Fremont flow). • Flows: 3,000-8,000 cfs* depending on hydrology • Duration: 30-45 days • Period: Gates operable December–April 15 (occasionally April 16–May 15 depending on hydrologic conditions). * Flows less than 3,000 cfs may require physical modifications to the Yolo Bypass and toe drain to achieve levels of desired floodplain habitat.								
Delta Cross Channel Gate Operations								
4. Delta Cross Channel Gate Operations Considerations include (1) reduce transport of outmigrating Sacramento River fish into central Delta, (2) maintain flows downstream on Sacramento River, (3) and providing sufficient Sacramento River flow into interior Delta when water quality for M&I and AG may be of concern.								
Oct–Nov: DCC gate closed if fish are present (assume 15 days per month; may be open longer depending on presence of fish) Dec–Jun: DCC gate closed Jul–Sep: DCC gate open								

Table 3A-8. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Enhanced Spring Delta Outflow" for Dual Conveyance

Rio Vista Minimum Instream Flows
5. Rio Vista Minimum Instream Flows Maintain minimum flows for outmigrating salmonids and smelt.
Sep–Dec: Per D-1641 Jan–Aug: Minimum of 5,000 cfs
Delta Inflow & Outflow
6. Delta Inflow & Outflow Considerations include (1) Provide sufficient outflow to maintain desirable salinity regime downstream of Collinsville during the spring, (2) explore range of approaches toward providing additional variability to Delta inflow and outflow.
Delta Outflow: Feb–Aug & Dec–Jan: Per D-1641 Sep–Nov: Fall X2 per FWS Smelt BO SWRCB Flow Criteria of 55% of Unimpaired Flow at Freeport (capped at 40,000 cfs)
Freeport Minimum Instream Flows
7. Freeport Minimum Instream Flows SWRCB Minimum Requirement of 55% of Unimpaired Flow at Freeport Jan–Jun Minimum flow requirement capped at 40,000 cfs
Cold Water Pool Storage
8. Cold Water Pool Storage Trinity, Shasta, Oroville and Folsom storage were modified to enable more cold water pool storage: by increasing Storage Level 3 to 75% of the maximum storage, within Storage Level 3, exports are gradually reduced until Storage Level 2 is reached in the reservoir.
Operations for Delta Water Quality and Residence Time
9. Operations for Delta Water Quality and Residence Time Considerations include (1) maintain a minimum level of pumping from the south Delta during summer to provide limited flushing for general water quality conditions (reduce residence times), (2) for M&I and AG salinity improvements, and (3) to allow operational flexibility during other periods to operate either north or south diversions based on real-time assessments of benefits to fish and water quality.
Assumptions: Jul–Sep: Prefer south delta pumping up to 3,000 cfs before diverting from north Oct–Jun: Prefer north delta pumping (real-time operational flexibility)
In-Delta Agricultural and Municipal & Industrial Water Quality Requirements
10. In-Delta Agricultural and Municipal & Industrial Water Quality Requirements Existing M&I and AG salinity requirements
Assumptions: Existing D-1641 North and Western Delta AG and MI standards EXCEPT move compliance point from Emmaton to Threemile Slough juncture. Maintain all water quality requirements contained in the NDWA/DWR Contract and other DWR contractual obligations.

Table 3A-9. Long-Term BDCP Water Operations Proposal for Proportional North Delta Inflow Bypass Alternative (American Rivers et al 2011)

North Delta Diversion Bypass Flows
1. North Delta Diversion Bypass Flows *Objectives to (1) achieve Fall X2, protections in the South Delta, (2) re-establishment of a more natural hydrograph during winter and spring months, and (3) reservoir operations to prevent unintended drawdowns with a range of potential conveyance capacities.*
Constant Low-Level Pumping (Dec–Jun) Diversions up to 6% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.
Initial Pulse Protection Low level pumping maintained through the initial pulse period. For the purpose of modeling, the initiation of the pulse is defined by the following criteria: (1) Wilkins Slough flow changing by more than 45% over a five day period and (2) flow greater than 12,000 cfs. Low-level pumping continues until (1) Wilkins Slough returns to pre-pulse flows (flow on first day of 5-day increase), (2) flows decrease for 5 consecutive days, or (3) flows are greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flow table (Sub-Table A). These parameters are for modeling purposes. Actual operations will be based on real-time monitoring of fish movement. If the first flush begins before Dec 1, May bypass criteria must be initiated following first flush and the second pulse period will have the same protective operation.
Post-Pulse Operations After initial flush(es), go to Level I post-pulse bypass rule (see Sub-Table A) until 15 total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass rule until 30 total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule.
Sub-Table A. Post-Pulse Operations for North Delta Diversion Bypass Flows

Level I Post-Pulse Operations			**Level II Post-Pulse Operations**			**Level III Post Pulse Operations**		
Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.			Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.			Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.		
Dec–Apr			**Dec–Apr**			**Dec–Apr**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)

Table 3A-9. Long-Term BDCP Water Operations Proposal for Proportional North Delta Inflow Bypass Alternative (American Rivers et al 2011)

15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	18,400 cfs plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs
May			**May**			**May**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs

Table 3A-9. Long-Term BDCP Water Operations Proposal for Proportional North Delta Inflow Bypass Alternative (American Rivers et al 2011)

Jun			Jun			Jun		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,400 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs
Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs		

Sub-Table B. San Joaquin Inflow Relationship to OMR

April and May	June	April and May	June
If San Joaquin flow at Vernalis is the following	Average OMR flows would be at least the following (interpolated linearly between values)	If San Joaquin flow at Vernalis is the following	Average OMR flows would be at least the following (interpolated linearly between values)
≤ 5,000 cfs	-2,000 cfs	≤ 5,000 cfs	-2,000 cfs
6,000 cfs	+1,000 cfs	3,501 to 10,000 cfs	3,501 to 10,000 cfs
10,000 cfs	+2,000 cfs		
15,000 cfs	+3,000 cfs	10,001 to 15,000 cfs	+1,000 cfs
≥30,000 cfs	+6,000 cfs	>15,000 cfs	+2,000 cfs

Table 3A-9. Long-Term BDCP Water Operations Proposal for Proportional North Delta Inflow Bypass Alternative (American Rivers et al 2011)

South Delta Channel Flows

OMR Flows

All OMR criteria required by the various fish protection triggers (density, calendar, and flow based triggers) described in FWS and NMFS OCAP BOs were incorporated into the modeling of the baseline and the January, 2010 proposed project, as well as these newly proposed operational criteria. Whenever those triggers would result in OMRs higher than those shown below, the higher OMR requirements would be met.

Combined Old and Middle River flows no less than values below[1] (cfs)

Month	W	AN	BN	D	C
Jan	0	0	-1,000	-1,500	-1,500
Feb	0	0	-1,000	-1,500	-1,500
Mar	0	0	-1,000	-1,500	-1,500
Apr	0	0	-1,000	-1,500	-1,500
May	0	0	-1,000	-1,500	-1,500
Jun	0	0	-1,000	-1,500	-1,500
Jul	-3,500	-3,500	-3,500	-3,500	-3,500
Aug	-3,500	-3,500	-3,500	-3,500	-3,500
Sep	-3,500	-3,500	-3,500	-3,500	-3,500
Oct	-3,500	-3,500	-3,500	-3,500	-3,500
Nov	-3,500	-3,500	-3,500	-3,500	-3,500
Dec	-2,500	-2,500	-2,500	-2,500	-2,500

Head of Old River Operable Barrier (HORB) Operations/Modeling assumptions (% OPEN)

MONTH	HORB[1]	MONTH	HORB[1]
Oct	50%	May	50%
Nov	100%[2]	Jun 1–15	50%
Dec	100%	Jun 16–30	100%
Jan	50%[3]	Jul	100%
Feb	50%	Aug	100%
Mar	50%	Sep	100%
April	50%		

Table 3A-9. Long-Term BDCP Water Operations Proposal for Proportional North Delta Inflow Bypass Alternative (American Rivers et al 2011)

