Chapter 3

Master Responses

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Introduction

Some comments on the SDIP Draft EIS/EIR were made frequently, demonstrating common concerns among those submitting written comments and those speaking at the public hearings. The array of similar comments about a particular topic revealed different aspects of the common issue. To allow presentation of a response that addresses all aspects of these related comments, Master Responses have been prepared for those topics that were raised in a number of comments from agencies, interested groups, and members of the public. Each Master Response allows a well-integrated response that addresses all facets of a particular issue, rather than piecemeal responses to individual comments, which may not have described the full complexity of the related concerns.

Master Responses

The following is a list of the Master Responses given below:

- **Master Response A**—Relationship between the South Delta Improvements Program and the Operations Criteria and Plan
- **Master Response B**—Relationship between the South Delta Improvements Program and the Pelagic Organism Decline
- **Master Response C**—Extension of the Comment Period on the South Delta Improvements Program Draft EIS/EIR
- **Master Response D**—Developing and Screening Alternatives Considered in the South Delta Improvements Program Draft EIS/EIR
- **Master Response E**—Reliance on Expanded Environmental Water Account Actions for Fish Entrainment Reduction
- **Master Response F**—Relationship between the South Delta Improvements Program and Climate Change Effects
- **Master Response G**—No-Barriers Conditions Compared with the No-Action Baseline

- **Master Response H**—Cumulative Impact Baseline Conditions
- **Master Response I**—Reliability of CALSIM and DSM2 Models for Evaluation of Effects of the South Delta Improvements Program
- **Master Response J**—Relationship between the South Delta Improvements Program and the CALFED Record of Decision and EIS/EIR Programmatic Documents
- **Master Response K**—Staged Decision-Making Process
- **Master Response L**—Relationship between the South Delta Improvements Program and the California Water Plan Update 2005
- **Master Response M**—Interim Operations
- **Master Response N**—Trinity River Operations
- **Master Response O**—Gate Operations Review Team
- **Master Response P**—Effects of the South Delta Improvements Program on State Water Project Article 21 Deliveries
- **Master Response Q**—Effects of the South Delta Improvements Program on San Joaquin River Flow and Salinity
- **Master Response R**— Effects of the South Delta Improvements Program Stage 1 Tidal Gates and Dredging on Flood Elevations in the South Delta Channels

Master Response A—Relationship between the South Delta Improvements Program and the Operations Criteria and Plan

Comment Summary

DWR and Reclamation received several comments and questions about the relationship of the SDIP and its environmental analysis to the federal Endangered Species Act (ESA) review of the biological assessment (BA) of the 2004 Operations Criteria and Plan (OCAP), which describes the current and future operation of the CVP and SWP (including 8,500 cfs maximum diversion), and the associated biological opinions (BOs) issued by the USFWS and NMFS. Many comments claimed that the SDIP analysis was flawed because it was based on an OCAP analysis that is the subject of ongoing litigation. The response includes a comparison of the OCAP and SDIP descriptions of the operations of the permanent operable barriers (gates) and possible effects on delta smelt.

Response

The USFWS and NMFS each published a BO (U.S. Fish and Wildlife Service 2004, 2005; National Marine Fisheries Service 2004) for the OCAP (Bureau of Reclamation 2004). On April 26 and on July 6 of 2006, Reclamation requested re-initiation of consultation on the NMFS BO and USFWS BO, respectively. Reclamation made the request of NMFS in order to address the recent listing of green sturgeon and the designated critical habitats of steelhead and salmon. The request was made of USFWS to consider changed circumstances and new information that has become known since 2004 with respect to a decline in pelagic organisms in the Delta. Reclamation made these requests with the understanding that the existing 2004 and 2005 BOs will remain in effect during the re-consultation. Reclamation expects this re-consultation to take approximately 18–24 months. DWR and Reclamation have committed to two stages of decision-making for SDIP, and the re-initiation of consultation will affect SDIP decision-making differently for Stage 1 and Stage 2.

ESA Compliance for SDIP Stage 1 (Physical Component)

DWR and Reclamation do not intend for the request to re-consult on the OCAP BOs to affect the ESA decision-making on Stage 1 of SDIP because Stage 1 actions are the same as what was described in the BOs, which are in effect until the OCAP reconsultation is complete. On June 5, 2006, DWR and Reclamation submitted requests for initiation of consultation for Stage 1 to USFWS, NMFS, and DFG based on the June 2006 SDIP Action Specific Implementation Plan (ASIP). The ASIP serves as the biological assessment describing Stage 1

actions, and provides a project level description of impacts and mitigation specific to SDIP Stage 1 actions. Stage 1 will include making a decision on the physical and structural components associated with the permanent operable gates and dredging under current regulatory requirements of SWP export operations (i.e., 6,680 cfs limit). DWR and Reclamation have requested take authorization for Stage 1 permanent gate construction and gate operations based on the ASIP and the current BOs. Since projects that are described in these BOs may be permitted, DWR and Reclamation may proceed with decision-making on the SDIP Stage 1 component upon completion of the SDIP ASIP consultation. However, once reconsultation for OCAP is complete, additional conservation measures may be required based on new information developed during the reconsultation process.

Although the OCAP (2004) BOs include an analysis of the effects of operation of the permanent gates, DWR and Reclamation also described those operational effects in the SDIP ASIP. The description of the gate operations in the OCAP (2004) is very similar to the description and simulation of gate operations for the SDIP Draft EIS/EIR and ASIP.

Description of Gate Operations in OCAP

The SDIP (permanent barriers and increased CCF diversion limit) was included in the early consultation items that were considered in the BO for the OCAP (2004). The USFWS letter (February 16, 2005 pg 2-3) for the USFWS BO for OCAP states:

> The early consultation will result in a preliminary biological opinion except that the incidental take statement provided for the early consultation does not constitute authority to take listed species. Once the South Delta Action Specific Implementation Plan (ASIP) is completed, the Service will re-examine the project description and effects in the ASIP and in this opinion. If the project description and effects to the delta smelt are the same as in the early consultation effects section of the biological opinion, the Service will formalize the early consultation portion of this biological opinion. If there are additional effects or project elements that are not addressed in the early consultation section of the biological opinion, Reclamation and DWR will reinitiate on this biological opinion to cover smelt effects described in the South Delta ASIP.

Page 111 and 112 of the USFWS BO describes the permanent gate operations (summarized here): The head of Old River is expected to be closed for the 31-day VAMP period to protect juvenile Chinook salmon, and the months of October and November to improve habitat conditions for migrating adult Chinook salmon. The head of Old River gate can be operated (closed) at other times to improve water quality, with the approval of DFG, USFWS, and NMFS. The fish agencies approval would be based on conditions that there would be no increased take of delta smelt beyond the authorized take, and no additional impacts on other threatened and endangered (T&E) species.

The Middle River, Old River at DMC, and Grant Line Canal gates would be operated as needed from April 15 to November 30 to improve stage and water quality conditions in south Delta channels. Approval to operate these gates in the remainder of the year would depend on the same conditions of no increased take

of delta smelt beyond the authorized take, and no additional impacts on other T&E species.

Page 219 and 220 describe the effects of permanent gate operations on delta smelt. The two paragraphs in the BO are repeated here for clarity.

> The closure of the barriers in the south Delta imposes a number of adverse effects on the delta smelt. The closure of the HORB in the spring could change the hydrology of the south and central Delta and may cause smelt to move towards the south Delta export facilities rather than out to Suisun Bay. The HORB closure could also degrade central Delta water quality by directing poorer quality San Joaquin River water to the central Delta. The closure of the agricultural barriers could prevent flow cues in the Delta upon which adult delta smelt may rely. These flows cues may be important from December through March, and the closure of the barriers during this time may interfere with the upstream and downstream migration of smelt. Additionally, the closure of the barriers could decrease water quality and increase water temperature behind the barriers. Smelt could also be subjected to higher entrainment in agricultural diversions behind the barriers as well as increased predation.
>
> However, since all the permanent South Delta barriers are operable, the Service or the delta smelt working group may recommend that any barrier be opened to help protect delta smelt from entrainment, high water temperatures, or other adverse conditions. These openings may help to allow juvenile delta smelt to move from the south and central delta to Suisun Bay. The proposed barrier operations should be an improvement over the temporary barriers since the permanent barriers can be operated more precisely to close the barriers the minimum amount required to maintain water levels. This will allow smelt to have the ability to pass the barriers for the few hours when the barriers are open. The Service may request that the barriers remain open for longer periods if smelt distributions are a concern.

Description of Gate Operations in SDIP Draft EIS/EIR

The description of the gates operation in the SDIP Draft EIS/EIR and the ASIP are similar to the description in the BO for OCAP (2004). More specific details of the proposed daily operations of the agricultural gates are provided in the SDIP Draft EIS/EIR Section 5.2 (Delta Tidal Hydraulics), Section 5.3 (Water Quality), and Section 6.1 (Fish). The gate operations are fully described in the ASIP in Chapter 2 (Project Description) Section 2.3.2 (Gate Operations). The tidal gates (including the existing Clifton Court Forebay gate) will be operated under adaptive management procedures, with the Gate Operations Review Team (GORT) advising DWR on day-to-day decisions to provide fish protection, water quality improvements, and local water level control.

To ensure consistency between CEQA/NEPA and ESA, DWR and Reclamation have committed to operating the gates as described in the BOs for the OCAP (2004). The primary difference is that under the OCAP operation, the head of Old River gate would not necessarily be operated on the VAMP shoulders (April 1 through 14 and May 16 through 31) although the OCAP (2004) provides flexibility to allow this operational modification.

The head of Old River (HOR) gate was simulated as closed for two months (April and May) in the SDIP EIS/EIR, to increase the protection of juvenile Chinook salmon. The SDIP simulation included a partial closure of the HOR gate in the summer, to reduce the diversion of San Joaquin River flow into Old River. This provided improvements in south Delta channel salinity, and increased the flow at Stockton to increase DO concentrations in the DWSC, compared to the description in OCAP. This potential closure of the HOR for water quality improvements was in the BOs for the OCAP, but required approval by the fish agencies. The OCAP (2004) described that the HOR gate would be closed in October and November to increase flow at Stockton. The SDIP simulation of the HOR gate provided a partial closure to allow some inflow (500 cfs) into the south Delta channels for water level control.

The proposed daily operations of the gates in Middle River and Old River at DMC would allow the gates to be open during all flood tide (i.e., rising tide, upstream flow) periods each day, 8–10 hours, and to be closed at each high tide to produce increased tidal circulation of water towards the Grant Line Canal gate. This will allow more movement of delta smelt and other fish than with the existing temporary barriers. The Grant Line Canal gates would be open during flood tide periods and partially closed to provide a weir with a crest elevation of about –0.5 feet msl. This will allow all water from the south Delta channels upstream of the gates to flow through Grant Line Canal during ebb tide periods. This will maintain an opening across the Grant Line Canal gate throughout the day for large migrating fish that can swim past the gate.

Although these simulated gate operations are slightly different than what was described and analyzed in the BOs for the OCAP (2004), there would be no new significant impacts or additional required mitigation measures. The effects on water quality, hydrology, fish, and other resources are generally the same for the gates operated as described in OCAP (2004) or in the SDIP EIS/EIR.

The SDIP Draft EIS/EIR provided a more specific description of the proposed GORT. This SDIP Final EIS/EIR includes Master Response O that describes the GORT membership and procedures. The GORT is consistent with the approval and recommendation of the fish agencies (DFG, USFWS, and NMFS) that was generally described in the BOs for the OCAP. The SDIP Draft EIS/EIR and ASIP descriptions of the operable gates are therefore consistent with the description of the operations of the permanent operable barriers contained in the BOs for the OCAP.

ESA Compliance for SDIP Stage 2 (Operations)

Stage 2 decision-making addresses SWP operational changes and would begin after a Stage 1 decision. Supplemental documentation would be prepared and available for public review prior to implementation of the decision made for Stage 2.

The 2004 and 2005 OCAP BOs addressed Stage 2 of the SDIP through an "early consultation" process. However, Reclamation has re-initiated consultation on the OCAP BOs, and the new BA and resultant BOs will not address the effects of SDIP Stage 2 operations.

During the SDIP Stage 2 decision-making process, DWR and Reclamation will initiate consultation with NMFS and USFWS for the proposed SDIP Stage 2 action. ESA compliance could be achieved through the ASIP process or normal consultation under Section 7 of the ESA.

Reliance on the OCAP BOs for the SDIP Cumulative Analysis

The evaluation of potential impacts from the SDIP does not rely on the OCAP BOs. As Chapter 3 of the SDIP Draft EIS/EIR explains, on page 3-8, "For the water resources (water supply, tidal hydraulics, and water quality) cumulative impacts were identified based on results of the OCAP Modeling, as this document modeled the cumulative effect of all of the past, present, and reasonably foreseeable future water projects, including the SDIP. The analysis of cumulative impacts on fish was also based on this analysis and the associated BOs. Chapter 10 contains a detailed description and analysis of the expected cumulative impacts of the proposed project."

However, the evaluation of cumulative SDIP impacts was fully described in Chapter 10. The SDIP cumulative effects were based on the CALSIM and DSM2 modeling done for the 2020 conditions. These are the assumed future cumulative conditions for both CEQA and NEPA. The OCAP modeling and the SDIP 2020 modeling with CALSIM and DSM2 include the same set of new projects and revised operations limits (i.e., 8,500 cfs SWP pumping limits, expanded EWA, Freeport diversions, American Water Forum demands). The description of potential cumulative fish impacts does describe the potential impacts and mitigation measures identified in the OCAP BOs. However, the SDIP cumulative impacts evaluation does not rely on the findings in the OCAP BOs, as suggested in some comments. Chapter 10 provides a complete quantitative and qualitative evaluation of the potential cumulative impacts from SDIP Stage 1 and Stage 2 actions.

Master Response B—Relationship between the South Delta Improvements Program and the Pelagic Organism Decline

Comment Summary

DWR and Reclamation received several comments regarding the relationship of the POD investigations to the implementation of the SDIP. Specifically, questions were raised regarding the effects of POD studies on the Stage 2 decision regarding increasing the SWP exports.

Response

The SDIP Stage 1 decision will not include any changes in operations at the SWP Banks or at the CVP Tracy Pumping Plants. Stage 2 of the SDIP addresses the potential increase in the export limit of the SWP. A decision on Stage 2 will be based on additional analysis and compliance with state and federal laws on environmental and endangered species protection. Until that time, no increase in exports above what is currently permitted will occur.

In the last few years, the abundance indices measured by the IEP Fall Midwater Trawl survey (MWT) demonstrated substantial declines in numerous pelagic fishes in the upper Bay-Delta Estuary. The abundance indices for 2002–2005 were measured at low levels for delta smelt and juvenile striped bass, longfin smelt, and threadfin shad (www.delta.dfg.ca.gov). Data from another IEP fish monitoring survey, the Summer Townet Survey (TNS), corroborate the MWT findings for delta smelt and striped bass. The abundance of American shad, a dominant pelagic fish species, has not shown the same decline in the MWT. While there is evidence of recent declines in some pelagic species from the middle and upper estuary, analyses of San Francisco Bay Study midwater trawl data suggest there has not been a general decline in catches of pelagic fishes in the lower estuary during the same period. Based on these findings, the problem may be limited to fish dependent on the middle or upper portion of the Bay-Delta Estuary.

The observations of recent Delta fish abundances are a concern to DWR and Reclamation, as well as the other agencies involved in the management of Delta resources. As such, DWR and Reclamation are contributing resources to the POD studies and efforts undertaken to determine the cause of the observed decline. Also, the Science Program of the CALFED Bay-Delta Program has targeted additional resources to assist in determining the cause of this decline, through modeling and analysis of historical data. DWR and Reclamation remain active participants in the normal IEP programs and surveys.

CALFED sponsored a review panel and workshop for the preliminary POD study results that was held in November 2005. The Review Panel issued a short report suggesting several changes in the POD field and laboratory studies as well as the ongoing monitoring efforts. A response document from the IEP POD work team was released along with the 2006–2007 study plan inn March 2006. These workshop documents and POD work plans are available from the CALFED Science website at:

<http://science.calwater.ca.gov/pod/pod_index.shtml>.

The 2006–2007 POD study plan will evaluate and refine the evidence for the POD conceptual models. Expansion of existing monitoring (5 expanded surveys), ongoing studies (19 studies) and new studies (15 studies) are planned for 2006–2007. The estimated cost of these studies is $3.7 million annually.

Two narrative hypotheses (the Winter Entrainment Hypothesis and the Bad Suisun Bay Hypothesis) suggest linkages among different stressors and pathways to produce observed declines of more than one species. The work plan emphasizes analyses of the proposed linkages among stressors.

The POD Work Team will develop, direct, review and synthesize the results of the study efforts. A wide range of products and deliverables will be developed including management briefs, publications and reports, web-based monitoring data, and presentations at conferences, workshops and meetings.

The operation of the permanent operable gates under Stage 1 will likely provide better conditions for fish than those under the existing temporary barriers program. The operable gates will also allow more flexibility to address conflicts that sometimes occur between protections desired for San Joaquin River salmon and Delta Smelt during the April–May period. Information gathered during POD investigations and throughout the adaptive management of the gates would be applied to operate the gates for improved fish protection. Therefore, the results and the information from the POD investigations are not necessary for the Stage 1 decision. The current analysis of existing data of the incremental effects of implementing Stage 1 is sufficient to assess its incremental impacts.

The SDIP decision process has been divided into Stage 1 and Stage 2 in response to these concerns about the current status of the pelagic organisms and the potential effect of CVP and SWP export pumping. DWR and Reclamation have committed to additional CEQA and NEPA compliance review for the Stage 2 decision that will include any new information that is obtained through the current IEP surveys and POD studies.

Master Response C—Extension of the Comment Period on the South Delta Improvements Program Draft EIS/EIR

Comment Summary

The comment period for the SDIP Draft EIS/EIR should be extended because of the complexity of the SDIP.

Response

CEQA and NEPA generally require a 45-day public and agency review period of a draft EIR or EIS, respectively. Section 15105 (a) of CEQA states,

> The public and agency review for a draft EIR should not be less than 30 days nor longer than 60 days except in unusual circumstances. When a draft EIR is submitted to the State Clearinghouse for review by state agencies, the public review period shall not be less than 45 days, unless a shorter period, not less than 30 days, is approved by the State Clearinghouse.

DWR and Reclamation recognized the size and complexity of the SDIP and designed the public and agency review and comment period of the SDIP Draft EIS/EIR accordingly. The period for review and comment was extended from the required 45-day period to a 90-day period. In addition to this extended review period, DWR and Reclamation held public meetings in Sacramento, Oakland, Stockton, Visalia, and Los Angeles to inform the public and agencies about the project and the document and to answer questions. Additionally, Reclamation held three public hearings—one each in Sacramento, Stockton, and Los Angeles. These workshops and hearings took place during the 90-day review period. Several thousand comments were received from the public and agencies during the 90-day review period, which indicates the effectiveness of the outreach and the sufficiency of the length of the review period. For these reasons, the comment period for the SDIP Draft EIS/EIR has not been extended.

Master Response D—Developing and Screening Alternatives Considered in the South Delta Improvements Program Draft EIS/EIR

Comment Summary

Several comments suggested that the methodology used for developing and screening alternatives that were brought forward for detailed evaluation in the EIS/EIR was flawed. Other comments suggested that the process did not consider all feasible alternatives and improperly limited the scope of the alternatives that were evaluated. In particular, an alternative with lower total CVP and SWP water demands was suggested.

Response

CEQA requires that an EIR describe a range of reasonable alternatives to the project that would feasibly attain most of the project objectives and would avoid or substantially lessen any significant effects of the proposed project (State CEQA Guidelines, Section 15126.6[f]). Therefore, before preparing an EIR, the lead agency typically identifies and considers a broad list of potentially feasible alternatives to the proposed project. After an initial review, the lead agency rejects those alternatives determined to be infeasible and conducts a detailed evaluation of the remaining potentially feasible alternatives in the EIR. At the end of the CEQA process, the lead agency makes findings on the significant impacts of the project that include the ultimate determination of the feasibility of the alternatives included in the EIR. To be "feasible," an alternative must be "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, legal, social, and technological factors" (State CEQA Guidelines, Section 15364).

Because CEQA does not specify the number of alternatives that must be considered in an EIR, adequacy of the range of alternatives is instead judged against a rule of reason that requires the EIR to set forth only those alternatives necessary to permit a reasoned choice (State CEQA Guidelines, Section 15126.6[f]). The range of alternatives to be analyzed in an EIR turns upon the specificity of the lead agency's objectives. As noted above, the alternatives to be analyzed in an EIR must feasibly attain most of the basic objectives of the proposed project (State CEQA Guidelines, Section 15126.6[f]). An EIR does not need to analyze alternatives that are "remote or speculative," i.e., unlikely as a practical matter to be capable of implementation within a reasonable time (State CEQA Guidelines Section 15126.6[f][3]).

Like CEQA, NEPA does not require that an agency consider every possible alternative in an EIS, only those that are reasonable and feasible (40 CFR 1502.14[a]). The range of alternatives that must be considered is properly

limited to those reasonably related to the purposes and objectives of the project. The reasonableness of the range of alternatives considered in an EIS depends on "the nature of the proposal and the facts in each case" (Council on Environmental Quality [CEQ], "Forty Most Asked Questions Concerning CEQ's NEPA Regulations," Question 1, 46 FR 18026, 18027 [1981]). Project alternatives derive from an EIS's "purpose and need" section, which briefly defines "the underlying purpose and need to which the agency is responding in proposing the alternatives including the proposed action." (40 CFR Section 1502.13.)

The range of alternatives is also governed by the project objectives that are defined by the federal agency. Once the federal agency has defined the project purpose, need, and objectives, NEPA and CEQ Regulations (40 CFR 1502.14[a] state that the federal agency must "rigorously explore and objectively evaluate all reasonable alternatives and for alternatives that were eliminated from detailed study, briefly discuss the reasons for their having been eliminated."

DWR and Reclamation conducted an extensive alternatives development and screening analysis for the SDIP. During the screening process, each action that potentially could feasibly attain most of the project objectives was evaluated on a three-phase basis before inclusion in the SDIP Draft EIS/EIR. The objectives used for screening actions that potentially could meet the project purpose and need were broader than the objectives that were refined and included in Chapter 1 of the SDIP Draft EIS/EIR. The SDIP objectives are based on directives from the CALFED Program. As described in Chapter 1 of the SDIP Draft EIS/EIR, the operational changes at SWP Banks, channel dredging, and operational gates that are part of the SDIP were considered necessary components of the through-Delta approach to conveyance in the CALFED ROD. This alternatives evaluation process is described in Appendix A in the SDIP Draft EIS/EIR.

During the alternatives screening process in 2002, DWR and Reclamation evaluated several physical actions having the potential to feasibly attain most of the project objectives and substantially lessen any significant effects. The actions that were evaluated at each phase are described in Appendix A and are shown in Table A-1. Based on the screening criteria applied at each phase, specific actions were screened out. Those actions remaining through the third-phase screening were carried forward and evaluated at an equal level of detail in the SDIP Draft EIS/EIR.

During preparation of the SDIP Draft EIS/EIR, DWR and Reclamation decided to implement the SDIP using a staged decision-making process. The initial screening of potential alternatives covered the whole of the project and evaluated the alternative to determine whether it would feasibly attain most of the objectives of the project. The decision to pursue a staged decision-making process does not change the overall project objectives. DWR and Reclamation later considered the possible alternatives and the ability of these alternatives to feasibly attain most of the project objectives for Stage 1. The analysis showed that a separate initial screening of a staged decision-making process would not have resulted in a different screening result than what was evaluated in the SDIP Draft EIS/EIR.

As described in Appendix A of the EIR/EIS, a reduction in CVP and SWP exports was evaluated as a possible alternative that might feasibly attain most of SDIP objectives. However, this potential alternative was not carried forward because even a moderate export reduction would not itself adequately meet the local objective for minimum tidal elevations and would worsen water quality. Although it would contribute to meeting the fish objective of reduced entrainment, it would not meet the export objective. Therefore, it failed to feasibly attain "most of the project objectives" and was eliminated from further evaluation.

South-of-Delta SWP contractors manage their water supplies based on water allocated from each of their sources, one of which is the SWP. Alternatives that included sources of water outside the Delta (e.g., groundwater, desalination, etc.) were not included in the alternatives screening analysis because they could not feasibly attain the purpose of and need for increasing project deliveries. Increasing the permitted SWP diversion capability at the CCF from the current 6,680 cfs to 8,500 cfs to allow an increase in pumping at SWP Banks would improve water export supplies during periods when there are fewer criteria for environmental needs controlling Delta flows and exports.

DWR worked with a broad coalition of stakeholders to develop alternative operational scenarios that could meet the export objective purpose and need. Participants in this process, referred to as the 8,500 Stakeholders Process, were representatives of resource agencies (including Reclamation), water agencies and districts, and environmental groups. Facilitated meetings were held through most of 2002, producing four proposals for operational scenarios (described in Appendix A as Operational Scenarios B through E). Operational Scenario F was proposed in June 2003. In July 2003, Reclamation and DWR developed Operational Scenario A, which combined Scenarios D and F. Operational Scenario E was subsequently dropped because it did not provide the CVP with a reliable capacity for exporting CVP supplies via CCF and SWP Banks.

The remaining three operational scenarios (relabeled A, B, and C) have been carried forward and are evaluated in the SDIP Draft EIS/EIR. Although each of these alternatives includes a permitted increase in exports, these three scenarios provide a range of ways to meet the increased exports objective, with Operational Scenario B being the most restrictive alternative that would allow increased exports only in periods with relatively low density of fish species of most interest. Scenario B would not allow exports of more than 6,680 cfs in the December–June period, unless fish agencies determined that fish densities were low enough to allow increased pumping. This would require active management decision-making throughout this period. Operational Scenario A would be the least restrictive, allowing 8,500 cfs whenever water was available and all other Delta objectives were satisfied. The evaluation of this range of alternatives for Stage 2 of the SDIP provides DWR and Reclamation with information about how incremental changes in the amount and timing of exports affect environmental resources.

Master Response E—Reliance on Expanded Environmental Water Account Actions for Fish Entrainment Reduction

Comment Summary

A number of comments on the EIS/EIR raise questions about the adequacy of the Stage 2 (operations) mitigation that would be provided by an expanded EWA or by measures to avoid increased pumping and credit EWA with a fraction of the additional exports allowed from November through March for later use by EWA to make export reductions during periods of high fish density. This master response describes the general procedures that would provide adequate mitigation for the potential increase in fish entrainment impacts.

Response

EWA Effects on Reduced Entrainment

The EWA program consists of two primary elements: implementing fish actions that protect species of concern and increasing water supply reliability by acquiring and managing assets to compensate for the effects of these actions. Actions that protect fish species include reduction of pumping at the SWP and CVP export pumping plants in the Delta. Project export pumping varies by season and hydrologic year and can adversely affect fish at times when fish are near the pumps or moving through the Delta. Pumping reductions can reduce water supply reliability for the SWP and CVP contractors, causing conflicts between fishery and water supply interests. A key feature of the EWA is use of water assets to replace supplies that are interrupted during pumping reductions. The EWA assets can also provide other benefits such as augmenting instream flows and Delta outflows.

The CALFED agencies established an EWA to provide water for the protection and recovery of fish beyond that which would be available through the existing baseline of regulatory protection. The EWA involves neither new sources of water nor new construction.

The current operations of the SWP and CVP pumping plants have a measurable effect on fish entrainment in the Delta. The fish salvage facilities and methods to account for current entrainment effects are fully documented in Appendix J, "Methods for Assessment of Fish Entrainment in SWP and CVP Exports."

Appendix B, "Simulation of Environmental Water Account Actions to Reduce Fish Entrainment Losses: Interactive Daily Environmental Water Account Gaming Evaluations," thoroughly discusses the current EWA and likely effects

on reduced fish entrainment. Results from "EWA Gaming" sessions to explore the possible effects of 8,500 cfs pumping are reported in Appendix B. The gaming group found that the overall size of the EWA actions (export reductions) necessary to provide equivalent fish protection (i.e., similar actions to same reduced pumping levels in selected weeks with high fish density) were only slightly greater (Table B-1 indicates an average increase of 11%) than the size of the selected EWA actions with 6,680 cfs pumping. This was because with the increased export allowance, some of the pumping required to fill San Luis Reservoir could occur earlier in the year, resulting in lower exports in late winter/early spring and, therefore, reducing the water cost of EWA actions (i.e., pumping cutbacks) in March and early April. The EWA water needed to provide the reduced pumping during VAMP was the same with either 6,680 cfs or 8,500 cfs because CVP and SWP pumping are each limited to 50% of the base flow of the San Joaquin River during the VAMP period. The EWA gaming of 8,500 cfs operations provided evidence that the EWA would need to be expanded by less than 15% to provide the level of protection currently achieved with the EWA resources for the existing 6,680 cfs operations.

The annual amounts of water used by EWA for SWP and CVP export reductions to protect fish in the first 6 years of EWA implementation were: 290 taf in 2001, 250 taf in 2002, 350 taf in 2003, 125 taf in 2004, 340 taf in 2005, and 150 taf in 2006. This is an average of about 235 taf per year.

Mitigation of SDIP Entrainment Impacts with Expanded EWA

The SDIP Stage 2 alternatives would allow shifts in the timing and an average annual increase of 3–5% in SWP and CVP export pumping. These additional exports were determined in Section 6.1, Fish, to have some potential for significant impacts on selected fish species that were evaluated. Impacts were identified to occur whenever fish densities were relatively high during periods of increased export pumping.

As described in Section 6.1 of the SDIP Draft EIS/EIR, the SDIP will mitigate to a less-than-significant level any potential increased entrainment through an expanded EWA or an avoidance and crediting system. Although more extensive entrainment protections may be desired, the existing EWA actions, together with the existing D-1641 objectives on exports (export/inflow [E/I] ratio) and Delta outflow requirements (X2) and extended DCC closure periods, are the appropriate baseline conditions for the SDIP impact assessment and cumulative impact analyses. The existing EWA (with an average of about 175 thousand acre-feet per year [taf/yr] of simulated purchases and an average of about 210 taf/yr of simulated export reductions—see Section 5.1) was included in the CALSIM monthly modeling of the upstream CVP and SWP reservoirs and Delta operations for the baseline and for each alternative. The actual EWA actions for 2001–2006 have been slightly larger than these simulated actions in CALSIM.

The Introduction and Summary of Significant Impacts at the beginning of Section 6.1, Fish, in the SDIP Draft EIS/EIR describes the overall avoidance and credit measures that will be used in the absence of an expanded EWA to mitigate periods of increased entrainment caused by increased exports under SDIP operational components. The preferred mitigation measure is an expanded EWA that would maintain the working relationships, information-sharing network, and decision-making procedures that have been established during the 5-year history of the EWA. An expanded EWA would increase the EWA budget to allow protective export-reduction actions to be greater than those described in the ROD and greater than those implemented in the 2001–2005 EWA. The proposed expanded EWA that has been modeled using CALSIM for the 2004 OCAP studies provided about 225–275 taf/yr of simulated export reductions. The expanded EWA has therefore been simulated with CALSIM as between 50 taf/yr (dry years) and 100 taf/yr (wet years) higher than the existing EWA. DWR and Reclamation are preparing an EIS/EIR for the proposed long-term (expanded) EWA program.