[1] Percent of time the HORB is open. Agricultural barriers are in and operated consistent with current practices. HORB would be open 100% whenever flows are greater than 10,000 cfs at Vernalis. [2] For modeling assumption only. Action proposed: Before the D-1641 pulse = no OMR restrictions (HORB open) During the D-1641 pulse = no south Delta exports for two weeks (HORB closed) After the D-1641 pulse =–5,000 cfs OMR through November (HORB open 50% for 2 weeks) Exact timing of the action will be based on hydrologic conditions [3] The HORB becomes operational at 50% when salmon fry are immigrating (based on real time monitoring). This generally occurs when flood flow releases are being made.
Fremont Weir/Yolo Bypass
Weir Improvements Sacramento Weir–No change in operations; improve upstream fish passage facilities Lisbon Weir–No change in operations; improve upstream fish passage facilities Fremont Weir–Improve fish passage at existing weir elevation; construct opening and operable gates at elevation 17.5 feet with fish passage facilities; construct opening and operable gates at a smaller opening with fish passage enhancement at elevation 11.5 feet
Fremont Weir Gate Operations To provide seasonal floodplain inundation in the Yolo Bypass, the 17.5 foot and the 11.5 foot elevation gates are assumed to be opened between December 1st and March 31st. This may extend to May 15th, depending on the hydrologic conditions and the measures to minimize land use and ecological conflicts in the bypass. As a simplification for modeling, the gates are assumed opened until April 30th in all years. The gates are operated to limit maximum spill to 6,000 cfs until the Sacramento River stage reaches the existing Fremont Weir elevation. While desired inundation period is on the order of 30 to 45 days, gates are not managed to limit to this range, instead the duration of the event is governed by the Sacramento River flow conditions. To provide greater opportunity for the fish in the bypass to migrate upstream into the Sacramento River, the 11.5 foot elevation gate is assumed to be open for an extended period between September 15th and June 30th. As a simplification for modeling, the period of operation for this gate is assumed to be September 1st to June 30th. The spills through the 11.5 ft elevation gate are limited to 100 cfs to support fish passage.
Delta Cross Channel Gate Operations
Assumptions Per SRWCB D-1641 with additional days closed from Oct 1–Jan 31 based on NMFS BO (Jun 2009) Action IV.1.2v (closed during flushing flows from Oct 1–Dec 14 unless adverse water quality conditions).
Rio Vista Minimum Instream Flows
Assumptions Sep–Dec: Per D-1641 Jan–Aug: Minimum of 3,000 cfs

Table 3A-9. Long-Term BDCP Water Operations Proposal for Proportional North Delta Inflow Bypass Alternative (American Rivers et al 2011)

Delta Inflow & Outflow					
Delta Outflow Feb–Jun: Per D-1641 FALL X2					
Month	**W**	**AN**	**BN**	**D**	**C**
Jan	NA	NA	NA	NA	NA
Feb	NA	NA	NA	NA	NA
Mar	NA	NA	NA	NA	NA
Apr	NA	NA	NA	NA	NA
May	NA	NA	NA	NA	NA
Jun	NA	NA	NA	NA	NA
Jul	NA	NA	NA	NA	NA
Aug	NA	NA	NA	NA	NA
Sep	74	81	NA	NA	NA
Oct	74	81	NA	NA	NA
Nov	74	81	NA	NA	NA
Dec	NA	NA	NA	NA	NA
Operations for Delta Water Quality and Residence Time					
Assumptions Jul–Sep: Prefer south delta pumping up to 3,000 cfs before diverting from north Oct–Jun: Prefer north delta pumping (real-time operational flexibility)					
In-Delta Agricultural and Municipal & Industrial Water Quality Requirements					
Assumptions Existing D-1641 North and Western Delta AG and MI standards EXCEPT move compliance point from Emmaton to Threemile Slough juncture. Maintain all water quality requirements contained in the NDWA/ DWR Contract and other DWR contractual obligations.					

Reservoir Release Percentages				
Month	**Release Percentage**	**Maximum Keswick Release**	**Maximum Thermalito Release**	**Maximum Nimbus Release**
February	40%	15,000	10,000	3,000
March	100%	15,000	10,000	3,000
April	100%	15,000	10,000	3,000
May	60%	15,000	10,000	3,000
June	40%	15,000	10,000	3,000

Table 3A-9. Long-Term BDCP Water Operations Proposal for Proportional North Delta Inflow Bypass Alternative (American Rivers et al 2011)

Shasta Lake Offramps					
Month	**Cap 1**	**Storage 1**	**Cap 2**	**Storage 2**	**Cap 3**
February	15,000	2,800	9,125	2,400	3,250
March	15,000	3,000	9,125	2,600	3,250
April	15,000	3,200	9,125	2,800	3,250
May	15,000	3,000	9,125	2,600	3,250
June	15,000	2,800	9,125	2,400	3,250
Oroville Reservoir Offramps					
Month	**Cap 1**	**Storage 1**	**Cap 2**	**Storage 2**	**Cap 3**
February	10,000	2,000	5,375	1,300	750
March	10,000	2,200	5,375	1,500	750
April	10,000	2,300	5,375	1,700	750
May	10,000	2,200	5,375	1,500	750
June	10,000	2,000	5,375	1,300	750
Folsom Lake Offramps					
Month	**Cap 1**	**Storage 1**	**Cap 2**	**Storage 2**	**Cap 3**
February	3,000	350	1,900	250	800
March	3,000	400	1,900	300	800
April	3,000	450	1,900	350	800
May	3,000	400	1,900	300	800
June	3,000	350	1,900	250	800

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Table 3A-10. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Limited Dual Conveyance Facility" (CCWD 2011)

North Delta Diversion Bypass Flows

1. North Delta Diversion Bypass Flows

Objectives include flows of the functional equivalent thereof to (1) maintain fish screen sweeping velocities, (2) reduce upstream transport from downstream channels, (3) support salmonid and pelagic fish transport to regions of suitable habitat, (4) reduce predation effects downstream, and (5) maintain or improve rearing habitat in the north Delta.

Constant Low-Level Pumping (Dec–Jun):

Diversions up to 6% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.

Initial Pulse Protection:

Low level pumping maintained through the initial pulse period. For the purpose of monitoring, the initiation of the pulse is defined by the following criteria: (1) Wilkins Slough flow changing by more than 45% over a five day period and (2) flow greater than 12,000 cfs. Low-level pumping continues until (1) Wilkins Slough returns to prepulse flows (flow on first day of 5-day increase), (2) flows decrease for 5 consecutive days, or (3) flows are greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flow table (Sub-Table A). These parameters are for modeling purposes. Actual operations will be based on real-time monitoring of fish movement.

If the first flush begins before Dec 1, May bypass criteria must be initiated following first flush and the second pulse period will have the same protective operation.

Post-Pulse Operations:

After initial flush(es), go to Level I post-pulse bypass rule (see SubTable A) until 15 total days of bypass flows above 20,000 cfs. Then go to the Level II post-pulse bypass rule until 30 total days of bypass flows above 20,000 cfs. Then go to the Level III post-pulse bypass rule.

Sub-Table A. Post-Pulse Operations for North Delta Diversion Bypass Flows

Level I Post-Pulse Operations			Level II Post-Pulse Operations			Level III Post Pulse Operations		
Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.			Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.			Based on the objectives stated above, it is recommended to implement the following operating criteria: • Bypass flows sufficient to prevent upstream tidal transport at two points of control: (1) Sacramento River upstream of Sutter Slough and (2) Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.		
Dec–Apr			**Dec–Apr**			**Dec–Apr**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)

Table 3A-10. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Limited Dual Conveyance Facility" (CCWD 2011)

15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	18,400 cfs plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs
May			**May**			**May**		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs

Table 3A-10. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Limited Dual Conveyance Facility" (CCWD 2011)

Jun			Jun			Jun		
If Sacramento River flow is over…	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**	**If Sacramento River flow is over…**	**But not over…**	**The bypass is…**
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping (main table)	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping (main table)
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,400 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs
Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs			Jul–Sep: 5,000 cfs Oct–Nov: 7,000 cfs		
South Delta Channel Flows								
2. South Delta Channel Flows *Minimize take at south Delta pumps by reducing incidence and magnitude of reverse flows during critical periods for pelagic species.*								
OMR Flows • FWS smelt and NMFS BO's model of adaptive restrictions (temperature, turbidity, salinity, smelt presence) Table below provides a rough representation of the current estimate of "most likely" operation under FWS and NMFS BO's for modeling purposes.								
Combined Old and Middle River flows no less than values below* (cfs)								
Month	**W**		**AN**		**BN**	**D**		**C**
Jan	-4,000		-4,000		-4,000	-5,000		-5,000
Feb	-5,000		-4,000		-4,000	-4,000		-4,000
Mar	-5,000		-4,000		-4,000	-3,500		-3,000
Apr	-5,000		-4,000		-4,000	-3,500		-2,000