The working relationships, information-sharing networks, and decision-making procedures have been working as planned during the past 5 years of EWA operations. An expanded EWA will allow additional mitigation actions (e.g., pumping reductions during periods of high fish density) to be coordinated by these same interagency staff to offset any potential impacts of increased entrainment that may occur with the additional SDIP exports.

The current EWA can control only about 5% of the total SWP pumping. The CVPIA b(2) water management program provides additional opportunities for CVP pumping reductions. Nevertheless, the EWA managers have successfully implemented many “actions” to reduce pumping in response to increased fish salvage density during the 6-year history of EWA. Expanding these EWA operational procedures is consistent with the directive for cooperative and adaptive management programs, as described in the CALFED ROD.

Mitigation of SDIP Entrainment Impacts with Avoidance and Crediting Measures

In the event that the long-term EWA is not expanded to provide sufficient additional resources to mitigate potential entrainment impacts caused by the shifting and increased SDIP pumping, the avoidance and crediting measures that are encompassed in Mitigation Measures Fish-MM-1, Fish-MM-2, and Fish-MM-3 will be implemented to mitigate the impacts described in the SDIP Draft EIS/EIR.

With an EWA functioning at existing levels, the avoidance of increased pumping above current limits during periods of EWA actions (i.e., periods of export reductions specified by the EWA technical team) will avoid any increased entrainment during these protection periods. As long as the avoided increased pumping is matched with an equivalent reduction taken by the EWA, it will not be charged against the EWA. In addition, a crediting measure based upon the

amount of additional pumping beyond current limits during November through March will be applied to increase the resources of the EWA.

The percentage of additional pumping beyond the current limits that will be allowed as a credit for EWA protection actions has not yet been decided. It is expected to be between 10% and 30%. For example, a credit of 10% of the additional SDIP pumping (in non-protection periods) would allow the overall entrainment impacts to be reduced, as long as the fish density during the subsequent period of protection is at least 10 times the density during the periods of increased SDIP pumping. Increased pumping in December and January may occur while fish are relatively sparse, with an average density of two fish/taf (see Figure B-23 in Appendix B of the SDIP Draft EIS/EIR). If 100 taf of additional pumping occurred, a credit of 10 taf could be used by the EWA team in February or March when the density of the fish may be 20 fish/taf. The 200 fish entrained during the increased pumping period would be mitigated by the 200 fish that would not be entrained in the high fish density period by the reduction of 10 taf in baseline pumping.

Example of the Avoidance and Crediting Measures

Figure 3-1a, below, shows an example of SWP pumping between October and June of a hypothetical year, to illustrate the avoidance of additional pumping during EWA actions and the crediting period of November through March. The example baseline SWP pumping was 6,680 cfs throughout the November–June period, because the E/I export limit (shown as dashed line) was assumed to be greater than 6,680 cfs. There was some additional allowed baseline SWP pumping from December 15 to March 15 equal to 1/3 of the San Joaquin River flow. The example baseline pumping was reduced by six assumed EWA actions. Some EWA water may also have been required to reduce SWP pumping from 50% of the base San Joaquin River flow to the target SWP export during the VAMP period (of 750 cfs or 1,500 cfs).

Figure 3-1a shows that the future pumping with SDIP Stage 2 limits would have increased to the E/I limits, shown in this example year to be more than 6,680 cfs from October through June. Future pumping limits would have been 8,500 cfs for the last week of December, all of January, all of February, and the first half of March. The example future pumping would not change during VAMP. The example future pumping would have increased to 8,500 cfs by the end of June.

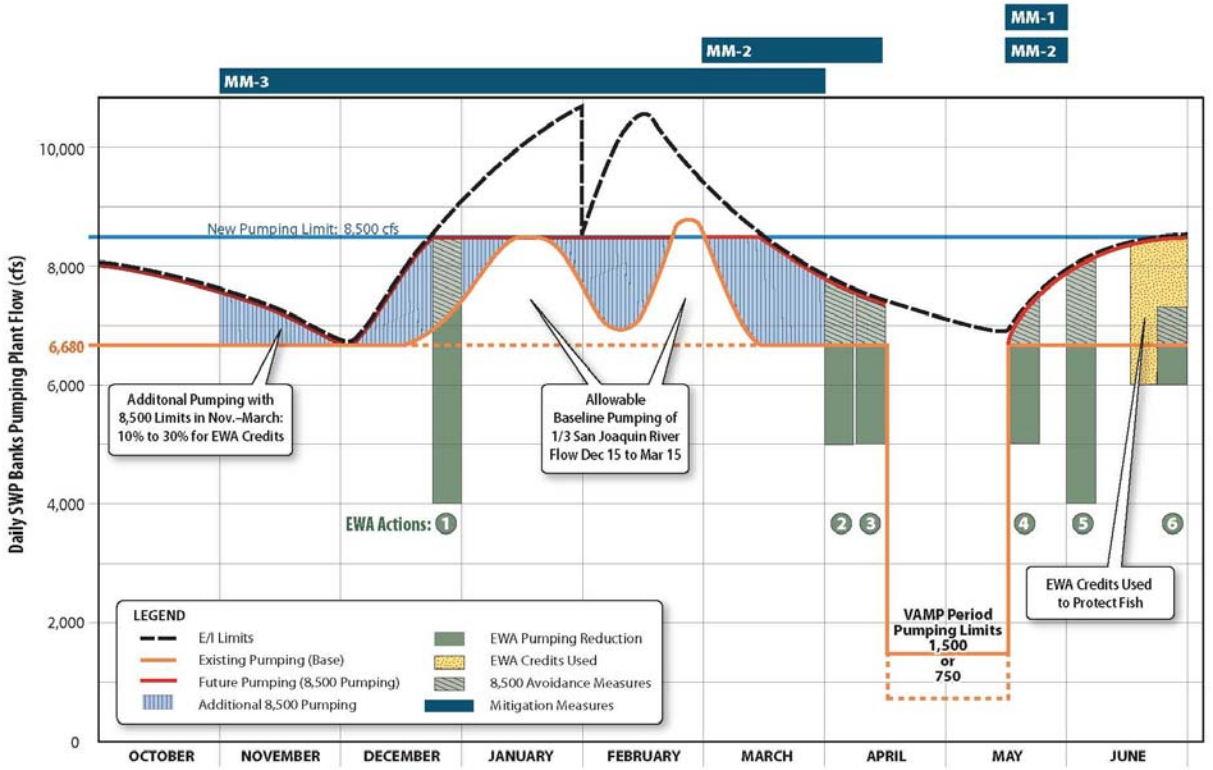
Figure 3-1a shows the SDIP Stage 2 avoidance measure. This measure would provide future pumping reductions from the increased pumping limit to the baseline pumping limit, whenever baseline EWA actions were taken. In the example year shown, for the first five EWA actions, the additional pumping allowed under the SDIP Stage 2 limits are reduced (avoided) to the baseline pumping. The avoidance measure maintains the future pumping at the reduced baseline EWA levels (4,000 cfs for EWA action 1; 5,000 cfs for EWA actions 2,3, and 4; and 4,000 cfs for EWA action 5). The EWA action 6 pumping reduction was only 680 cfs (to 6,000 cfs), so the avoidance measure would

provide only 680 cfs of pumping reduction from the future increased pumping limit of 8,500 cfs. The future pumping during EWA action 6 would have been 7,140 cfs (i.e., 8,500 cfs minus 680 cfs EWA minus 680 cfs avoidance).

Figure 3-1a also shows the SDIP Stage 2 crediting measure. The crediting measure would provide EWA with between 10% and 30% of the additional SWP pumping volume obtained from the SDIP Stage 2 limits during the November–March crediting period. In the example year shown, this EWA credit was applied at the end of June to reduce SWP pumping from 8,500 cfs to 6,000 cfs for about 2 weeks.

Figure 3-1b shows the example baseline pumping with EWA actions compared to the example SDIP Stage 2 pumping with the 8,500 cfs limits, EWA actions, avoidance measures provided during the periods of EWA actions, and the EWA credits applied in June of the example. In the example year shown in Figure 3-1a, pumping was increased from the baseline in several periods outside of baseline EWA actions, the reduced SWP baseline pumping during periods of EWA actions was maintained by the avoidance measure, and additional EWA actions were taken at the end of June using the crediting measure.

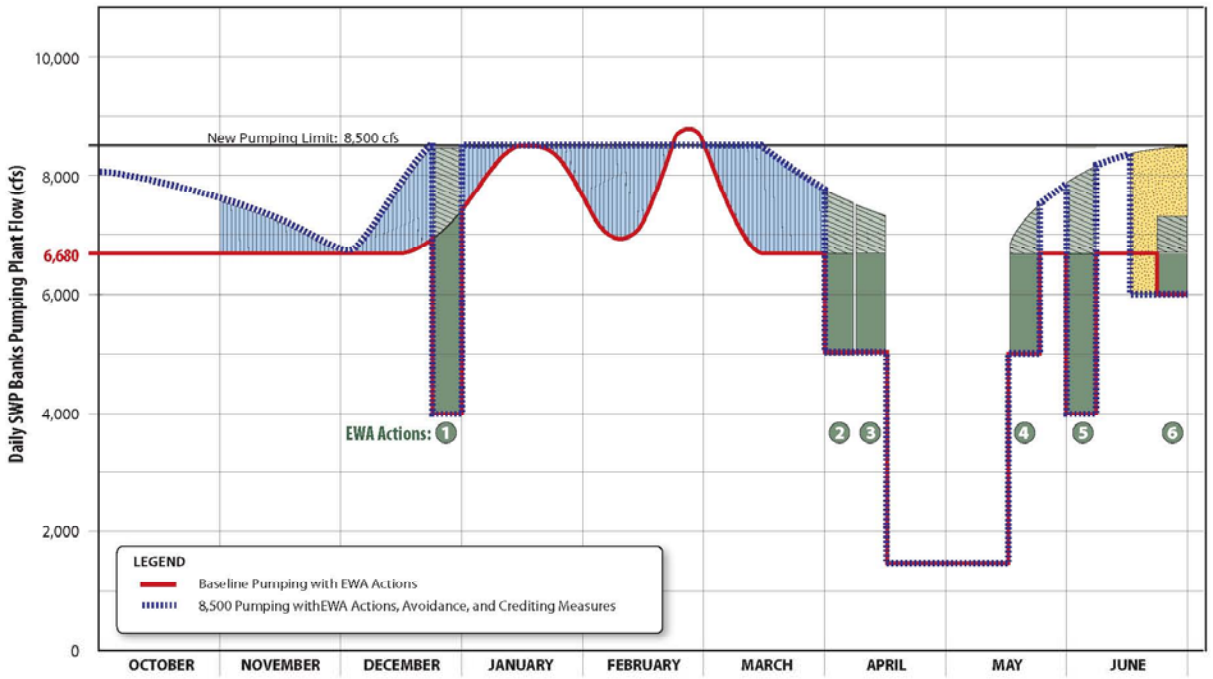
The SDIP Stage 2 effects on fish entrainment can be evaluated from the CVP and SWP fish facility salvage records. The additional pumping times the measured fish density will be the additional fish entrainment each day. The increased entrainment is therefore the fraction of the total pumping allowed by the increased diversion limits times the total daily fish salvage. The fish mitigation achieved by the expanded EWA or by the proposed avoidance and crediting measures can be calculated in the same way. Pumping reductions on days with high fish density will mitigate for additional pumping on days with lower fish density. The proposed mitigation measures are, therefore, verifiable.



06757.06 001 SDIP Final EIS/EIR (08/06)

Jones & Stokes

Figure 3-1a
Example of South Delta Improvements Program Stage 2
Avoidance and Crediting Mitigation Measures for Fish Entrainment Impacts



06757.06 001 SDIP Final EIS/EIR (09/06)

Jones & Stokes

Figure 3-1b
Example of South Delta Improvements Program Stage 2 Baseline Pumping with EWA Actions and 8,500 Pumping with EWA Actions, Avoidance, and Crediting Measures

Master Response F—Relationship between the South Delta Improvements Program and Climate Change Effects

Comment Summary

Several comments ask why Reclamation and DWR have not considered any of the likely effects of global warming and sea-level rise in the evaluation of the SDIP.

Response

Although there is much study about potential causes and potential effects of global warming, there is also significant disagreement on the magnitude of the effects. For example for the year 2100, projections for air temperature increases range from 1.4°C to 5.8°C and projections for sea level rise vary from 0.3 feet to 2.9 feet (Intergovernmental Panel on Climate Change 2001). Over California, projections for changes in precipitation not only vary in magnitude, but they also vary in direction with some projections indicating more precipitation and others predicting less precipitation (Dettinger 2005).

The uncertainties involved in assessing potential impacts of climate change encompass both physical processes and institutional responses to the projected changes. For example, scientists are still trying to understand the intricate relationships between atmospheric gases and plant responses, so there is considerable uncertainty about the effects of increased carbon dioxide on plant consumption of water. Additionally, governments may enact legislation to curb greenhouse gas emissions or to promote planting vegetation that could mitigate some of the effects of greenhouse gas emissions. Governments may also change the way the Delta is managed to address sea level rise. This wide range of uncertainty complicates any assessment of potential climate change impacts.

Per the Governor's directive (Executive Order S-3-05), the potential impacts of climate change on the State's resources, including water supply, are being evaluated. Using CALSIM II, preliminary estimates have been done of the potential impact upon the SWP, CVP and the Delta 50 years in the future. The Department recently released *Progress on Incorporating Climate Change into Management of California's Water Resources*. This report is a first look at some of the changes that might affect our water resources in the future. As these estimates become more refined, they will be helpful in guiding strategies for the management and development of the State's water resources, including improvements to the SWP and the Delta. This study is available on the Bay Delta Office website at:

<http://baydeltaoffice.water.ca.gov>.

Although first steps have been taken into assessing potential impacts of climate change on California's water resources, the methods and analytical tools used are still under development and are not yet appropriate for application to specific projects such as the South Delta Improvements Program. Methods for addressing uncertainties related to climate change projections are also being developed, but are not currently available for analysis.

In response to the uncertainty regarding rising sea levels, DWR has modified the design of the foundations for the proposed gates to accommodate gates up to 1 foot taller if necessary at a later time. As designed, the gates are of sufficient size to capture tidal energy to promote circulation under virtually all current conditions. Should the proposed project be built, gates of this size would be installed. The gates are lifted by air bladders, which have a useful life of about 25 years. A taller gate can be installed at that time, should it be determined necessary, without requiring modification of the size of the foundation. The increase of 1 foot is chosen because it is within the mid-range of the potential rise in sea level forecasted for the year 2100. Changing the design and constructing the foundations for this potential can be done for a small marginal cost and would prevent significant work later should a larger gate be needed.

Master Response G—No-Barriers Conditions Compared with the No-Action Baseline

Comment Summary

Several comments suggest that the existing conditions, which include the temporary barriers program, should be compared with conditions without any temporary barriers. Some want to know the effects of the temporary barriers on tidal flows and salinity; others suggest that the no-barriers condition should have been the baseline for SDIP. Several comments suggest that relatively large salinity impacts have occurred with the temporary barriers program. DWR and Reclamation have decided to show the DSM2 model comparison of the no-barriers conditions with the No-Action baseline (with temporary barriers) to demonstrate that there were not any large salinity effects masked by the selected baseline conditions.

Response

Although the south Delta temporary barriers program has been implemented since 1992, it is considered to be a temporary measure awaiting implementation of the SDIP. However, the baseline for CEQA is normally the condition at the time the NOP is filed with the State Clearinghouse. DWR and Reclamation believe that the Temporary Barriers Program is appropriately included in CEQA and NEPA baselines. The fall head of Old River barrier has been installed in the majority of years (28 of 39) since 1968. The head of Old River barrier has been installed in the spring of the majority (9 of 15) years since 1992. It is not installed in high-flow years. The agricultural water-level control barriers have also been installed in the majority of years since 1992. DWR is prepared to continue this program as partial compensation to SDWA for effects of CVP and SWP pumping. These barriers were a part of the Delta environmental conditions at the time that the CEQA evaluation began and are properly included in the 2001 and 2020 baselines.

Nevertheless, there is interest in evaluating the likely effects that the temporary barriers program has had on south Delta tidal flows, water levels, water quality, fish habitat, and fish entrainment. The SDIP is planned as a better implementation of fish protection and water level and water quality objectives. It is likely that SDIP Stage 1 implementation of operable tidal gates and boat locks, with gate operations directed by the interagency GORT, will provide greater benefits and smaller impacts than the temporary barriers program.

Section 5.2, Delta Tidal Hydraulics, compares the tidal water level fluctuations and tidal flushing flows for the no-barriers conditions, the temporary barriers, and the proposed SDIP gate operations for a monthly simulation with full CVP and SWP pumping. These simulations demonstrate the superior tidal flushing

flows and higher minimum water levels that will be achieved with the tidal gate operations. The temporary barriers hold the minimum water level slightly higher during the summer than the tidal gate operations, but greatly restrict the tidal flushing flows.

The temporary barriers program has resulted in higher San Joaquin River flows past Stockton because the head of Old River barrier directly reduces diversions into Old River. During the summer period, the agricultural barriers increase the tidal water level and reduce the natural flow split (diversion) at the head of Old River. This has likely increased dissolved oxygen (DO) conditions in the DWSC but has allowed more of the San Joaquin River salinity to become mixed with Sacramento River water and diverted at the CCWD intakes, central Delta agricultural diversions, and the SWP Banks Pumping Plant. Correspondingly, less San Joaquin River water has been exported at the CVP Tracy Pumping Plant.

These likely effects of the temporary barriers program have been compared to the 2001 and 2020 baseline conditions, with simulations of tidal hydraulics and salinity (EC) using DSM2. These results at selected locations are summarized and compared to the other SDIP alternatives in the following discussion. This will allow the effects of the SDIP alternatives to be compared to the no-barriers conditions, as well as the NEPA and CEQA baselines. These new comparisons do not change the SDIP impact assessment, but they provide an indication of how the SDIP operable gate benefits compare with the temporary barriers benefits.

Comparison between Simulated Flows and EC for Temporary Barriers and No-Barriers Conditions

Simulated Flows

The no-barriers conditions are representative of south Delta flow and EC in the absence of the temporary barriers. Diversions at the head of Old River would be increased compared to natural conditions because of effects from the CVP and SWP export pumping on lowered water levels in Old River. While natural conditions (without CVP and SWP export pumping) would give a flow split of about 50% into the head of Old River and 50% flowing to Stockton, the effects of CVP and SWP pumping reduce the fraction flowing past Stockton.

The temporary barriers represent the existing conditions, in which these temporary rock barriers are installed and removed each year (flow permitting). The general effects of the temporary barriers are to block diversion into Old River when the head of Old River barrier is installed, or to increase the water levels at the head of Old River and thereby reduce San Joaquin River flow diversions into Old River. The temporary barrier at the head of Old River is installed for only half of April and half of May, so the April and May monthly Stockton flow fractions never increased to more than 75.

The simulated San Joaquin River flows at Stockton are shown in Figure 3-2, below, for no-barriers and temporary barriers conditions. The temporary barriers increase the Stockton flow in most months. The temporary barriers are not

installed in winter months (December–March). In some high flow months, the temporary barriers would not be installed at the head of Old River or in the south Delta channels.

Mossdale is located on the San Joaquin River slightly upstream of the head of Old River and about 15 miles upstream of Stockton. Figure 3-2 also shows the effects of the temporary barriers on the Stockton/Mossdale flow ratio, as a function of the export/Mossdale ratio. The DSM2 results suggest that the fraction flowing past Stockton would be reduced as the ratio of CVP and SWP export pumping to the San Joaquin River flow at Mossdale increases. With no barriers in place, the Stockton/Mossdale flow fraction would be reduced to zero when the export/Mossdale ratio approached 10 (exports approach ten times the Mossdale flow). The temporary barriers generally increased the Stockton/Mossdale flow fraction by about 0.2 (20%) in months when the barriers were simulated to be installed.

These same flow relationships are shown in Figure 5.3-21 for the comparison of the temporary barriers (2001 baseline) to the proposed SDIP Stage 1 permanent operable gates (Alternative 2A, Stage 1). Additional increases in the Stockton flow result from the simulated tidal gate operations.

Simulated EC

The assumed San Joaquin River EC values are generally higher than the EC at the CCWD Rock Slough and Old River intakes, or at the SWP Banks and CVP Tracy Pumping Plant. Therefore, the EC values at these water supply diversions generally will be increased slightly when the fraction of San Joaquin River water at these intakes is increased. If the fraction of San Joaquin River water were reduced, the EC values at these intakes would be reduced. Because the temporary barriers generally reduce the diversions into Old River, the fraction of San Joaquin River water at the CVP Tracy Pumping Plant would be reduced, and the EC values would be reduced. Table 3-1, below, shows that for the simulated 2001 conditions, the reduction in EC at CVP Tracy would be 8 µS/cm from an average of 538 µS/cm to 530 µS/cm. The EC at SWP Banks would increase by 7 µS/cm from 440 µS/cm to 447 µS/cm. The average EC at the CCWD Los Vaqueros (Old River) intake would increase by about 3 µS/cm, from 465 µS/cm to 468 µS/cm. The average EC at Rock Slough would be slightly reduced by 2 µS/cm, from 534 µS/cm to 532 µS/cm.

Figure 3-3, below, shows the changes in EC simulated at the CCWD Old River intake. The simulated changes in average EC at the CCWD intakes are very small. The monthly changes are also small; some months have slight increases, and other months have small decreases. The comparison of the no-barriers and the temporary barriers conditions indicates that although the barriers will increase the Stockton flow, the 2001 and 2020 baseline conditions, which include temporary barriers, are not very different from no-barriers conditions. These changes can be compared with the effects of the permanent operable tidal gates during Stage 1 of the SDIP, shown in Figure 5.3-15. The simulated increase in average EC at Old River at SR 4 was 3 µS/cm and was considered to be less than significant for the temporary barriers baseline. The simulated increase in average

EC would be about 5 µS/cm from the no-barriers conditions, from 465 µS/cm to 470 µS/cm. This small change of about 1% would still be considered less than significant.

The SDIP Draft EIS/EIR selected the proper baseline conditions to include the temporary barriers program. Nevertheless, the effects of the temporary barriers program on tidal flows and salinity in south Delta channels have been evaluated to demonstrate that there were no large salinity effects caused by the temporary barriers program that were not evaluated.

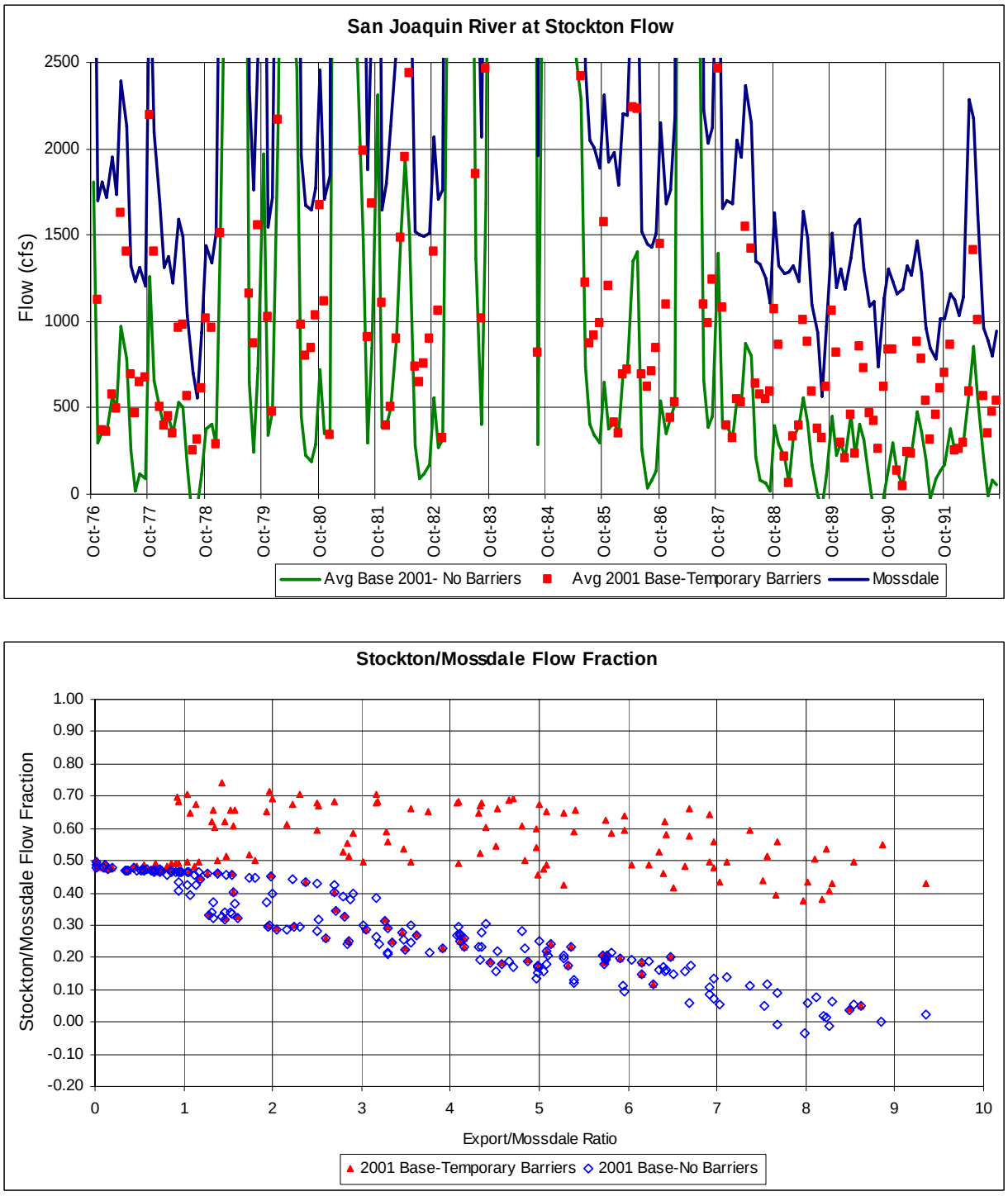


Figure 3-2. DSM2-Simulated Monthly San Joaquin River Flow at Stockton for 1976–1991 and the Stockton/Mossdale Flow Fraction as a Function of the Export/Mossdale Ratio for Temporary Barriers and No-Barriers Conditions (2001 Conditions)

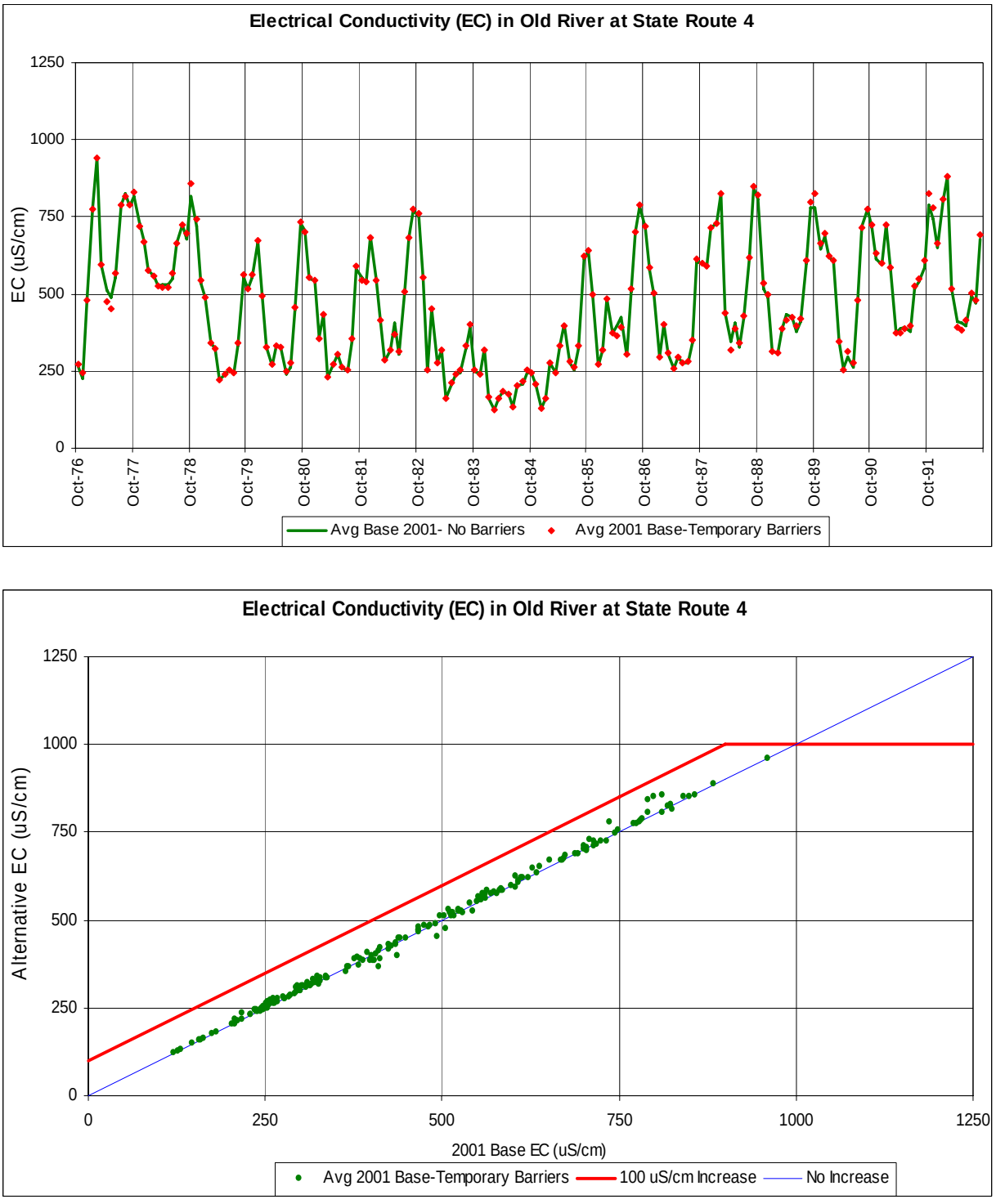


Figure 3-3. DSM2-Simulated EC (µS/cm) in Old River near SR 4 Bridge (CCWD Los Vaqueros Intake) for 1976–1991 with Temporary Barriers Compared with No-Barriers Conditions

Table 3-1. DSM2-Simulated Average EC (µS/cm) at Selected Locations with No-Barriers and Temporary Barriers (SDIP Baseline) for 2001 and 2020 Conditions for the 1976–1991 Period

	No-Barriers	Temporary Barriers	Operable Tidal Gates	No-Barriers to Temporary Barriers Change	Temporary Barriers to Tidal Gate Change
A. 2001 Conditions					
Emmaton	1,074	1,074	1,075	0	1
Jersey Point	1,079	1,079	1,081	0	2
Rock Slough	534	532	531	–2	–1
Old River at State Route 4	465	468	470	3	2
SWP Banks Pumping Plant	440	447	450	7	3
CVP Tracy Pumping Plant	538	530	473	–8	–57
Old River at Tracy Boulevard	604	595	491	–9	–104
Middle River at Mowry Bridge	597	601	445	4	–166
Grant Line Canal at Tracy Boulevard	597	595	560	–2	–35
B. 2020 Conditions					
Emmaton	1,073	1,072	1,073	–1	1
Jersey Point	1,081	1,081	1,083	0	2
Rock Slough	541	539	538	–2	–1
Old River at State Route 4	466	469	471	3	2
SWP Banks Pumping Plant	441	446	452	5	6
CVP Tracy Pumping Plant	540	526	474	–14	–52
Old River at Tracy Boulevard	607	595	493	–13	–102
Middle River at Mowry Bridge	600	603	530	3	–72
Grant Line Canal at Tracy Boulevard	600	601	561	1	–40

Master Response H—Cumulative Impact Baseline Conditions

Comment Summary

Comments suggested that the cumulative impact assessment in the SDIP Draft EIS/EIR should have considered the environmental impacts resulting from past CVP and SWP operations.