Table 3A-10. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Limited Dual Conveyance Facility" (CCWD 2011)

May	-5,000	-4,000	-4,000	-3,500	-2,000
Jun	-5,000	-5,000	-5,000	-5,000	-2,000
Jul	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A
Oct	N/A	N/A	N/A	N/A	N/A
Nov	N/A	N/A	N/A	N/A	N/A
Dec	-6,800	-6,800	-6,300	-6,300	-6,100
* Values are monthly average for use in modeling. December 20–31 targets are–5,000 cfs (W, AN),–3,500 cfs (BN, D), and–3,000 cfs (C), and are averaged with an assumed background of–8,000 cfs for December 1–19. Values are reflective of the "most likely" operation under the FWS Delta Smelt Biological Opinion. Values for modeling may be updated based on review by fishery agencies.					
South Delta Export–San Joaquin Inflow Ratio:					
–Vernalis flow-based export limits Apr 1st–May 31st as required by NMFS BO (Jun, 2009) as assumed in No Action Alternative					
Fremont Weir/Yolo Bypass					
3. Fremont Weir/Yolo Bypass					
Considerations include (1) increasing spawning and rearing habitat for splittail and rearing habitat for salmonids for >30 days, (2) providing alternate migration corridor to the mainstem Sacramento River, and (3) increasing effectiveness of habitat and food transport in Cache Slough.					
Sacramento Weir–No change in operations; improve upstream fish passage facilities					
Lisbon Weir–No change in operations; improve upstream fish passage facilities					
Fremont Weir–Improve fish passage at existing weir elevation; construct opening and operable gates at elevation 17.5 feet with fish passage facilities; construct opening and operable gates at a smaller opening with fish passage enhancement at elevation 11.5 feet					
Fremont Weir Gate Operations–					
December 1–March 30 (extend to May 15, depending on hydrologic conditions and measures to minimize land use and ecological conflicts) open the 17.5 foot and 11.5 foot elevation gates when Sacramento River flow at Freeport is greater than 25,000 cfs (provides local and regional flood control benefit and coincides with pulse flows and juvenile salmonid migration cues, provides seasonal floodplain inundation for food production, juvenile rearing, and spawning) to provide Yolo Bypass inundation of 3,000 to 6,000 cfs depending on river stage. Operating the gates to allow Yolo Bypass inundation when Sacramento River flow is greater than 25,000 cfs will reduce impacts to water supply associated with Hood bypass flow constraints. Potential impacts to water supply would be avoided or minimized through an operations plan.					
Close the 17.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 20,000 cfs but keep 11.5 foot elevation gates open to provide greater opportunity for fish within the bypass to migrate upstream into the Sacramento River; close 11.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 15,000 cfs					

Table 3A-10. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS based upon "Limited Dual Conveyance Facility" (CCWD 2011)

Delta Cross Channel Gate Operations
4. Delta Cross Channel Gate Operations Considerations include (1) reduce transport of outmigrating Sacramento River fish into central Delta, (2) maintain flows downstream on Sacramento River, (3) and providing sufficient Sacramento River flow into interior Delta when water quality for M&I and AG may be of concern.
Oct–Nov: DCC gate closed if fish are present (assume 15 days per month; may be open longer depending on presence of fish) Dec–Jun: DCC gate closed Jul–Sep: DCC gate open
Rio Vista Minimum Instream Flows
5. Rio Vista Minimum Instream Flows Maintain minimum flows for outmigrating salmonids and smelt.
Sep–Dec: Per D-1641 Jan–Aug: Minimum of 3,000 cfs
Delta Inflow & Outflow
6. Delta Inflow & Outflow Considerations include (1) Provide sufficient outflow to maintain desirable salinity regime downstream of Collinsville during the spring, (2) explore range of approaches toward providing additional variability to Delta inflow and outflow.
Delta Outflow: Feb–Jun: Per D-1641 Sep–Nov: Implement Fall X2 per FWS BO
Operations for Delta Water Quality and Residence Time
7. Operations for Delta Water Quality and Residence Time Considerations include (1) maintain a minimum level of pumping from the south Delta during summer to provide limited flushing for general water quality conditions (reduce residence times), (2) for M&I and AG salinity improvements, and (3) to allow operational flexibility during other periods to operate either north or south diversions based on real-time assessments of benefits to fish and water quality.
Assumptions: Jul–Sep: Prefer south delta pumping up to 3,000 cfs before diverting from north Oct–Jun: Prefer north delta pumping (real-time operational flexibility)
In-Delta Agricultural and Municipal & Industrial Water Quality Requirements
8. In-Delta Agricultural and Municipal & Industrial Water Quality Requirements Existing M&I and AG salinity requirements
Assumptions: Existing D-1641 North and Western Delta AG and MI standards EXCEPT move compliance point from Emmaton to Threemile Slough juncture. Maintain all water quality requirements contained in the NDWA/ DWR Contract and other DWR contractual obligations.

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Table 3A-11. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS Separated Corridors

Delta Cross Channel Criteria					
1. Delta Cross Channel Criteria *Objectives to provide separated corridors for South Delta fish passage and water conveyance from Sacramento River to South Delta intakes*					
Delta Cross Channel Criteria: Sacramento River Flows less than 11,000 cfs or over 25,000 cfs: Gates Closed Sacramento River Flows 11,000 cfs to 25,000 cfs: Divert up to 25% of Sacramento River flow					
South Delta Channel Flows					
2. South Delta Channel Flows *Minimize take at south Delta pumps by reducing incidence and magnitude of reverse flows during critical periods for pelagic species.* *Apply only to Middle River Flows except during flood events when South Delta gates are open*					
OMR Flows • FWS smelt and NMFS BO's model of adaptive restrictions (temperature, turbidity, salinity, smelt presence) Table below provides a rough representation of the current estimate of "most likely" operation under FWS and NMFS BO's for modeling purposes.					
Combined Old and Middle River flows no less than values below* (cfs)					
Month	**W**	**AN**	**BN**	**D**	**C**
Jan	-4,000	-4,000	-4,000	-5,000	-5,000
Feb	-5,000	-4,000	-4,000	-4,000	-4,000
Mar	-5,000	-4,000	-4,000	-3,500	-3,000
Apr	-5,000	-4,000	-4,000	-3,500	-2,000
May	-5,000	-4,000	-4,000	-3,500	-2,000
Jun	-5,000	-5,000	-5,000	-5,000	-2,000
Jul	N/A	N/A	N/A	N/A	N/A
Aug	N/A	N/A	N/A	N/A	N/A
Sep	N/A	N/A	N/A	N/A	N/A
Oct	N/A	N/A	N/A	N/A	N/A
Nov	N/A	N/A	N/A	N/A	N/A
Dec	-6,800	-6,800	-6,300	-6,300	-6,100
* Values are monthly average for use in modeling. December 20–31 targets are–5,000 cfs (W, AN),–3,500 cfs (BN, D), and–3,000 cfs (C), and are averaged with an assumed background of–8,000 cfs for December 1–19. Values are reflective of the "most likely" operation under the FWS Delta Smelt Biological Opinion. Values for modeling may be updated based on review by fishery agencies.					
South Delta Export–San Joaquin Inflow Ratio: –Vernalis flow-based export limits Apr 1st–May 31st as required by NMFS BO (Jun, 2009) as assumed in No Action Alternative					
Fremont Weir/Yolo Bypass					
3. Fremont Weir/Yolo Bypass *Considerations include (1) increasing spawning and rearing habitat for splittail and rearing habitat for salmonids for >30 days, (2) providing alternate migration corridor to the mainstem Sacramento River, and (3) increasing effectiveness of habitat and food transport in Cache Slough.*					
Sacramento Weir–No change in operations; improve upstream fish passage facilities					
Lisbon Weir–No change in operations; improve upstream fish passage facilities					
Fremont Weir–Improve fish passage at existing weir elevation; construct opening and operable gates at elevation 17.5 feet with fish passage facilities; construct opening and operable gates at a smaller opening with fish passage enhancement at elevation 11.5 feet					