Response

The cumulative impact assessment did consider the past operation of the CVP, SWP, and other projects. However, a specific account of the past operational activities and resulting environmental effects was not evaluated separately from the baseline conditions in the SDIP Draft EIS/EIR. The baseline conditions presented in the SDIP Draft EIS/EIR include the results of those past actions.

Recent guidance provided by the CEQ (2005) regarding assessing cumulative impacts indicates that the cumulative impact analysis should focus on identifiable present effects of past actions, not the past actions themselves and an adequate cumulative impact analysis may be conducted by focusing on the current aggregate effects of those past actions. The current aggregate of effects for the SDIP is represented by the baseline conditions described for each resource area evaluated in the SDIP Draft EIS/EIR. The focus of the cumulative assessment was a comparison of the current conditions, including actions caused by past projects, with expected future conditions. Future conditions used in the cumulative impact assessment included changes in future operations of the CVP, SWP, and other water supply projects.

As an example of how past actions are included in the cumulative impact analysis, the CALSIM hydrologic model incorporates historical hydrologic conditions over the 73-year period of record that encompasses development of water projects and associated changes in operations. This information was used to establish the baseline hydrologic conditions that were then compared to future changes resulting from reasonably foreseeable projects. This information was then used to help assess the cumulative impacts on water-related resources, including water quality and fish.

Master Response I—Reliability of CALSIM and DSM2 Models for Evaluation of Effects of the South Delta Improvements Program

Comment Summary

Several comments question the reliability of the CALSIM and DSM2 models that were used for impact assessment of SDIP effects on Delta tidal hydraulic conditions, Delta water quality, and fish habitat conditions in the Delta and below CVP and SWP reservoirs.

Response

Both CALSIM and DSM2 modeling results are used as the foundation for impact assessment of the SDIP alternatives. CALSIM remains the best available simulation model for projects involving CVP and SWP operations. The DSM2 model is the accepted standard for planning studies in the Delta. The validity and reliability of the CALSIM model for CVP and SWP operations and the DSM2 model for Delta tidal hydraulic conditions are discussed below.

CALSIM II Modeling of CVP and SWP Reservoir and Delta Operations

Section 5.1 introduces the development and application of the CALSIM monthly model and provides a discussion of the reliability of the model for tracking likely changes in the system-wide operations of the CVP and SWP reservoirs and the Delta. Operations of reservoirs that are managed by water districts are included in the system-wide hydrology conditions but assumed to be independent of CVP and SWP. The major objective for the CALSIM model is to accurately portray the effects of hydrological variations on reservoir operations and water supply conditions (diversions and Delta exports).

The great advantage of CALSIM is that it has been jointly developed by Reclamation and DWR and has been used extensively for CALFED planning studies and most other large water resources development evaluations since 1995. Prior to that time, there were separate CVP and SWP models. Several reviews and evaluations of the CALSIM model have been conducted by the CALFED Science Program and others in recent years. Several model assumptions and calculations that could be improved to more closely reflect actual recent operations have been identified. Many improvements and changes to better incorporate actual reservoir and diversion operations have been implemented. The CALSIM model will continue to be modified and improved as the model is used for future planning and evaluation studies. Results from the

CALFED Science Program review of CALSIM, with several related reports, are available at the website:

<http://science.calwater.ca.gov/library.shtml>.

DWR prepared a technical report (California Department of Water Resources 2003) describing the ability of the CALSIM model to match historical operations for water years 1975 to 1998. This 24-year period includes the 1976–1977 and 1987–1992 droughts, as well as the driest (1977) and the wettest (1983) years on record. The version of CALSIM used for this study was the 2002 benchmark study, which was also used for the SDIP simulations, with some inputs changed to reflect the historically changing conditions rather than a fixed level of development (i.e., 2001 or 2020). The ability to track historical reservoir and Delta operations was generally good.

Because CVP and SWP exports are the variables most likely to change with SDIP alternatives, the ability to match historical pumping is an important validation. For the average 24-year average exports, the model simulated 1% higher SWP exports (1,810 taf/yr) and 6% higher CVP exports (2,650 taf/yr). For the dry period (1987–1992) the model simulated 5% lower SWP exports (1.930 taf/yr) and 4% lower CVP exports (2,230 taf/yr). The full report describes the model's ability to track year-to-year variations in reservoir operations and Delta operations caused primarily by the fluctuations in hydrology. A general sensitivity study of CALSIM has also been released (California Department of Water Resources 2005).

In response to the December 2003 recommendations made by the CALFED Science Program review panel on improvements to the existing CALSIM II model, DWR and Reclamation jointly developed a program to enhance the capabilities of the model and improve the applicability of the model in use for water resources planning in California. The highest priority in this phase of model development is given to overhauling the representation of the Sacramento Valley hydrology. Reclamation has sponsored extensive modifications of the San Joaquin River hydrology representations, which have been subjected to peer review. This project is referred to as the CALSIM III Hydrology Development Project. Additional information is available at the website:

<http://baydeltaoffice.water.ca.gov/modeling/hydrology/CalSimIII/index.cfm>.

Nevertheless, the review and evaluation of the CALSIM model does not invalidate the modeling approach for water-related impact assessment. CALSIM remains the best available simulation model for projects involving CVP and SWP operations. The CALSIM version used for the 2002 Benchmark studies and the SDIP is adequate for accurately tracking the likely changes in seasonal (monthly) CVP and SWP reservoir and Delta operations that would occur with the SDIP operational alternatives.

Linking fish effects with changes in water operations is a more difficult and uncertain task. A workshop (CALFED Science Program 2002) and symposium (CALFED Science Program 2003) were held during preparation of the OCAP

biological assessments and biological opinions, to describe and evaluate methods for relating water project operations to fish habitat, survival, and production (populations). This is a more uncertain linkage for impact assessments than the CALSIM representation of monthly project operations. The methods for relating fish effects to project operations used in the SDIP Draft EIS/EIR are consistent with these scientific discussions and represent the best available modeling and assessment tools, which attempt to use all information about the resulting reservoir (i.e., release temperature) and river habitat conditions (i.e., river depth, temperature) with fish life-stage requirements.

DSM2 Delta Tidal Hydraulic and Water Quality Modeling

The development, calibration, and documentation of the DSM2 model are fully described in Appendix D. This Delta tidal hydraulics, water quality, and particle tracking model, which is maintained and released by DWR as a public-domain model, is usable by all stakeholders. It has been extensively used in the CALFED and other recent evaluations of Delta tidal hydraulic and salinity conditions.

Additional historical calibration results for tidal water level fluctuations and tidal flow variations for calendar years 2002, 2003, and 2004 (including the Jones Tract flooding event) are available from the Delta modeling section of DWR's Bay-Delta office:

<http://baydeltaoffice.water.ca.gov/modeling/deltamodeling/dsm2studies.cfm>.

Other tidal hydrodynamic models are being used for current CALFED studies (i.e., Flooded Islands and DRMS), but the DSM2 model is the accepted standard for planning studies in the Delta and is completely adequate for evaluation of the effects of SDIP tidal gates and modified pumping alternatives, because the full range of river inflows and the full range of tidal variations that may influence these gate operations are simulated within the 1976–1991 evaluation period.

Master Response J—Relationship between the South Delta Improvements Program and the CALFED Record of Decision and EIS/EIR Programmatic Documents

Comment Summary

DWR and Reclamation received several comments requesting that the EIS/EIR describe the relationship between the SDIP and the CALFED ROD, the CALFED Bay-Delta Program, and other programs and projects related to CALFED.

Response

As discussed in the SDIP Draft EIS/EIR, the CALFED Programmatic EIS/EIR and ROD describe the general effects of implementing the CALFED alternatives. The CALFED preferred alternative included the SDIP, but the direct, indirect, and cumulative impact analysis of the Programmatic EIS/EIR is not sufficiently detailed for purposes of making a decision on SDIP. The SDIP Draft EIS/EIR discloses the project-level impacts of constructing and operating the elements of the SDIP. The SDIP Draft EIS/EIR is considered a stand-alone document and the Programmatic EIS/EIR was used only to develop background information and provide mitigation guidance. The SDIP Draft EIS/EIR includes an independently developed analysis of the impacts of the SDIP, including direct, indirect, and cumulative impacts, alternatives, and avoidance/mitigation measures.

The SDIP meets the policy commitments described in the CALFED ROD that each project implementing the CALFED Program would be subject to the appropriate type of environmental analysis and will evaluate and use the appropriate programmatic mitigation strategies described in the Programmatic EIS/EIR and the CALFED ROD. (*Id*., pp. 29–30, 32–35, and Appendix A.)

Master Response K—Staged Decision-Making Process

Comment Summary

Several comments raised questions about the timing of implementation of the two stages of SDIP.

Response

Although the SDIP will be implemented in two distinct stages (Stage 1 and Stage 2), the SDIP balances the needs of the environment with the needs of the water users that rely on the Delta. Each action alternative evaluated in the SDIP Draft EIS/EIR includes a physical/structural component designed to improve conditions in the Delta for agricultural diverters and fish, and an operational component to improve delivery reliability for south-of-Delta beneficial uses. Staging the decisions for the implementation of the SDIP will allow improvements in the south Delta to proceed while additional relevant biological data are collected, analyzed, and subsequently incorporated into a decision on whether to move forward on Stage 2 and if so, in what manner.

Because Stage 1 would be implemented before Stage 2, the effects of Stage 1 are evaluated independently for each resource. Stage 1 analysis includes an evaluation of the proposed physical/structural component actions. The effects of operating SWP Banks Pumping Plant at its current regulatory export limit of 6,680 cfs (together with other Delta objectives in D-1641) are not specifically evaluated because the current permitted Delta operations of the CVP and SWP are considered a part of the baseline condition. The incremental effects of the current permitted Delta export operations of the CVP and SWP with the operable gates, assuming no changes in the operations of SWP and CVP, are evaluated in the SDIP Draft EIS/EIR to determine any incremental impacts of the gate operations on existing export operations. The analysis in the SDIP Draft EIS/EIR shows that there would be no such incremental effects on export operations attributable to the operation of the proposed permanent operable gates.

DWR and Reclamation have committed to further CEQA and NEPA compliance review, based on available new information, before making a decision on Stage 2 (changes in export pumping). Therefore, DWR and Reclamation will again look at all the actions that could potentially meet the project objectives. It is likely that additional Operational Scenarios will be developed through public outreach and the evaluation of the new information. More specific information on an expanded EWA will be available through the long-term EWA EIS/EIR. More specific information on likely future water transfers, including operational constraints and requirements for specific environmental compliance for transfers will also likely be available. See also Master Response A for information

regarding the reinitiation of consultation with USFWS and NMFS with respect to potential impacts on endangered species and Stage 2.

Master Response L—Relationship between the South Delta Improvements Program and the California Water Plan Update 2005

Comment Summary

Several comments ask for more specific information about the relationship between SDIP increased export capacity and the California Water Plan Update 2005, which outlines scenarios with substantial water conservation and efficiency that can reduce overall statewide water demands.

Response

The California Water Plan Update 2005 was released on February 14, 2006. The Water Plan analyzes three water demand scenarios; a current trends scenario, a low resource intensive scenario, and a high resource intensive scenario. The current trends scenario looks at the 2030 water demand by projecting the recent trends in population growth and development patterns, agricultural and industrial production, environmental water dedication, and voluntary conservation. The second scenario, referred to as less resource intensive, uses projected population growth, higher agricultural and industrial production, more environmental water dedication, and more intentional water conservation than the current trends scenario. The less resource intensive scenario increases water conservation but does not implement all cost-effective conservation measures. The third scenario is more resource intensive. It includes a higher population growth rate, higher agricultural and industrial production, no additional environmental water dedication (year 2000 level), and lower conservation than the current trends scenario. Each water demand scenario was analyzed in 10 regions that encompass the entire State of California, and changes in water demand vary significantly by region.

The SDIP objective to increase water deliveries and delivery reliability to SWP and CVP water contractors south of the Delta and provide opportunities to convey water for fish and wildlife purposes by increasing the maximum permitted level of diversion through the existing intake gates at CCF to 8,500 cfs is consistent with Bulletin 160-98 as well as the 2005 California Water Plan Update. Increasing the flexibility of the export facilities in the south Delta allows DWR and Reclamation to more effectively manage resources north of, south of, and within the Delta. If demand south of the Delta decreased, as described in the current trends and less resource intensive scenario in the 2005 Water Plan Update, it is not certain that it would be reflected in less demand for water exported from the Delta. The estimated demands in these scenarios do not account for 1–2 maf per year of groundwater overdraft in the state. The use of one source of supply over another is dependent upon the integrated resources plan of each specific water district. If this decrease were reflected in less demand

for water exported from the Delta, the increased flexibility of Stage 2 of the SDIP could allow better protection for fish and greater deliveries for refuges and other habitats, as well as provide a more reliable source of water for south-of-Delta users.

One of the major factors affecting water supply reliability in California is the uncertain annual rainfall and amount of snowpack. Increased export capacity provides water contractors access to water when it is available during wet years so contractors can store it for future use. The storage of water from wetter water years may include ground water recharge as well as decreased ground water extraction. Increased export capacity can also improve reliability by allowing greater diversions at times when fish issues are not limiting. This flexibility can, therefore, be used to both protect listed fish species and reduce water shortages in drier years. The SDIP will improve the water supply reliability of the integrated CVP and SWP system of reservoirs, Delta exports, and water conveyance facilities.

The CALFED program includes a thorough evaluation of water-use efficiency and funded actions to improve efficiency statewide. The SDIP will increase the reliability of water deliveries from the Delta to CVP and SWP contractors. Reduced demands and efficiency can proceed independently from the SDIP. The SDIP contributes to the overall CALFED goals of making through-Delta conveyance work more efficiently and reducing conflicts with habitat restoration and water quality improvements. The SDIP would allow an increased diversion capacity; however, the SDIP does not set the water delivery targets and does not change the contracted water demands.

The water use efficiency and water conservation measures recommended by the Water Plan Update 2005 do not meet future demand without increasing use of groundwater resources. Increased permitted export capacity will provide operational flexibility that can be used to help meet water demands, protect the Delta environment, and help reduce groundwater overdraft.

Master Response M—Interim Operations

Comment Summary

Several commenters were confused by the Interim Operations that were described in Chapter 2 of the SDIP Draft EIS/EIR as occurring while the SDIP operable gates are being constructed.

Response

Interim Operations are not included in Stage 1. A decision to implement Interim Operations would be part of the Stage 2 decision process. The Interim Operations would begin only after an SDIP Stage 2 decision is made, but may be implemented before the permanent gates are fully operable, if the Stage 2 decision is made while the gates are under construction. Interim operations were described in Chapter 2 as conditional on approval by fisheries and water quality agencies. The interim operations would be compatible with the Stage 2 selected pumping operations. The text in Chapter 2 describing Interim Operations has been modified.

Interim operations would occur only during the December 15–March 15 period, which is already part of the existing CCF diversion limits. During this period there are generally no local diversions, so fish entrainment is likely the major conditional approval issue. The existing CCF diversion limit for the December 15–March 15 period, as specified in the Corps Public Notice 5820A, Amended, dated October 13, 1981, will remain in effect until a Stage 2 decision is made. If the Stage 2 decision is not to change the maximum CCF diversion rate, the existing diversion limits—including the allowable increase from 6,680 cfs of 1/3 of the San Joaquin River flow—would remain the maximum diversion limit between December 15 and March 15.