Table 3A-11. Long-Term BDCP Water Operations Proposal for BDCP EIR/EIS Separated Corridors

Fremont Weir Gate Operations–
December 1-March 30 (extend to May 15, depending on hydrologic conditions and measures to minimize land use and ecological conflicts) open the 17.5 foot and 11.5 foot elevation gates when Sacramento River flow at Freeport is greater than 25,000 cfs (provides local and regional flood control benefit and coincides with pulse flows and juvenile salmonid migration cues, provides seasonal floodplain inundation for food production, juvenile rearing, and spawning) to provide Yolo Bypass inundation of 3,000 to 6,000 cfs depending on river stage. Operating the gates to allow Yolo Bypass inundation when Sacramento River flow is greater than 25,000 cfs will reduce impacts to water supply associated with Hood bypass flow constraints. Potential impacts to water supply would be avoided or minimized through an operations plan.
Close the 17.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 20,000 cfs but keep 11.5 foot elevation gates open to provide greater opportunity for fish within the bypass to migrate upstream into the Sacramento River; close 11.5 foot elevation gates when Sacramento River flow at Freeport recedes to less than 15,000 cfs
Delta Cross Channel and Georgiana Slough Gate Operations
4. Delta Cross Channel Gate Operations Considerations include (1) reduce transport of outmigrating Sacramento River fish into central Delta, (2) maintain flows downstream on Sacramento River, (3) and providing sufficient Sacramento River flow into interior Delta when water quality for M&I and AG may be of concern.
Delta Cross Channel: Sacramento River Flows less than 11,000 cfs or over 25,000 cfs: Closed Sacramento River Flows 11,000 cfs to 25,000 cfs: Divert up to 25% of Sacramento River flow Georgiana Slough: Operated to limit flow to less than 7,500 cfs all year to prevent impingement of fish on screens. This will usually allow Georgiana Slough to be open until Sacramento River flow exceeds 45,000 cfs.
Rio Vista Minimum Instream Flows
5. Rio Vista Minimum Instream Flows Maintain minimum flows for outmigrating salmonids and smelt.
Sep–Dec: Per D-1641 Jan–Aug: Minimum of 3,000 cfs
Delta Inflow & Outflow
6. Delta Inflow & Outflow Considerations include (1) Provide sufficient outflow to maintain desirable salinity regime downstream of Collinsville during the spring, (2) explore range of approaches toward providing additional variability to Delta inflow and outflow.
Delta Outflow: Jul–Aug & Dec-Jan: Per D-1641 Sep–Nov: Implement Fall X2 per FWS Smelt BO
Mokelumne River Barriers
7. Mokelumne River Barriers Jan–July: Gates Closed (possibly with fish ladder) Aug–Dec: Gates Open.
In-Delta Agricultural and Municipal & Industrial Water Quality Requirements
8. In-Delta Agricultural and Municipal & Industrial Water Quality Requirements Existing M&I and AG salinity requirements
Assumptions: Existing D-1641 North and Western Delta AG and MI standards EXCEPT move compliance point from Emmaton to Threemile Slough juncture. Maintain all water quality requirements contained in the NDWA/ DWR Contract and other DWR contractual obligations.

Table 3A-12. Second Screening: Comparison of Conveyance Alternatives with First Level Screening Criteria that Reflect CEQA and NEPA Requirements with Project Objectives and Purpose Statements in the NOP and NOI

Under CEQA, the answers to <u>most</u> of these questions should be "Possibly" or "Unknown" to continue to be considered under the Second Level Screening Criteria. If the answers to most of these questions are "No" or "Not Likely," the alternative need not be considered in the Second Level Screening Criteria.

Under general NEPA principles, the answers to <u>all</u> of these questions should be "Possibly" or "Unknown" if an alternative is to continue to be considered under the Second Level Screening Criteria. However, because the EIR/EIS is a joint document and the project/action will be a joint state/federal undertaking, alternative with "Possibly" or "Unknown" answers to <u>most</u> of these questions is adequate to continue consideration under the Second Level Screening Criteria. If the answers to most of the questions are "Not Likely," the alternative would not be considered under subsequent screening criteria.

Potential Alternative	Could the potential alternative provide for the conservation and management of covered species through actions within the BDCP Planning Area that will contribute to the recovery of the species?	Could the potential alternative protect, restore, and enhance certain aquatic, riparian, and associated terrestrial natural communities and ecosystems?	Could the potential alternative reduce the adverse effects to certain listed species of diverting water by relocating the intakes of the SWP and CVP?	Could the potential alternative restore and protect the ability of the SWP and CVP to deliver up to full contract amounts, when hydrologic conditions result in the availability of sufficient water, consistent with the requirements of state and federal law and the terms and conditions of water delivery contracts held by SWP contractors and certain members of San Luis Delta Mendota Water Authority, and other existing applicable agreements?	Results of First Level Screening
1. Second Screening Dual Conveyance Alternative 1A–*Dual Conveyance with a Tunnel–January 2010 BDCP Operations–15,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
2. Second Screening Dual Conveyance Alternative 1B–*Dual Conveyance with a Lined or Unlined East Canal January 2010 BDCP Operations–15,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
3. Second Screening Dual Conveyance Alternative 1C–*Dual Conveyance with a Lined or Unlined West Canal January 2010 BDCP Operations–15,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
4. Second Screening Dual Conveyance Alternative 2A–*Dual Conveyance with a Tunnel–Scenario 6 Operations–15,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
5. Second Screening Dual Conveyance Alternative 2B–*Dual Conveyance with a Lined or Unlined East Canal Scenario 6 Operations–15,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
6. Second Screening Dual Conveyance Alternative 2C–*Dual Conveyance with a Lined or Unlined West Canal Scenario 6 Operations–15,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
7. Second Screening Dual Conveyance Alternative 3A–*Dual Conveyance with a Tunnel–January 2010 BDCP Operations–6,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
8. Second Screening Dual Conveyance Alternative 3B–*Dual Conveyance with a Lined or Unlined East Canal January 2010 BDCP Operations–6,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
9. Second Screening Dual Conveyance Alternative 3C–*Dual Conveyance with a Lined or Unlined West Canal January 2010 BDCP Operations–6,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
10. Second Screening Dual Conveyance Alternative 4A–*Dual Conveyance with a Tunnel–Scenario 6 Operations–9,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
11. Second Screening Dual Conveyance Alternative 4B–*Dual Conveyance with a Lined or Unlined East Canal Scenario 6 Operations–9,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
12. Second Screening Dual Conveyance Alternative 4C–*Dual Conveyance with a Lined or Unlined West Canal Scenario 6 Operations–9,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
13. Second Screening Dual Conveyance Alternative 5A–*Dual Conveyance with a Tunnel–January 2010 BDCP Operations and Fall X2–3,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening

Table 3A-12. Second Screening: Comparison of Conveyance Alternatives with First Level Screening Criteria that Reflect CEQA and NEPA Requirements with Project Objectives and Purpose Statements in the NOP and NOI

Under CEQA, the answers to <u>most</u> of these questions should be "Possibly" or "Unknown" to continue to be considered under the Second Level Screening Criteria. If the answers to most of these questions are "No" or "Not Likely," the alternative need not be considered in the Second Level Screening Criteria.

Under general NEPA principles, the answers to <u>all</u> of these questions should be "Possibly" or "Unknown" if an alternative is to continue to be considered under the Second Level Screening Criteria. However, because the EIR/EIS is a joint document and the project/action will be a joint state/federal undertaking, alternative with "Possibly" or "Unknown" answers to <u>most</u> of these questions is adequate to continue consideration under the Second Level Screening Criteria. If the answers to most of the questions are "Not Likely," the alternative would not be considered under subsequent screening criteria.