Master Response N—Trinity River Operations

Comment Summary

Several comments ask for more specific information about SDIP impacts on Trinity River restoration flows and fish habitat conditions.

Response

Trinity River Operations

The SDIP Draft EIS/EIR conforms to the Trinity River Mainstem Fishery Restoration EIS and ROD. The minimum flows required under the ROD were specified in the 2001 baseline and alternatives. However, because Reclamation was operating the Trinity River Division (TRD) temporarily (while the ROD lawsuit was active) with a maximum release as specified for a below-normal year, the wet-year and above-normal-year flows were less than those specified in the ROD. All Trinity River minimum flows specified in the ROD were included in the 2020 baseline and alternatives. The CALSIM output indicates that there would be no changes in Trinity River monthly flows in the 2001 or the 2020 alternatives.

Although there is the potential for CVP Delta operations to influence TRD operations, the CALSIM modeling, with the specified Trinity River ROD minimum flow and carryover storage targets to provide the required Trinity River release temperatures from Lewiston Dam and to maintain "balanced" storage conditions with Shasta Reservoir and Folsom Reservoir, showed that there would be no substantial changes in the Trinity River flows, exports, or Trinity Reservoir carryover storage with the SDIP. Because flows in the Trinity River and carryover storage would not change with the SDIP alternatives, the temperature and other habitat conditions in the Trinity River would remain the same. The SDIP will therefore have no effects on the fishing rights on the Klamath and Trinity Rivers or on the threatened coho salmon in Trinity River, federally reserved to the Hoopa Valley Tribe.

Appendix Q of the SDIP Draft EIS/EIR provides a specific discussion of the potential effects of SDIP on the TRD of the CVP. Summary graphs show the comparison of 2020 baseline and Alternative 2A results for annual carryover storage, monthly Trinity River flows, and monthly Trinity exports to the Sacramento River. These graphs indicate that Alternative 2A will not have any significant effects on Trinity River flows, exports, or carryover storage levels.

Operations of the Trinity River Division are largely independent of the downstream Delta operations that may be changed slightly with SDIP Stage 2 alternatives.

Effects on Fish and Fishing Rights

Reclamation is fully committed to operating the TRD as directed in the Trinity River ROD. In addition, the on-going management of the Klamath and Trinity Rivers, including habitat restoration, water management, harvest management, and hatchery management activities should maintain and improve salmon runs and therefore enhance the ability of the Hoopa Valley Tribe to exercise their federally reserved fishing rights. Reclamation fully expects the restoration flows to provide higher escapement and production for all Trinity River anadromous salmonids.

The SDIP Draft EIS/EIR focused on the coho salmon life history and all possible effects the project could have on the various coho life stages, such as adult migration, spawning and juvenile rearing, and migration in the Trinity River. The temperature analysis used Chinook salmon water temperature criteria because the water temperature tolerance ranges and timing for adult and juvenile migration are comparable. While it is recognized that different species of fish have slightly different temperature criteria and life history timing, Chinook salmon temperature criteria were used in the temperature assessment as representative of migration, spawning, and rearing criteria for salmonids. The coho rearing life stage requires a temperature assessment for all months, although coho would generally rear in the tributaries, which are unaffected by the Lewiston release temperatures. Steelhead have similar water temperature requirements as coho. Lamprey and sturgeon have water temperature criteria that are slightly warmer than for Chinook salmon.

Chinook salmon temperature criteria indices (Table 6.1-7) were used for coho because the species have similar temperature tolerances. Table K.1-14 indicates that the temperature indices for rearing were 1.0 (<67ºF) for all months. The temperature indices for adult migration (September–December) were less than 1.0 (greater than 60ºF) at Lewiston Dam in just 10 of the 288 months evaluated (72 years). The Lewiston water temperatures increased slightly in a few months, reducing the temperature indices (Table K.2A-16). The temperature modeling results indicated that Trinity River at North Fork water temperatures did not change with any of the project alternatives because these downstream temperatures are influenced more by meteorological conditions.

A complete water temperature impact evaluation was not made for the other species because the Chinook salmon temperature criteria were assumed to be representative of the other salmonids. Modeling showed no substantial changes in Trinity River flows, Trinity exports, or Trinity Reservoir carryover storage, and therefore no temperature effects on any Trinity River fish will result from the SDIP (See Appendix Q).

Master Response O—Gate Operations Review Team

Comment Summary

The general function of the GORT for determining gate operations is described in Section 5.2 for tidal flows and water levels, Section 5.3 for water quality effects, and Section 6.1 for fish protection. DWR and Reclamation received several comments asking for more information about the procedures and priorities for determining SDIP gate operations needed to achieve these multiple benefits.

Response

Purpose of Gate Operations Review Team

DWR and Reclamation are the agencies responsible for the operation of the gates. The GORT is an interagency team designed to address the real-time operations of the proposed permanent operable gates, assist in balancing competing objectives for gate operation, and assure state and federal ESA requirements are met.

Gate Operations Review Team Members

The proposed GORT will consist of representatives from the three fish management agencies (USFWS, NMFS, and DFG) and the two water project agencies (Reclamation and DWR). The State Water Board has required DWR and Reclamation to prepare a draft of a gate operations plan by January 1, 2008, with a final plan by January 1, 2009. The plan will outline the intended seasonal operations of the gates.

Stakeholder Participation

The Federal Advisory Committee Act generally prevents stakeholders from directly advising Reclamation in matters related to operations. However, DWR will meet with stakeholders to ascertain the needs and priorities of each group prior to the gate operation season each year (late February–early March). DWR Bay-Delta Office will maintain the list of participants. Stakeholders will include:

- Delta municipal water users (cities/counties),
- Delta agricultural water users,
- Delta recreational water users,
- environmental organizations and interest groups, and
- SWP and CVP water users.

DWR will communicate the results of the seasonal gate operations plan and provide updates based on any major GORT decisions during the operating season. Operation of the SDIP tidal gates will require interactive analysis supported by monitoring, modeling, and evaluation of likely consequences.

Priorities of Operation

The stated purpose of constructing the gates will remain at the forefront of discussions on Priorities of Operations. The Head of Old River Gate will be used to prevent the straying of San Joaquin River fall- and late fall–run Chinook salmon, a candidate for listing under the ESA, from entering south Delta channels via Old River. The three tidal gates will be operated to provide south Delta agricultural users with sufficient water stage and water quality. Gate operation must comply with conditions of the biological opinions issued by NMFS, USFWS, and DFG. Additional use of the head of Old River gate for fish protection and water quality improvement that do not compromise these primary purposes can be considered by the GORT. Generally speaking, the priorities for gate operations will be as follows:

- Comply with biological opinions issued pursuant to the ESA and CESA.
- Meet primary purposes of SDIP gate operations to prevent movement of San Joaquin River Chinook salmon into the south Delta via Old River, and provide adequate minimum water levels and improved water quality (via circulation) for agricultural users to help achieve water quality objectives.
- Provide improved dissolved oxygen in the Stockton DWSC
- Protect other non-listed species as requested by fishery agencies
- Provide water quality beyond that necessary to meet the water quality objectives
- Provide for recreational uses

GORT will provide the opportunity for interactive development of gate operation recommendations. The management process for the SDIP gate operations will rely on the established network of agency interactions that include the CALFED Ops Group, the EWA management and technical review teams, and the established IEP fish survey programs. The GORT is the only new element in this management framework. No new monitoring requirements are suggested because water quality data from the existing stations and fish data from the existing surveys are sufficient.

The regulatory requirement for maintaining EC at or below the salinity objectives, and also maintaining DO at or above the DO objectives, while also minimizing fish entrainment impacts, will require real-time monitoring, assessment, and gate operation decisions. The GORT management procedures will be used to help satisfy the State Water Board water rights and Regional Water Quality Control Board (RWQCB) water quality requirements.

The future ability to increase DO in the Stockton DWSC with an oxygenation device should make these adaptive management decisions easier. DWR is constructing and testing a full-scale oxygenation system for the Stockton DWSC. Construction is on schedule to have the facility completed by fall 2006 and begin testing and operational monitoring in spring 2007.

Process for Resolving GORT Conflicts and Disagreements

The GORT is expected to meet as needed, with a weekly schedule likely during the spring and summer fish-protection and irrigation season. Summary of GORT decisions will be sent out within a day via email to the stakeholders.

The SDIP gate operations will be added as a routine item for the monthly CALFED Ops Group meetings, where all aspects of Delta operations for both water management and fish protection actions are reviewed and discussed by representatives of state and federal agencies and stakeholders. Unresolved issues in real-time operation will be elevated to the Water Operations Management Team (executive level representatives of NMFS, USFWS, DFG, DWR, and Reclamation) for resolution. The final resolution will be transmitted to stakeholders via email as soon as possible (generally, within 1 day). This is similar to the procedure used for other Delta actions (i.e., DCC closure, EWA actions).

General Plan for Gate Operations

The planned operation for the head of Old River fish control gate is described in Chapter 2 and Sections 5.2, Tidal Hydraulics, 5.3,Water Quality, and 6.1, Fish. The head of Old River gate will be closed for approximately 30 days during the April–May period and may be partially closed during the early fry and smolt migration period, if the GORT so directs. The simulations for the SDIP Draft EIS/EIR assumed that the head of Old River gate would be closed for April and May. However, the updated SDIP project description includes definite closure only for the 31-day VAMP period, with an option to extend closure for up to the full 2 months. If the GORT chooses to only close the Gate for the 31-day VAMP period, the benefits for juvenile Chinook salmon during this time may be less than described in Section 6.1 of the SDIP Draft EIS/EIR. The GORT will attempt to resolve any conflicts between operations that would benefit Chinook salmon and operations that would benefit delta smelt or other fish of concern. If GORT is unable to agree on an operation, whether the issue is fish protection or other concerns, the issue will be elevated to the Water Operations Management Team (WOMT) for decision.

GORT management procedures will also consider issues related to municipal needs, such as the City of Tracy Wastewater Treatment Plant (WWTP) dilution flow needs of 250 cfs in Old River downstream of Middle River. The requested minimum flow of 250 cfs can be provided from a combination of the Middle

River upstream flow, created by the Middle River gate closure during ebb tides, and partial opening of the head of Old River gate during the April and May fish protection period. For purposes of the SDIP analysis, a minimum flow of about 500 cfs into Old River from the San Joaquin River was assumed at the location of the head of Old River gate during the summer period. However, as described in OCAP and the updated SDIP project description, the GORT is not required to operate the head of Old River gate in this way, and therefore the magnitude of the benefits may vary from those described in the SDIP Draft EIS/EIR. A minimum flow of about 250 cfs from the San Joaquin River was also assumed for the fall migration period and would be provided by the fish passage structure at the head of Old River. The GORT is not required to operate the head of Old River gate in this way, and therefore the magnitude of the benefits may vary from those described in the SDIP Draft EIS/EIR.

The agricultural gates will be operated to provide an acceptable minimum water level and sufficient circulation to maintain the water quality objectives and where possible to achieve lowest possible salinity whenever irrigation diversions are operating consistent with the Operating criteria above. However, Reclamation and DWR cannot commit to using SDIP elements for the sole purpose of maximizing water quality benefits. There may be times when operating the permanent gates for water quality would adversely affect protected species of fish. At other times operation of the gates to protect water quality in the south Delta may have unacceptable affects on water quality elsewhere.

The tidal gates can be operated in a variety of ways. The minimum water level can be controlled by the weir elevation of the Grant Line Gates, or these gates can be operated to capture the incoming tide and the gates in Old River at Tracy and Middle River can be operated as weirs. Adequate tidal circulation can generally be provided for a range of minimum water levels, although higher minimum water levels will reduce the tidal flushing. The GORT will make these trade-off decisions, with appropriate input from SDWA representatives. In general, the operable gates are expected to provide benefits to all resources in the Delta compared to the temporary barriers as a result of the flexibility that will be available for responding to real-time conditions in the south Delta.

Master Response P—Effects of the South Delta Improvements Program on State Water Project Article 21 Deliveries

Comment Summary

DWR and Reclamation received several questions about actual SWP Article 21 deliveries in recent years, and the possible effects of Article 21 deliveries on fish entrainment and the ability of EWA to provide protection for fish during these periods of high pumping. Other comments suggested that the CALSIM model may not accurately estimate total SWP deliveries because the model does not assume large enough Article 21 monthly deliveries.

Response

SWP Article 21 Deliveries

Water delivered to SWP contractors is generally classified as Table A deliveries and Article 21 deliveries. Table A deliveries are the basic SWP contractor share of the projected annual delivery, which are based on Table A of the long-term water supply contracts. In addition, Article 21 of the contracts allows contractors to receive added supplies above the scheduled monthly Table A amounts under certain conditions (e.g., when SWP San Luis Reservoir is full).

In the past, DWR required contractors to take a portion of Table A deliveries each month, before allowing Article 21 deliveries. Currently, contractors schedule their total deliveries for a calendar year by first using any carryover storage, then using any Article 21 water, and finally request Table A deliveries. Because Article 21 water is generally available only in the winter when the SWP share of San Luis Reservoir is full and ends about mid-April when export reductions for the VAMP period begin, Article 21 deliveries usually occur in the January–April period of each year.

The classification of SWP Article 21 deliveries, therefore, depends on the scheduled monthly Table A deliveries. Article 21 deliveries are limited by the permitted pumping level at the SWP Banks Pumping Plant (i.e., minimum of the daily Corps permitted diversion limit or E/I limit or X2 limit) minus the already scheduled monthly deliveries. The Article 21 deliveries are also limited by the ability of each SWP contractor to locally store the water in a reservoir or groundwater basin. It is allocated in proportion to Table A contract amounts if requests exceed the amount offered. Total deliveries over the Tehachapi Mountains to southern California contractors are also limited by the capacity at the Edmonston Pumping Plant (i.e., 4,480 cfs). The total annual Article 21 deliveries for 1995–2004 are tabulated in the 2005 State Water Project Delivery

Reliability Report, and shown in Table 3-2, below. Only in 2005 were the classified Article 21 deliveries more than 10% of the total deliveries.

There may be additional demands for Article 21 water when new facilities being constructed by SWP contractors come on-line. For example, The Metropolitan Water District of Southern California (MWD) is completing its Inland Feeder, which could transport Article 21 water to Diamond Valley Lake. Semitropic Water Storage District is completing turn-out and recharge facilities in conjunction with an expanded groundwater banking program.

Table 3-2. Annual Total South of Delta SWP Deliveries and Article 21 Deliveries for 1995–2005 (thousands of acre-feet)

Calendar Year	Total South-of-Delta SWP Deliveries (taf)	Article 21 Deliveries (taf)
1995	2,005	64
1996	2,542	28
1997	2,391	21
1998	1,728	20
1999	2,896	158
2000	3,511	309
2001	1,774	48
2002	2,758	43
2003	3,272	60
2004	2,913	218
2005	3,709	737
Average	2,500	155

CALSIM Modeling of Article 21 Deliveries

The CALSIM II model assumes that SWP contractors accept monthly scheduled Table A deliveries and then accept Article 21 water when available. CALSIM assumes that a constant fraction of the total annual Table A deliveries will be made in each month. The assumed fraction is about 4% in January, about 5% in February, and about 6% in March. The maximum simulated Table A deliveries was about 2,800 cfs in January, 3,500 cfs in February, and 3,825 cfs in March. When San Luis Reservoir is full, a considerable quantity of unused SWP pumping may be available for Article 21 deliveries. The maximum monthly Article 21 deliveries are based on assumed additional demands for local storage or groundwater banking. The assumptions at the time of the CALFED ROD (August 2000) were used in the SDIP and OCAP modeling. The modeling for

the Long-Term EWA EIS/EIR has been revised to incorporate these same Article 21 assumptions:

- December–March: 134 taf per month (2,250 cfs)
- April–November: 84 taf per month (1,365 cfs)

As described in Section 5.1, the CALSIM model accurately accounts for Table A and Article 21 deliveries. The CALSIM-simulated Article 21 deliveries (Table 5.1-12) average 148 taf/yr and generally match the magnitude of actual Article 21 deliveries in recent years (Table 3-2, above). Article 21 water can be used by contractors with storage facilities to increase their deliveries in wet years. As Table 3-2 indicates, however, the overall fraction of SWP deliveries is usually less than 10% of total deliveries.