Potential Alternative	Could the potential alternative provide for the conservation and management of covered species through actions within the BDCP Planning Area that will contribute to the recovery of the species?	Could the potential alternative protect, restore, and enhance certain aquatic, riparian, and associated terrestrial natural communities and ecosystems?	Could the potential alternative reduce the adverse effects to certain listed species of diverting water by relocating the intakes of the SWP and CVP?	Could the potential alternative restore and protect the ability of the SWP and CVP to deliver up to full contract amounts, when hydrologic conditions result in the availability of sufficient water, consistent with the requirements of state and federal law and the terms and conditions of water delivery contracts held by SWP contractors and certain members of San Luis Delta Mendota Water Authority, and other existing applicable agreements?	Results of First Level Screening
14. Second Screening Dual Conveyance Alternative 6A–*Dual Conveyance with a Tunnel–Enhanced Ecosystem Conveyance Operations Alternative–9,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
15. Second Screening Dual Conveyance Alternative 7A–*Dual Conveyance with a Tunnel–Enhanced Spring Delta Outflow Alternative–9,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
16. Second Screening Dual Conveyance Alternative 8A–*Dual Conveyance with a Tunnel–Proportional North Delta Inflow Bypass Alternative–9,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
17. Second Screening Dual Conveyance Alternative 9A–*Dual Conveyance with a Tunnel–State Water Resources Control Board 2010 Flow Recommendations for Delta Ecosystem–9,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
18. Second Screening Isolated Conveyance Alternative 1A–*Isolated Conveyance with a Tunnel–January 2010 BDCP Operations–15,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
19. Second Screening Isolated Conveyance Alternative 1B–*Isolated Conveyance with a Lined or Unlined East Canal–January 2010 BDCP Operations–15,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
20. Second Screening Isolated Conveyance Alternative 1C–*Isolated Conveyance with a Lined or Unlined West Canal–January 2010 BDCP Operations–15,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening
21. Second Screening Through Delta Conveyance Alternative 1–*Separate Corridors Operations–15,000 cfs*	Possibly	Possibly	Possibly	Possibly	Continue to Second Level Screening

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Table 3A-13. Second Screening: Comparison of Conveyance Alternatives with Second Level Screening Criteria Related to CEQA and NEPA

If the answer to the CEQA Criteria and/or the NEPA Criteria question is "Possibly" or "Unknown," the alternative would be considered in the Third Level Screening. If the answers to both questions are "No" or "Not Likely," the alternative would not be considered under subsequent screening criteria.			
Potential Alternative	**CEQA Criteria: Would the potential alternative avoid or substantially lessen any of the expected significant environmental effects of the "proposed project"?**	**NEPA Criteria: Would the potential alternative "address one or more significant issues" related to the proposed action?**	**Results of Second Level Screening**
1. Second Screening Dual Conveyance Alternative 1A–*Dual Conveyance with a Tunnel–January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
2. Second Screening Dual Conveyance Alternative 1B–*Dual Conveyance with a Lined or Unlined East Canal January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
3. Second Screening Dual Conveyance Alternative 1C–*Dual Conveyance with a Lined or Unlined West Canal January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
4. Second Screening Dual Conveyance Alternative 2A–*Dual Conveyance with a Tunnel–Scenario 6 Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
5. Second Screening Dual Conveyance Alternative 2B–*Dual Conveyance with a Lined or Unlined East Canal Scenario 6 Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
6. Second Screening Dual Conveyance Alternative 2C–*Dual Conveyance with a Lined or Unlined West Canal Scenario 6 Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
7. Second Screening Dual Conveyance Alternative 3A–*Dual Conveyance with a Tunnel–January 2010 BDCP Operations–6,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
8. Second Screening Dual Conveyance Alternative 3B–*Dual Conveyance with a Lined or Unlined East Canal January 2010 BDCP Operations–6,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
9. Second Screening Dual Conveyance Alternative 3C–*Dual Conveyance with a Lined or Unlined West Canal January 2010 BDCP Operations–6,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
10. Second Screening Dual Conveyance Alternative 4A–*Dual Conveyance with a Tunnel–Scenario 6 Operations–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
11. Second Screening Dual Conveyance Alternative 4B–*Dual Conveyance with a Lined or Unlined East Canal Scenario 6 Operations–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
12. Second Screening Dual Conveyance Alternative 4C–*Dual Conveyance with a Lined or Unlined West Canal Scenario 6 Operations–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
13. Second Screening Dual Conveyance Alternative 5A–*Dual Conveyance with a Tunnel–January 2010 BDCP Operations and Fall X2–3,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
14. Second Screening Dual Conveyance Alternative 6A–*Dual Conveyance with a Tunnel–Enhanced Ecosystem Conveyance Operations Alternative–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
15. Second Screening Dual Conveyance Alternative 7A–*Dual Conveyance with a Tunnel–Enhanced Spring Delta Outflow Alternative–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
16. Second Screening Dual Conveyance Alternative 8A–*Dual Conveyance with a Tunnel–Proportional North Delta Inflow Bypass Alternative–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
17. Second Screening Dual Conveyance Alternative 9A–*Dual Conveyance with a Tunnel–State Water Resources Control Board 2010 Flow Recommendations for Delta Ecosystem–9,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
18. Second Screening Isolated Conveyance Alternative 1A–*Isolated Conveyance with a Tunnel–January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
19. Second Screening Isolated Conveyance Alternative 1B–*Isolated Conveyance with a Lined or Unlined East Canal–January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
20. Second Screening Isolated Conveyance Alternative 1C–*Isolated Conveyance with a Lined or Unlined West Canal–January 2010 BDCP Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening
21. Second Screening Through Delta Conveyance Alternative–*Separate Corridors Operations–15,000 cfs*	Unknown at this Time	Possibly	Continue to Third Level Screening

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Table 3A-14. Second Screening: Comparison of Conveyance Alternatives with Third Level Screening Criteria Related to Economically Feasibility under CEQA and Reasonableness under NEPA

If the answers to all of these questions are "Not Likely" or "Unknown," the alternative would be considered in the EIR/EIS. If the answers to any of these questions are "LIKELY" or "YES," the alternative would not be considered in the EIR/EIS.

	Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that a reasonably prudent public agency would not proceed with the alternative?	Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that it would be impractical to proceed with the alternative?	Would the potential alternative take so long to implement, as compared with the proposed project or action, that it would not meet the project objectives or purpose within an acceptable time frame?	Would the potential alternative require technology or physical components that are clearly technically infeasible based on currently available science and engineering criteria for the scope of the potential alternative?	Would construction, operation, and/or maintenance of the potential alternative violate any federal or state statutes or regulations (other than sources of law that would be amended or eliminated as part of the alternative)?	Would the potential alternative involve an outcome that is clearly undesirable from a policy standpoint in that the outcome could not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors?	Results of Third Level Screening
1. **Second Screening Dual Conveyance Alternative 1A–***Dual Conveyance with a Tunnel–January 2010 BDCP Operations–15,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
2. **Second Screening Dual Alternative 1B–***Dual Conveyance with a Lined or Unlined East Canal January 2010 BDCP Operations–15,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
3. **Second Screening Dual Conveyance Alternative 1C–***Dual Conveyance with a Lined or Unlined West Canal January 2010 BDCP Operations–15,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
4 **Second Screening Dual Conveyance Alternative 2A–***Dual Conveyance with a Tunnel–Scenario 6 Operations–15,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
5 **Second Screening Dual Conveyance Alternative 2B–***Dual Conveyance with a Lined or Unlined East Canal Scenario 6 Operations–15,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
6 **Second Screening Dual Conveyance Alternative 2C–***Dual Conveyance with a Lined or Unlined West Canal Scenario 6 Operations–15,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
7 **Second Screening Dual Conveyance Alternative 3A–***Dual Conveyance with a Tunnel–January 2010 BDCP Operations–6,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
8 **Second Screening Dual Conveyance Alternative 3B–***Dual Conveyance with a Lined or Unlined East Canal January 2010 BDCP Operations–6,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
9 **Second Screening Dual Conveyance Alternative 3C–***Dual Conveyance with a Lined or Unlined West Canal January 2010 BDCP Operations–6,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
10 **Second Screening Dual Conveyance Alternative 4A–***Dual Conveyance with a Tunnel–Scenario 6 Operations–9,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
11 **Second Screening Dual Conveyance Alternative 4B–***Dual Conveyance with a Lined or Unlined East Canal Scenario 6 Operations–9,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria

Table 3A-14. Second Screening: Comparison of Conveyance Alternatives with Third Level Screening Criteria Related to Economically Feasibility under CEQA and Reasonableness under NEPA

If the answers to all of these questions are "Not Likely" or "Unknown," the alternative would be considered in the EIR/EIS. If the answers to any of these questions are "LIKELY" or "YES," the alternative would not be considered in the EIR/EIS.

	Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that a reasonably prudent public agency would not proceed with the alternative?	Are the marginal costs of the potential alternative, as compared to the cost of the proposed project or action, so substantial that it would be impractical to proceed with the alternative?	Would the potential alternative take so long to implement, as compared with the proposed project or action, that it would not meet the project objectives or purpose within an acceptable time frame?	Would the potential alternative require technology or physical components that are clearly technically infeasible based on currently available science and engineering criteria for the scope of the potential alternative?	Would construction, operation, and/or maintenance of the potential alternative violate any federal or state statutes or regulations (other than sources of law that would be amended or eliminated as part of the alternative)?	Would the potential alternative involve an outcome that is clearly undesirable from a policy standpoint in that the outcome could not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors?	Results of Third Level Screening
12 Second Screening Dual Conveyance Alternative 4C–*Dual Conveyance with a Lined or Unlined West Canal Scenario 6 Operations–9,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
13 Second Screening Dual Conveyance Alternative 5A–*Dual Conveyance with a Tunnel–January 2010 BDCP Operations and Fall X2–3,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
14 Second Screening Dual Conveyance Alternative 6A–*Dual Conveyance with a Tunnel–Enhanced Ecosystem Conveyance Operations Alternative–9,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Unknown	Not Likely	Evaluate this alternative for Consistency Criteria
15 Second Screening Dual Conveyance Alternative 7A–*Dual Conveyance with a Tunnel–Enhanced Spring Delta Outflow Alternative–9,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Unknown	Not Likely	Evaluate this alternative for Consistency Criteria
16 Second Screening Dual Conveyance Alternative 8A–*Dual Conveyance with a Tunnel–Proportional North Delta Inflow Bypass Alternative–9,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Unknown	Not Likely	Evaluate this alternative for Consistency Criteria
17 Second Screening Dual Conveyance Alternative 9A–*Dual Conveyance with a Tunnel–State Water Resources Control Board 2010 Flow Recommendations for Delta Ecosystem–9,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Likely because preliminary modeling analysis indicates that Delta outflow criteria could not be accomplished even with reducing deliveries to upstream water rights holders.	Not Likely	Could be eliminated from further consideration, however, maintained in this analysis for evaluation with Consistency Criteria
18 Second Screening Isolated Conveyance Alternative 1A– *Isolated Conveyance with a Tunnel–January 2010 BDCP Operations–15,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
19 Second Screening Isolated Conveyance Alternative 1B– *Isolated Conveyance with a Lined or Unlined East Canal–January 2010 BDCP Operations–15,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
20 Second Screening Isolated Conveyance Alternative 1C– *Isolated Conveyance with a Lined or Unlined West Canal–January 2010 BDCP Operations–15,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria
21 Second Screening Through Delta Conveyance Alternative 1– *Separate Corridors Operations–15,000 cfs*	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Not Likely	Evaluate this alternative for Consistency Criteria

Table 3A-15. Second Screening: Comparison of the Range of Alternatives to Provisions in the Sacramento-San Joaquin River Delta Reform Act

Measures of Consistency	Results
Does the range of alternatives provide a reasonable range of flow criteria?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes seven different operations criteria with different flow criteria.
Does the range of alternatives provide a reasonable range of diversion rates?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes four different operations criteria with different diversion rates.
Does the range of alternatives provide a reasonable range of other operational criteria to satisfy the criteria of approval as a Natural Community Conservation Plan?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes at least three different operations criteria that were developed specifically to increase benefits for aquatic resources as compared to the January 2010 BDCP Operations based upon preliminary modeling results.
Does the range of alternatives provide a reasonable range of hydrologic conditions?	Yes, the conveyance operations alternatives will be evaluated with and without the projected effects of climate change and sea level rise.
Does the range of alternatives include a Through Delta Conveyance alternative?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes the Separate Corridors Alternative.
Does the range of alternatives include a Dual Conveyance alternative?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes seven Dual Conveyance Alternatives.
Does the range of alternatives include an Isolated Conveyance alternative?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes one Isolated Conveyance Alternative.
Does the range of alternatives include a Dual or Isolated Conveyance–Lined Canal alternative?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes eight Dual Conveyance Alternatives and two Isolated Conveyance Alternatives with lined eastern or western canals.
Does the range of alternatives include a Dual or Isolated Conveyance–Unlined Canal alternative?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes eight Dual Conveyance Alternatives and two Isolated Conveyance Alternatives with unlined eastern or western canals.
Does the range of alternatives include a Pipeline/Tunnel Conveyance alternative?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes seven Dual Conveyance Alternatives and one Isolated Conveyance Alternatives with a pipeline/tunnel

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Table 3A-16. Comparison of the Range of Alternatives to Scoping Comments by CEQA Responsible Agencies and Federal Cooperating Agencies with Jurisdiction by Law or Special Expertise Related to Conveyance Alternatives

Measures of Consistency	Results
Does the range of alternatives include alternatives with a broad range of water quality objectives and operational strategies?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes five different operations criteria developed to meet different water quality objectives.
Does the range of alternatives include an alternative with potential interim changes to the SWRCB Bay-Delta Plan?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes operations criteria that include changes in operations of south Delta intakes that could be considered as potential interim changes to the SWRCB Bay-Delta Plan.
Does the range of alternatives include an alternative with long-term changes to the SWRCB Bay-Delta Plan with new conveyance facilities?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes 18 conveyance alternatives with long-term changes to the SWRCB Bay-Delta Plan with new Dual Conveyance or Isolated Conveyance facilities.
Does the range of alternatives include an alternative with long-term changes to the SWRCB Bay-Delta Plan without new conveyance facilities?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes a Through Delta alternative with minimum modifications to existing conveyance facilities.
Does the range of alternatives include an alternative with reduced diversions lower than diversions allowed for in the 2008 USFWS and 2009 NMFS biological opinions to assure continued existence of the species and some level of rehabilitation for the estuary?	Likely, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes at least one alternative, Isolated Conveyance, that based upon preliminary model results would result in lower SWP and CVP water supplies than under existing conditions, especially with projected climate change and sea level rise conditions.
Does the range of alternatives include an alternative with Delta outflows, and potentially Delta inflows, that reflect a more natural hydrograph than current SWRCB Bay-Delta Plan?	Yes, the range of conveyance alternatives that have been consistent with the three levels of screening criteria includes two conveyance alternatives, Enhanced Ecosystem Conveyance Operations Alternative and Modified Enhanced Ecosystem Conveyance Operations Alternative, that would result in a more natural hydrograph than occurs under existing conditions.

2

Table 3A-17. Determination of Consistency of with Legal Rights of Entities that are Not BDCP Participants

If the answer to this question is "Not Likely" or "Unknown," the alternative would be considered in the EIR/EIS. If the answers to this question are "LIKELY" or "YES," the alternative would not be considered in the EIR/EIS.	
Measures of Consistency	**Results**
Would the potential alternative result in the impairment of existing senior water rights in the Sacramento-San Joaquin Rivers watershed who are not applicants for incidental take authorization through the proposed Bay Delta Conservation Plan?	No for the range of conveyance alternatives that have been consistent with the three levels of screening criteria would not require changes in legal rights although legal ownership may change due to sale of property. However, the answer would be Likely for Second Screening Dual Conveyance Alternative 8A, which includes operations alternatives based on Scenario 7a, and Second Screening Dual Conveyance Alternative 9A, which includes operations alternatives based on the State Water Resources Control Board 2010 Flow Recommendations for Delta Ecosystem. Based upon preliminary model analyses, both of these alternatives would result in reductions in water deliveries to Sacramento River water rights holders in order to achieve the flow and water quality objectives in these operations alternatives.