The contractors have been requesting the deliveries of Article 21 water instead of Table A water since at least 2000. In 2003, MWD informed the Department that, for modeling purposes, MWD Article 21 demand should be increased from 50 taf per month to 100 taf per month for December–March, and zero the rest of the year. Kern County updated its demands in spring 2005 to 130 taf maximum for the first month of availability, dropping to 72 taf for subsequent months, year-round. If these requests were modeled, the revised Article 21 demands would be:

- December–March: 264 taf for first month (4,290 cfs), 206 taf in subsequent months (3,350 cfs)
- April–November: 163 taf per month (2,650 cfs)

These high values would often exceed the unused capacity (i.e., pumping limits minus the scheduled Table A deliveries) and have not been used in CALSIM modeling. As described in Section 5.1, the CALSIM model accurately estimates the monthly schedule for Table A deliveries and does not often leave much unused allowable pumping. Therefore, the CALSIM estimates of total SWP deliveries are very close to the maximum possible SWP deliveries each year.

The EWA protections during months with Article 21 deliveries are part of the baseline conditions simulated with CALSIM. It is true that higher monthly pumping with the SDIP Stage 2 limits, whether for Article 21 or Table A deliveries, will increase the EWA's water cost of pumping curtailments for fish protection, and reduce the EWA's ability to spill debt by refill of San Luis Reservoir. The total SWP pumping that was evaluated for entrainment impacts and possible impacts on EWA fish protection is accurate. The expanded EWA or the avoidance and credit system during the December–June period will provide sufficient water to adequately mitigate the potential fish entrainment impacts to a less-than-significant level during periods when EWA actions are taken (see Master Response E, *Reliance on Expanded Water Account Actions for Fish Entrainment Reduction*).

Master Response Q—Effects of the South Delta Improvements Program on San Joaquin River Flow and Salinity

Comment Summary

Several comments ask about the potential effects of increased CVP exports and deliveries on the flow and salinity in the San Joaquin River, which drains agricultural lands that may receive some of these increased exports. Other comments ask how this increased drainage might affect CVP operations of the New Melones Reservoir, on the Stanislaus River, to provide dilution to meet the EC objectives at Vernalis.

Response

Evaluation Methods

The evaluation of SDIP effects on San Joaquin River water management and salinity relied on the results from the CALSIM modeling of the 2001 and 2020 baseline and SDIP alternatives. The monthly reservoir operations and irrigation diversions and return flows (including some tile drainage into the San Joaquin River) are estimated for the 1922–1994 historical hydrology but with existing (2001) or future (2020) water demands for all water districts within the San Joaquin River basin. Operations for the CVP Friant Unit were assumed to be fixed, and did not change with any of the SDIP Stage 2 alternatives. No changes in Friant Dam releases for future San Joaquin River restoration were included in the SDIP simulations. No changes in CVP exports or deliveries would occur under SDIP Stage 1.

The CALSIM model includes a module that balances the calculated salt load of the San Joaquin River at Maze (upstream of the Stanislaus River confluence) with the necessary flow at Vernalis (downstream of the confluence with the Stanislaus River) to satisfy the EC objective at Vernalis. Although the DSM2 Delta salinity model shows that the CVP Tracy (DMC) salinity would improve, no benefits to reduced dilution releases from New Melones Reservoir were assumed. The possible benefits from improved CVP Tracy (DMC) salinity were considered too speculative to identify.

The State Water Board developed a general monthly water and salt budget for the San Joaquin River called the Input-Output Model of the San Joaquin River from the Lander Avenue Bridge to the Airport Way Bridge (Vernalis) (SJRIO) (State Water Resources Control Board 1987). The CALSIM model includes a simplified version of the SJRIO model method for calculating the San Joaquin River water and salt budget at Vernalis. The components of the San Joaquin

River water budget and salt budget in the SJRIO model must be estimated for each year. The possible changes from reduced DMC salinity or from increased CVP deliveries along the DMC are not included in the SJRIO model.

Technical work has recently been completed by Reclamation on the San Joaquin River module of CALSIM, and these improved calculations have been reviewed by the CALFED Science Program with assistance from the California Water and Environmental Modeling Forum. The CALSIM studies and the review can be obtained from the website at:

<http://science.calwater.ca.gov/workshop/calsim_05.shtml>.

These changes in the San Joaquin River module of CALSIM have not been used in any planning study. The Benchmark 2002 version of CALSIM that was used for SDIP is adequate to accurately evaluate changes in the San Joaquin River basin reservoir operations and the effects from increased CVP deliveries to areas that have return flows (i.e., drainage) to the San Joaquin River caused by SDIP Stage 2 alternatives.

CVP Tracy Pumping Plant Deliveries

The long-term average (1922–1994 period) annual CVP exports simulated with CALSIM for the 2001 baseline conditions was 2,312 taf. As an example of actual CVP deliveries, the CVP Tracy pumping plant exports during calendar year 2004 were about 2,748 taf, about 20% higher than the average simulated with CALSIM. The actual 2004 deliveries to CVP contractors along the DMC between the CVP Tracy Pumping Plant and O'Neil Forebay were about 455 taf, and the 2004 deliveries to the Mendota Pool exchange contractors, south of O'Neil Forebay and via the DMC, were about 805 taf. These deliveries (1,260 taf, 46% of total CVP pumping) were made to districts with drainage that could enter the San Joaquin River. The remainder of the water (1,488 taf, 54% of total CVP pumping) was delivered to the San Luis (i.e., Westlands) and San Felipe (i.e., Santa Clara) service areas, which do not have any drainage that could enter the San Joaquin River.

The Mendota Pool exchange contractors generally receive their full demands of 800 taf each year. Table 9-6 of the SDIP Draft EIS/EIR indicates that about 35% of the additional CVP deliveries from SDIP Alternative 2A Stage 2 would likely go to San Luis, Panoche, or other water districts with drainage to the San Joaquin River. The majority (65%) of the increased CVP deliveries would likely go to CVP service areas without drainage to the San Joaquin River.

Effects on CVP Tracy Pumping Plant EC

The salt budget for the DMC service area was not considered in the SDIP impact assessment. It is, however, very possible that the SDIP would have a beneficial effect over the long term. The following, simplified example serves to illustrate

the relationship between the salinity level of CVP exports and salt loads into the San Joaquin Basin.

The DSM2 modeling indicated that the EC at the CVP Tracy Pumping Plant would be reduced by about 10% with the SDIP Stage 1 or 2 because of a reduced fraction of San Joaquin River water at the CVP Tracy Pumping Plant. This reduction in export EC (Table 5.3-3) from about 530 µS/cm to about 480 µS/cm could have a potentially beneficial effect in the distant future on the San Joaquin River salinity.

For example, the baseline average CVP Tracy EC was estimated to be 530 µS/cm, which is about 350 mg/l of total dissolved solids (salt). This is equivalent to about 1,000 pounds of salt per acre-foot of water (0.5 tons per acre-foot [tons/af]). SDIP stage 1 (operable tidal gates) will reduce the average EC to 480 µS/cm, with a reduced salt load at the CVP Tracy Pumping Plant of about 0.45 tons/af. If it is assumed that the load reduction is directly applied to deliveries to the DMC and the Mendota Pool, the annual salt load in the 2004 deliveries to DMC and exchange contractors (1,260 taf) would be reduced from about 630,000 tons to about 567,000 tons, a possible reduction of 63,000 tons. In reality, deliveries to these areas are served both directly from Tracy Pumping Plant and from storage in San Luis Reservoir (i.e., mixture of water from CVP Tracy and SWP Banks Pumping Plants) so the benefit would not be this large.

Effects on Agricultural Drainage

All of the drainage water from deliveries to the DMC and Mendota Pool exchange contractors (1,260 taf in 2004) could potentially drain into the shallow groundwater or flow into the San Joaquin River upstream of the Merced River mouth. Because only about 20% of the applied water becomes drainage from agricultural lands, a total of about 250 taf might become drainage to the San Joaquin River. This drainage water would therefore have a salinity that is about 5 times the applied water salinity (i.e., 2,650 µS/cm, 1,750 mg/l total dissolved solids [TDS], or 2.5 tons/af). How much drainage water enters the shallow groundwater and how much flows to the San Joaquin River is difficult to assess.

Tile drainage from about 50,000 acres within the 97,000 acres of the Grasslands Drainage Area (GDA) is currently collected and bypassed in the San Luis Drain to Mud Slough. The historic (prior to 1995) annual drainage flow from this tile-drained land was estimated to be 50 taf (about 1.0 acre-feet/acre) with an annual salt load of about 200,000 tons (4 tons/af), which is equivalent to about 2,000 railway boxcars. During calendar year 2004, the total flow from the GDA was reduced to about 28 taf, with a salt load of about 110,000 tons. The GDA farmers are employing irrigation reduction and recycling improvements and have planted 4,000 acres in the Panoche Water District with salt tolerant crops and installed tile drainage. Drainage water is being applied to these lands to reduce the total drainage flow to the San Joaquin River. The salt and selenium load collected in the tile drainage of the reuse area must be disposed of in evaporation ponds, because the salinity is too high for any additional crop use.

The reduced salt load in the applied irrigation water, resulting from the SDIP, may allow farmers to employ more aggressive irrigation tail-water recovery and blending options that will reduce the drainage flow and salt load to the San Joaquin River. But other outcomes, such as irrigation of more lands, or reduced groundwater pumping, that would maintain the same drainage flow and salt load to the San Joaquin River, are also possible. Because the management of water and salt within each water district is relatively complex, the effects of the reduced DMC salinity on San Joaquin River flow and salt load are considered speculative.

Agricultural water users in the San Joaquin Valley are included in total maximum daily load (TMDL) implementation plans to meet specific water quality objectives (i.e., salt, boron, selenium) in the basin. Neither DWR nor Reclamation has any control over agricultural discharges. Individual dischargers (i.e., drainage districts) are responsible to meet water quality objectives for the receiving water to which they discharge. The SDIP Stage 2 alternatives that may increase CVP exports is not expected to have any significant impact on the drainage quality or quantity that enters the San Joaquin River. Neither would reduced CVP demands likely reduce the SJR drainage, because the CVP contractors with drainage to the SJR would likely receive the same water deliveries.

Effects on New Melones Reservoir Operations

The CALSIM model used operational rules derived from the New Melones Reservoir Interim Operations Plan, including a maximum water quality release volume to manage (i.e., provide dilution) the salinity at Vernalis to meet the EC objectives. Actual New Melones Reservoir operations may be slightly different than the CALSIM results.

For SDIP Alternative 2A Stage 2, the possible effects on New Melones carryover storage were examined. The average carryover storage was 1,323 taf for the 2001 baseline and 1,322 taf for 2001 Alternative 2A Stage 2. The difference is considered to be negligible.

The overall SDIP Stage 2 effects on Vernalis flow and EC were also very small and were considered negligible. The 2001 baseline average annual Vernalis flow volume was 2,660 taf/yr. For SDIP 2001 Alternative 2A Stage 2, the average annual Vernalis flow was increased by 2 taf/yr. The average 2001 baseline Vernalis EC (estimated in CALSIM) was 598 µS/cm. For SDIP 2001 Alternative 2A Stage 2, the average Vernalis EC was increased by 2 µS/cm to 600 µS/cm. The average EC and corresponding average salt load were increased by less than 0.5%.

The CALSIM results show a negligible effect on flow or EC values at Vernalis caused by the SDIP Stage 2 alternatives; therefore, no further analysis of New Melones Reservoir operations was considered necessary.

Effects of Future Projects

The San Luis Drainage Feature Reevaluation project final EIS/EIR states that there are about 380,000 acres of drainage impaired lands in the study area. The total area needing drainage service is reduced by land retirement programs and actions. The project, as proposed, will maintain and stabilize the water table and would reduce the drainage salt load entering the San Joaquin River. The preferred alternative identified in the Final EIS would retire a total of 308,000 acres and eliminate the existing discharge of drainage from the GDA.

CVP water contractually supports beneficial uses in the contract service area, in this case, the San Luis Unit. If land retirement reduces water demand such that the full contract amounts cannot be put to beneficial use in the contract service area, water in excess of demand would be used to meet other CVP obligations according to existing CVP needs and priorities. Water allocation issues and contract modifications are not part of the proposed federal action for the San Luis Drainage Reevaluation project. These possible drainage actions will not be affected or influenced by SDIP.

The San Luis Drainage Reevaluation project alternatives would likely have beneficial effects on the San Joaquin River water quality, and because it is a reasonably foreseeable project (with environmental documentation now completed), it should have been included in the projects considered for cumulative impacts (Table 10-1) and water quality discussion for SDIP Stage 2. These changes have been made to Chapter 10.

The SDIP may have a small beneficial effect on the implementation of TMDL measures to reduce salt and boron in the San Joaquin River because the average EC at the Tracy Pumping Plant will be reduced. Impact WQ-9 describes the projected 10% reduction simulated for CVP Tracy (DMC) EC under SDIP Stage 1. It is not likely that the SDIP Stage 2 will produce any substantial change in the agricultural drainage flow or salt load to the San Joaquin River. A future reduction in this drainage would provide a corresponding beneficial reduction in the salt load at Vernalis, and may allow less New Melones Reservoir water to be released by Reclamation for dilution to meet the Vernalis EC objectives.

Master Response R—Effects of the South Delta Improvements Program Stage 1 Tidal Gates and Dredging on Flood Elevations in the South Delta Channels

Comment Summary

Several comments ask for a more detailed analysis of flood-flow effects from the proposed SDIP Stage 1 tidal gates and dredging. Several comments ask if the tidal gates and dredging are absolutely "flood-neutral", such that there will be no increase in water levels upstream of the tidal gates or downstream of the dredging.

Response

DWR and Reclamation are committed to ensuring that the SDIP does not have an effect on the conveyance capacity of channels during a flood event. Modeling shows that the SDIP would be flood-neutral because the maximum calculated increase in flood stage related to the tidal gate designs and conveyance dredging plans is less than 0.1 feet (approximately one inch). A change of 0.1 feet is within the range of uncertainty of the HEC-RAS hydraulic model used for refined flood flow analyses initiated in response to the public comments received on this issue. Model uncertainty is generally caused by the approximate cross sections that are used to represent the simplified river geometry. The HEC-RAS model will simulate small changes of less than 0.1 feet, but a difference of less than 0.1 feet would not likely be measurable during high flow events, because the tidal variation remains about 0.5 feet.

Flood neutrality is achieved with gate designs that preserve enough of the existing conveyance area to eliminate any backwater effects from the flood flows through the tidal gates when the gates are fully open (completely lowered). Flood neutrality for the Middle River dredging is achieved by using a "tapered" dredging plan that begins with a dredged bottom elevation of –5 feet msl at the head of Middle River and provides a constant bottom slope of about 6 inches per mile to a bottom elevation of –8 feet msl six miles downstream from the head, and extending the dredging at –8 feet msl bottom elevation in Middle River from Howard Road Bridge to Tracy Boulevard Bridge. This tapering and extension of the original dredging plan described in the SDIP Draft EIS/EIR has removed backwater effects in Middle River resulting from the transition of the dredged reach to the non-dredged reach.