3

Table 3A-18. Water Operations Flow Criteria

<table>
<tr><th>Parameter</th><th>Criteria</th></tr>
<tr><td>Old and Middle River/San Joaquin inflow-export ratio</td><td>
● October, November: Flows will not be more negative than an average of −2,000 cfs during D-1641 San Joaquin River pulse periods, or −5,000 cfs during nonpulse periods.
● November, December: Flows will not be more negative than an average of −5,000 cfs and no more negative than an average of −2,000 cfs when the delta smelt action 1 triggers.
● January, February: 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 critical years.
● March: 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 to critical years.
● April, May: Allowable flows depend on gaged flow measured at Vernalis. If Vernalis flow is below 5,000 cfs, OMR flows will not be more negative than −2,000 cfs. If Vernalis is 5,000 to 6,000 cfs, OMR flows will not be more negative than −1,000 cfs. If Vernalis exceeds 6,000 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 exceeds 15,000 cfs, OMR flows will be at least 3,000 cfs. If Vernalis exceeds 30,000 cfs, OMR flows will be at least 6,000 cfs.
● June: Similar to April, but 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, OMR flows will be at least 0 cfs. If Vernalis exceeds 10,000 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 constraints.
</td></tr>
<tr><td>Head of Old River gate operations</td><td>
● December, June 16 to September 30: Operable gate will be open.
● All other months: Operable gate will be partially or completely closed as needed to support OMR flow criterion and, via real-time operations, to minimize entrainment risk for outmigrant juvenile salmonids and/or manage San Joaquin River water quality.
</td></tr>
<tr><td>Spring outflow</td><td>
● March, April, May: As described in Section 3.4.1.4.4, initial operations will be determined through the use of a decision tree. If at the initiation of dual conveyance, the best available science resulting from structured hypothesis testing developed through a collaborative science program indicates that spring outflow is needed to achieve the longfin smelt abundance objective the following water operations would be implemented within the decision tree. The evaluated starting operations (ESO) would be to provide a March–May average outflow scaled to the 90% forecast for the water year, with scaling as summarized in the table below.

March–May Average Outflow Criteria for “High Outflow” Outcome of Spring Outflow Decision Tree
<table>
<tr><th>Exceedance</th><th>Outflow criterion (cfs)</th></tr>
<tr><td>10%</td><td>>44,500</td></tr>
<tr><td>20%</td><td>>44,500</td></tr>
<tr><td>30%</td><td>>35,000</td></tr>
<tr><td>40%</td><td>>32,000</td></tr>
<tr><td>50%</td><td>>23,000</td></tr>
<tr><td>60%</td><td>17,209</td></tr>
<tr><td>70%</td><td>13,274</td></tr>
<tr><td>80%</td><td>11,382</td></tr>
<tr><td>90%</td><td>9,178</td></tr>
</table>
● Alternatively, if best available science resulting from structured hypothesis testing developed through a collaborative science program shows that Delta foodweb has improved, and evidence from the collaborative science program shows that longfin smelt abundance is not strictly tied to spring outflow, the alternative operation under the decision tree for spring outflow would be to follow flow constraints established under the Bay-Delta Water Quality Control Plan.
● February, June: Flow constraints established under the Bay-Delta Water Quality Control Plan will be followed.
● All other months: No constraints.
</td></tr>
<tr><td>Fall outflow</td><td>
● September, October, November: As described in Section 3.4.1.4.4, initial operations will be determined through the use of a decision tree. Within that tree, the evaluated starting operations would be to implement the existing BiOp requirements and the alternative operation would be to revert to the Bay-Delta Water Quality Control Plan requirements. This operation would be allowed if the research and monitoring conducted through the collaborative science program show that the position of the low-salinity zone, as required in the BiOp, does not need to be located in Suisun Bay and the lower Delta to achieve the BDCP objectives for Delta smelt habitat and abundance.
● All other months: No constraints.
</td></tr>
<tr><td>Winter and summer outflow</td><td>
● Flow constraints established under the Bay-Delta Water Quality Control Plan will be followed.
</td></tr>
<tr><td>North Delta bypass flows</td><td>
● October, November: Flows will exceed 7,000 cfs.
● July, August, September: Flows will exceed 5,000 cfs.
● December through June: Variable, as shown in Table 3A-19.
</td></tr>
</table>

NOTE:
OMR = Old and Middle Rivers

Table 3A-19. Flow Criteria for North Delta Diversion Bypass Flows from December through June

Constant Low-Level Pumping (December–June)

Diversions up to 6% of river flow for flows greater than 5,000 cfs. No more than 300 cfs at any one intake.

Initial Pulse Protection

Low-level pumping maintained through the initial pulse period. For the purpose of monitoring, the initiation of the pulse is defined by the following criteria: (1) Wilkins Slough flow changing by more than 45% over a 5-day period and (2) flow greater than 12,000 cfs. Low-level pumping continues until (1) Wilkins Slough returns to prepulse flows (flow on first day of 5-day increase), (2) flows decrease for 5 consecutive days, or (3) flows are greater than 20,000 cfs for 10 consecutive days. After pulse period has ended, operations will return to the bypass flows identified below under Post-Pulse Operations. These parameters are for modeling purposes. Actual operations will be based on real-time monitoring of fish movement.

If the first flush begins before December 1, May bypass criteria must be initiated following first flush and the second pulse period will have the same protective operation.

Post-Pulse Operations

After initial flush(es), Level I operations apply. After 15 total days of bypass flows above 20,000 cfs, Level II operations apply. After 30 total days of bypass flows above 20,000 cfs, Level III operations apply.

Based on the objectives stated above, it is recommended to implement the following operating criteria:

- Bypass flows sufficient to prevent upstream tidal transport at two points of control: Sacramento River upstream of Sutter Slough and Sacramento River downstream of Georgiana Slough. These points are used to prevent upstream transport toward the proposed intakes and to prevent upstream transport into Georgiana Slough.

Level I			Level II			Level III		
December–April			December–April			December–April		
Sacramento River Flow		Bypass Flow	Sacramento River Flow		Bypass Flow	Sacramento River Flow		Bypass Flow
Is Over	Is Not Over		Is Over	Is Not Over		Is Over	Is Not Over	
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low-level pumping	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping
15,000 cfs	17,000 cfs	15,000 cfs plus 80% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 60% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 50% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,600 cfs plus 60% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,400 cfs plus 50% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	12,000 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	18,400 cfs plus 30% of the amount over 20,000 cfs	20,000 cfs	no limit	15,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,000 cfs plus 0% of the amount over 20,000 cfs
May			May			May		
Sacramento River Flow		Bypass Flow	Sacramento River Flow		Bypass Flow	Sacramento River Flow		Bypass Flow
Is Over	Is Not Over		Is Over	Is Not Over		Is Over	Is Not Over	
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low-level pumping	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping
15,000 cfs	17,000 cfs	15,000 cfs plus 70% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 50% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 40% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,400 cfs plus 50% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	13,000 cfs plus 35% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	11,400 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,900 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	14,750 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	12,400 cfs plus 0% of the amount over 20,000 cfs

Table 3A-19. Flow Criteria for North Delta Diversion Bypass Flows from December through June

June			June			June		
Sacramento River Flow		Bypass Flow	Sacramento River Flow		Bypass Flow	Sacramento River Flow		Bypass Flow
Is Over	Is Not Over		Is Over	Is Not Over		Is Over	Is Not Over	
0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs	0 cfs	5,000 cfs	100% of the amount over 0 cfs
5,000 cfs	15,000 cfs	Flows remaining after constant low-level pumping	5,000 cfs	11,000 cfs	Flows remaining after constant low level pumping	5,000 cfs	9,000 cfs	Flows remaining after constant low level pumping
15,000 cfs	17,000 cfs	15,000 cfs plus 60% of the amount over 15,000 cfs	11,000 cfs	15,000 cfs	11,000 cfs plus 40% of the amount over 11,000 cfs	9,000 cfs	15,000 cfs	9,000 cfs plus 30% of the amount over 9,000 cfs
17,000 cfs	20,000 cfs	16,200 cfs plus 40% of the amount over 17,000 cfs	15,000 cfs	20,000 cfs	12,600 cfs plus 20% of the amount over 15,000 cfs	15,000 cfs	20,000 cfs	10,800 cfs plus 20% of the amount over 15,000 cfs
20,000 cfs	no limit	17,400 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	13,600 cfs plus 20% of the amount over 20,000 cfs	20,000 cfs	no limit	11,800 cfs plus 0% of the amount over 20,000 cfs

Table 3A-20. Results of Initial Screening for Conveyance Alignment Alternatives

	Potential Alternative	Results of Initial Screening Process
1	**Initial Screening Conveyance Alternative AI–***Dual Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	This alternative evaluated in the Second Screening Process
2	**Initial Screening Conveyance Alternative A2–***Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	This alternative evaluated in the Second Screening Process
3	**Initial Screening Conveyance Alternative A3–***Dual Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Continued Use of Existing South Delta Intakes*	This alternative evaluated in the Second Screening Process
4	**Initial Screening Conveyance Alternative A4–***Dual Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the Lower San Joaquin River, and Continued Use of Existing South Delta Intakes*	Eliminate from further evaluation because the outcome probably would not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors
5	**Initial Screening Conveyance Alternative B1–***Isolated Conveyance with a Tunnel between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	This alternative evaluated in the Second Screening Process
6	**Initial Screening Conveyance Alternative B2–***Isolated Conveyance with a Lined or Unlined East Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	This alternative evaluated in the Second Screening Process
7	**Initial Screening Conveyance Alternative B3–***Isolated Conveyance with a Lined or Unlined West Canal between North Delta Intakes and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	This alternative evaluated in the Second Screening Process
8	**Initial Screening Conveyance Alternative B4–***Isolated Conveyance with a Lined or Unlined East Canal between the Sacramento River near the Confluence with the Feather River and the and Lower San Joaquin River, and Abandonment of Existing South Delta Intakes*	Eliminate from further evaluation because the outcome probably would not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors
9	**Initial Screening Conveyance Alternative B5–***Isolated Conveyance with Diversion from the Sacramento River near West Sacramento into the Sacramento Deep Water Ship Channel and a Tunnel between the Deep Water Ship Channel and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Eliminate from further evaluation because the construction, operation, and/or maintenance of the potential facilities probably would violate federal or state statutes or regulations
10	**Initial Screening Conveyance Alternative B6–***Isolated Conveyance with a Tunnel between the Sacramento River near Fremont Weir and the SWP and CVP Pumping Plants, Isolated Conveyance with a Tunnel between the Sacramento River near Decker Island to Clifton Court Forebay and Bethany Reservoir, and Continued Use of the South Delta Intakes*	Eliminate from further evaluation because the outcome probably would not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors
11	**Initial Screening Conveyance Alternative B7–***Isolated Conveyance with Diversion from the San Joaquin River near Antioch and Desalination Facilities, a Tunnel between the Desalination Facilities and the SWP and CVP Pumping Plants, and Abandonment of Existing South Delta Intakes*	Eliminate from further evaluation because the outcome probably would not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors.
12	**Initial Screening Conveyance Alternative C1–***Separate Corridors*	This alternative evaluated in the Second Screening Process
13	**Initial Screening Conveyance Alternative C2–***Through Delta Conveyance with Armored Corridors*	Eliminate from further evaluation because the outcome probably would not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors
14.	**Initial Screening Conveyance Alternative C3–***Through Delta Conveyance with West Delta Salinity Barrier*	Eliminate from further evaluation because the outcome could result in adverse effects to listed species by relocating the intakes of the SWP and CVP
15	**Initial Screening Conveyance Alternative C4–***Through Delta Conveyance with Fish Screens at Clifton Court Forebay*	Eliminate from further evaluation because the outcome probably would not reflect a reasonable balancing of relevant economic, environmental, social, and technological factors

1

Table 3A-21. Results of Second Screening Process for Conveyance Alignment and Operations Alternatives

	Potential Alternative	Results of Second Screening Process
1	**Second Screening Dual Conveyance Alternative 1A–** *Dual Conveyance with a Tunnel–January 2010 BDCP Operations–15,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 1A**
2	**Second Screening Dual Conveyance Alternative 1B–** *Dual Conveyance with a Lined or Unlined East Canal January 2010 BDCP Operations–15,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 1B**
3	**Second Screening Dual Conveyance Alternative 1C–** *Dual Conveyance with a Lined or Unlined West Canal January 2010 BDCP Operations–15,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 1C**
4	**Second Screening Dual Conveyance Alternative 2A–** *Dual Conveyance with a Tunnel–Scenario 6 Operations–15,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 2A and 2D**
5	**Second Screening Dual Conveyance Alternative 2B–** *Dual Conveyance with a Lined or Unlined East Canal Scenario 6 Operations–15,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 2B**
6	**Second Screening Dual Conveyance Alternative 2C–** *Dual Conveyance with a Lined or Unlined West Canal Scenario 6 Operations–15,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 2C**
7	**Second Screening Dual Conveyance Alternative 3A–** *Dual Conveyance with a Tunnel–January 2010 BDCP Operations–6,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 3**
8	**Second Screening Dual Conveyance Alternative 3B–** *Dual Conveyance with a Lined or Unlined East Canal January 2010 BDCP Operations–6,000 cfs*	This alternative was considered to be eligible for evaluation in the EIR/EIS following the Second Screening Process. However, as described in Section 3A.10,4, this alternative is similar to Dual Conveyance Alternatives 3A and 1B and not evaluated separately.
9	**Second Screening Dual Conveyance Alternative 3C–** *Dual Conveyance with a Lined or Unlined West Canal January 2010 BDCP Operations–6,000 cfs*	This alternative was considered to be eligible for evaluation in the EIR/EIS following the Second Screening Process. However, as described in Section 3A.10,4, this alternative is similar to Dual Conveyance Alternatives 3A and 1C and not evaluated separately.
10	**Second Screening Dual Conveyance Alternative 4A–** *Dual Conveyance with a Tunnel–Scenario 6 Operations–9,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 4 and 4A**
11	**Second Screening Dual Conveyance Alternative 4B–** *Dual Conveyance with a Lined or Unlined East Canal Scenario 6 Operations–9,000 cfs*	This alternative was considered to be eligible for evaluation in the EIR/EIS following the Second Screening Process. However, as described in Section 3A.10,4, this alternative is similar to Dual Conveyance Alternatives 4A and 1B and not evaluated separately
12	**Second Screening Dual Conveyance Alternative 4C–** *Dual Conveyance with a Lined or Unlined West Canal Scenario 6 Operations–9,000 cfs*	This alternative was considered to be eligible for evaluation in the EIR/EIS following the Second Screening Process. However, as described in Section 3A.10,4, this alternative is similar to Dual Conveyance Alternatives 4A and 1C and not evaluated separately.
13	**Second Screening Dual Conveyance Alternative 5A–** *Dual Conveyance with a Tunnel–January 2010 BDCP Operations and Fall X2–3,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 5 and 5A**
14	**Second Screening Dual Conveyance Alternative 6A–** *Dual Conveyance with a Tunnel–Enhanced Ecosystem Conveyance Operations Alternative–9,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 7**
15	**Second Screening Dual Conveyance Alternative 7A–** *Dual Conveyance with a Tunnel–Enhanced Spring Delta Outflow Alternative–9,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 8**

Table 3A-21. Results of Second Screening Process for Conveyance Alignment and Operations Alternatives

Potential Alternative	Results of Second Screening Process
16 Second Screening Dual Conveyance Alternative 8A– *Dual Conveyance with a Tunnel–Proportional North Delta Inflow Bypass Alternative–9,000 cfs*	This alternative was considered to be eligible for evaluation in the EIR/EIS following the Second Screening Process. However, as described in Section 3A.10,5, this alternative is similar to Dual Conveyance Alternatives 7A and not evaluated separately.
17 Second Screening Dual Conveyance Alternative 9A– *Dual Conveyance with a Tunnel–State Water Resources Control Board 2010 Flow Recommendations for Delta Ecosystem–9,000 cfs*	Eliminate from further evaluation because the construction, operation, and/or maintenance of the potential facilities probably would violate federal or state statutes or regulations
18 Second Screening Isolated Conveyance Alternative 1A–*Isolated Conveyance with a Tunnel–January 2010 BDCP Operations–15,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 6A**
19 Second Screening Isolated Conveyance Alternative 1B–*Isolated Conveyance with a Lined or Unlined East Canal–January 2010 BDCP Operations–15,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 6B**
20. Second Screening Isolated Conveyance Alternative 1C–*Isolated Conveyance with a Lined or Unlined West Canal–January 2010 BDCP Operations–15,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 6C**
21 Second Screening Through Delta Conveyance Alternative 1–*Separate Corridors Operations–15,000 cfs*	This alternative to be evaluated in the EIR/EIS as: **Alternative 9**

1