South Delta Flows and Water Elevations During High-Flow Conditions

The San Joaquin River conveys relatively high flood flows into the south Delta. The peak daily flow in 2006 was about 35,000 cfs (on April 13, 2006). The most recent major flood event occurred in January of 1997, with an estimated peak flow of more than the 52,000 cfs "rated" flood capacity of the existing San Joaquin River levees in the vicinity of Vernalis (DWR Division of Flood Management, http://www.dfm.water.ca.gov/pubs/map_sac&sj_designflows.pdf). Because several levees failed, both upstream and downstream of Vernalis in January of 1997, it is difficult to estimate the total south Delta inflow from the Vernalis water level gage because water that was diverted through the upstream levee breaches reduced the measured total flow at Vernalis. DWR has published a detailed report, "The hydrology of the 1997 New Year's Flood: Sacramento and San Joaquin River Basins", describing the flood conditions associated with this record flood (California Department of Water Resources 1999). The rated San Joaquin River capacity of 52,000 cfs at Vernalis was used for the simulation of potential flooding effects using the HEC-RAS model.

As the flow increases in the San Joaquin River at Vernalis, the corresponding water elevation rises. This relationship between flow and water elevation is referred to as the "stage-discharge", or "rating" curve. Figure 5.2-14 from the SDIP Draft EIS/EIR indicates that the stage-discharge curve, as simulated in the DSM2 model, is typical of a large river with levees. The simulated water elevations match the measured elevations as Vernalis reasonably well for the range of high flows that occurred during January of 1997 and 2006. The highest monthly flow simulated with the DSM2 model for the 1976-1991 period was about 37,500 cfs.

Figure 3-4 shows the Vernalis water elevation as a function of the Vernalis flow, for the range of 1,000 cfs to 37,500 cfs. Also shown are the water elevations at the head of Old River (15 miles downstream of Vernalis) and at Brandt Bridge, located about 5 miles downstream of the head of Old River. These water elevations at the head of Old River and at Brandt Bridge are lower than at Vernalis because some of the high San Joaquin River flow is diverted into the Paradise Cut flood overflow weir, and because the river surface gradient increases with flow between these locations which are 15 or 20 miles downstream of Vernalis.

Figure 3-4 shows that the simulated modeled water elevation at Vernalis reaches the flood warning level of 29 feet msl at a flow of about 37,500 cfs. A flow of 52,000 cfs would cause the water level at Vernalis to rise to about 35 feet msl. The top of the levee at Vernalis is at elevation 37 feet msl, and the maximum elevation recorded in January 1997 was about 35 feet. The estimated peak flow in 1997 was somewhat higher than the rated capacity of 52,000 cfs on January 10.

Figure 3-4 indicates that the water level at the head of Old River and at Brandt Bridge depend on the San Joaquin River flow at Vernalis. At flows of greater

than 10,000 cfs there is very little influence from the tide, and river flow alone controls the water surface elevation. The water level at the head of Old River will be about 12 feet msl when the Vernalis flow is 25,000 cfs and the water level will increase to about 18 feet msl when the Vernalis flow is 52,000 cfs. The corresponding water elevations at Brandt Bridge are lower, with a water level of about 10 feet msl at a Vernalis flow of 25,000 cfs and a water level of about 14 feet msl at a Vernalis flow of 52,000 cfs. These DSM2-simulated "stage-discharge" curves are very similar to observed water elevations at these stations during periods of high flow.

Figure 3-5 shows the San Joaquin River flow diversions as a function of the Vernalis flow. As the San Joaquin River flow at Vernalis increases to about 17,500 cfs, the water level downstream at the Paradise Cut flood diversion weir increases to above the weir elevation of 12.5 feet msl, and some river flow is diverted into Paradise Cut. When the Vernalis flow is 25,000 cfs, the Paradise Cut weir flow is about 4,500 cfs, and when the Vernalis flow reaches 52,000 cfs, the model-simulated Paradise Cut weir flow is about 13,700 cfs. The San Joaquin River flow at the head of Old River is the Vernalis flow minus the Paradise Cut weir flow. At a Vernalis flow of 52,000 cfs, the simulated San Joaquin River flow at the head of Old River is therefore about 38,300 cfs.

Some of the San Joaquin River flow is diverted into Old River. At a Vernalis flow of 25,000 cfs, the Old River flow and the Brandt Bridge flow are both about 10,250 cfs, and the Paradise Cut flow is about 4,500 cfs. At a Vernalis flow of 52,000 cfs, the simulated Paradise Cut flow is about 13,700 cfs, the Old River flow is about 18,300 cfs, and the San Joaquin River at Brandt Bridge is about 20,000 cfs. This is the basic flow distribution along the San Joaquin River during a flood flow of 52,000 cfs.

Figure 3-6 shows the south Delta flow distribution in Middle River at the tidal gate, in Grant Line Canal at the tidal gate, and in Old River at the tidal gate, as a function of the San Joaquin River flow at Vernalis. At a Vernalis flow of 25,000 cfs the Paradise Cut flow is about 4,500 cfs, and the head of Old River diversion is about 10,250 cfs. The simulated Grant Line Canal flow is about 10,250 cfs, the Old River at the tidal gate flow is about 3,000 cfs, and the Middle River flow is about 1,250 cfs. At a Vernalis flow of 52,000 cfs the Paradise Cut flow is about 13,700 cfs and the head of Old River diversion is about 18,400 cfs. The majority (20,900 cfs) of the combined flow of 32,100 cfs is distributed in Grant Line Canal, with a simulated flow of about 6,800 cfs in Old River at the tidal gate, and about 4,400 cfs in Middle River.

Figure 3-7 shows the maximum simulated water level (high tide plus Vernalis flow) in Old River and Middle River downstream of Victoria Canal. These downstream stations are influenced by both the San Joaquin River flow and the tidal elevations at Martinez, in Suisun Bay. The high tide elevations are similar at these stations, and are between 3 feet and 5 feet msl at relatively low San Joaquin River flows, and increase to a maximum of between 6 feet and 7 feet msl for relatively high San Joaquin River flows and high tides at Martinez. Worst-case tidal conditions will therefore produce maximum water levels of between 6

and 7 feet msl when the San Joaquin River flow is 52,000 cfs. During the January 10, 1997 peak flood event on the San Joaquin River, the maximum Martinez tidal level was 5 feet msl (tidal range of 7 feet). The maximum measured tidal level on Old River at SR4 was 7.0 feet (tidal range of 2 feet). The maximum measured tidal level on Middle River at Victoria Canal was also 7.0 feet (tidal range of 2 feet).

The maximum water levels in south Delta channels will therefore depend on the San Joaquin River flow at Vernalis and on these downstream tidal conditions. The effects of the SDIP Stage 1 tidal gates and proposed dredging were evaluated for a high San Joaquin River flow of 52,000 cfs at Vernalis and relatively high downstream tidal conditions of 6.9 feet msl for Old River at SR 4 and 6.4 feet msl for Middle River at Victoria Canal. The simulated water levels with a Vernalis flow of 52,000 cfs were therefore similar to the maximum observed water levels for the estimated inflow of more than 52,000 cfs on January 10, 1997. The slightly lower water elevation on Middle River produces a simulated flow of about 5,700 cfs between Old River and Middle River in Victoria Canal.

Simulation of High-Flow Effects of SDIP Tidal Gates and Proposed Dredging

Because more accurate hydraulic simulation near the tidal gate structures and the proposed dredging locations was desired, the DSM2 cross-sections were transferred to a HEC-RAS model of these south Delta channels to compare the detailed hydraulic effects from high flows with existing channel conditions and with the SDIP tidal gates and proposed dredging. The maximum downstream elevations from a DSM2 simulation of Delta conditions for January 1997, but with the Vernalis flow specified as a constant of 52,000 cfs, were used for the HEC-RAS steady-state downstream water level boundaries. The Paradise Cut weir diversion flow of 13,700 cfs was obtained from the DSM2 model results. The other flow splits were simulated with the HEC-RAS model.

The simulated water levels in the south Delta channels under existing conditions without any temporary rock barriers are given in Table 3-3. The maximum water levels specified at the downstream ends of the three HEC-RAS model segments were 13.81 feet for the San Joaquin River at Brandt Bridge, 6.87 feet for Old River at Victoria Canal, and 6.38 feet for Middle River at Woodward Canal. The downstream boundary water levels on Old River and Middle River remained the same for the comparative simulation of the SDIP Stage 1 tidal gates with the modified Middle River dredging. The water level at the head of Old River was 17.91 feet msl for the existing conditions, and was reduced to 17.87 with the gates and dredging, because the Middle River dredging allows a slightly reduced water level at the head of Middle River, which then lowers the simulated water level at the head of Old River, located 4 miles upstream of the head of Middle River.

Table 3-3 indicates that the tapered and extended dredging plan in Middle River reduces the water level at the head of Middle River by –0.12 feet from 15.35 feet

to 15.23 feet. The dredging also allows 4,800 cfs (400 cfs more) flow into Middle River. About 1 mile downstream, at Mowry Bridge, the simulated water level was 14.55 feet for existing conditions and 14.35 feet with dredging. At Howard Road Bridge (4.5 miles downstream of the head), the simulated water level was 10.99 feet for existing conditions and 10.56 feet for SDIP Stage 1 with the modified dredging plan. At Tracy Boulevard Bridge, the simulated water level was 7.33 feet for existing conditions and 7.32 feet for SDIP Stage 1. About one-half mile downstream of the Tracy Boulevard Bridge, the simulated water elevation is increased from 7.21 feet to 7.24 feet, because the additional flow in Middle River could not be accommodated within the slightly dredged section. At the Middle River tidal gate, the water level was 6.73 feet for existing conditions and 6.76 feet for the SDIP Stage 1 with the modified dredging plan. However, these simulated increases (0.03 feet) are within the accuracy of the model, and are not considered a significant flood impact.

Table 3-3 indicates that the simulated water level in Old River at Tracy Boulevard Bridge was 9.77 feet for existing conditions and 9.74 for SDIP Stage 1 with modified dredging. For comparison, the maximum measured water level on January 10, 1997 was about 10.25 feet (tidal range of 0.5 feet). The simulated water level at the Old River tidal gate was 7.42 feet for existing conditions and 7.41 feet for SDIP Stage 1. This slight reduction in the modeled water level was caused by the lower modeled flows in Old River, which was the result of the modeled increased in flow down Middle River, which was allowed by the dredging. For comparison, the maximum measured water level at the Old River barrier on January 10, 1997 was about 8.0 feet (tidal range of 1 feet).

The simulated water level at the upstream end of Grant Line Canal was 10.81 feet for existing conditions and 10.79 for SDIP Stage 1. This slight reduction was caused by the reduced simulated flows in Grant Line Canal. The simulated water level in Grant Line Canal at Tracy Boulevard Bridge was 9.40 feet for existing conditions and 9.42 feet for SDIP Stage 1. The simulated water level at the Grant Line Canal tidal gate was 7.52 feet for existing conditions and 7.60 feet for SDIP Stage 1. This simulated increase of 0.08 feet is within the accuracy of the model and is not considered a significant flood impact.

The tidal gate designs are therefore considered to be “flood-neutral,” and they will not change the maximum water levels expected in these south Delta channels during periods of significant flood flows (Vernalis flow of greater than 40,000 cfs). DWR is continuing to refine the dredging plan for Middle River, in consultation with SDWA and Central Delta Water Agency (CDWA) engineers. The original dredging plan has been modified (tapered and extended) to provide a negligible water level increase of less than 0.1 feet in Middle River between the Howard Road Bridge and Tracy Boulevard Bridge.

HEC-RAS modeling indicates that this tapered and extended dredging in Middle River will reduce the simulated water surface rise to less than 0.1 feet along Middle River. Given that 0.1 feet is within the accuracy of the HEC-RAS model, the analysis shows the SDIP tidal gates and proposed dredging in Middle River

will not change the high water levels in south Delta channels that are expected during high flow events.

Impacts from Extended Dredging

No new significant impacts are identified for the modified (tapered and extended) dredging in Middle River. However, the extended dredging requires additional mitigation of the resulting additional impacts on Middle River habitat. Table 3-4 shows the additional vegetation and wetland impacts and mitigation of this dredging for each habitat type and special-status plant species. Non-compensation mitigation, such as preconstruction surveys or monitoring, for impacts described in the SDIP Draft EIS/EIR would also be implemented for these additional impacts.

Impacts related to other resources such as recreation, navigation, fish, land use, water quality, and wildlife would not be substantially different from what is described in the SDIP Draft EIS/EIR. Dredging this additional area would result in slightly increased temporary impacts on these resources, and the same restrictions that are described in the resource sections and/or the environmental commitments section of the SDIP Draft EIS/EIR would be implemented. For example, no significant impacts on fish attributable to dredging are identified. As described in the Project Description, dredging would occur between August 1 and November 30 to reduce impacts on fish. The extended dredging would also occur within this timeframe and therefore would not result in a significant impact. Likewise, there would be no substantial changes to land use or wildlife because the extended dredging would use the spoils ponds identified in the SDIP Draft EIS/EIR, and the dredging operation would occur as described. Impacts on recreation and navigation would be slightly longer in duration to complete the extended dredging, but the extended dredging could provide benefits for navigation and recreation by allowing more watercraft into this area of Middle River. The proposed operation of the Middle River tidal gate would not change, and thus the water quality benefits from the tidal circulation pattern will remain the same as described in the SDIP Draft EIS/EIR. Additionally, the extended dredging would ensure that there are no significant flooding impacts from the SDIP. Therefore, it is not expected that this modification to the project would result in any new significant impacts or require new mitigation.

Table 3-3. Comparison of HEC-RAS Simulated Flows and Water Levels in South Delta Channels for Existing Conditions and SDIP Stage 1 Modified Dredging with a Vernalis Flow of 52,000 cfs

	Existing Conditions		Modified Dredging		Flow	Level
Location	Flow (cfs)	Level (feet msl)	Flow (cfs)	Level (feet msl)	Change (cfs)	Change (feet)
San Joaquin River at head of Old River	38,300	17.91	38,300	17.91	0	-0.00
San Joaquin River at Brandt Bridge	20,000	13.81	20,000	13.81	0	0.00
Old River at Head Gate	18,400	17.83	18,400	17.87	0	0.04
Old River at Tracy Boulevard	6,800	9.77	6,700	9.74	-100	-0.03
Old River at Tidal Gate	6,800	7.42	6,700	7.41	-100	-0.01
Old River below Victoria Canal	14,900	6.87	14,700	6.87	-200	0.00
Grant Line Canal at Head	20,900	10.81	20,600	10.79	-300	-0.02
Grant Line Canal at Tracy Boulevard	20,900	9.40	20,600	9.42	-300	0.02
Grant Line Canal at Tidal Gate	20,900	7.52	20,600	7.60	-300	0.08
Middle River at Head	4,400	15.35	4,800	15.23	400	-0.12
Middle River at Mowry Bridge	4,400	14.55	4,800	14.35	400	-0.20
Middle River at Howard Road	4,400	10.99	4,800	10.56	400	-0.43
Middle River at Tracy Boulevard	4,400	7.33	4,800	7.32	400	-0.01
Middle River at Tidal Gate	4,400	6.73	4,800	6.76	400	0.03
Middle River below Woodward Canal	10,000	6.38	10,100	6.38	100	0.00

Note: Downstream water levels used as boundary conditions shown in bold. Flood flow moves In Victoria Canal from Old River to Middle River

Table 3-4. Marginal Habitat Effects of Extended Dredging on Middle River

Habitat Type/Species	Acres/Stands Affected	Mitigation Ratio	Mitigation Total (acres)
Cottonwood-willow woodland	24.92	Monitor and if loss, replace at 2–3 acres per acre lost	Up to 49.84–74.76
Riparian scrub	4.8	Monitor and if loss, replace at 2–3 acres per acre lost	Up to 9.6–14.4
Tule and cattail tidal emergent	5.32	Monitor and if loss, replace at 2–3 acres per acre lost	Up to 10.64–15.96
Valley oak riparian woodland	0.16	Monitor and if loss, replace at 2–3 acres per acre lost	Up to 0.32–0.48
Willow scrub	4.9	Monitor and if loss, replace at 2–3 acres per acre lost	Up to 9.8–14.7
Tidal perennial aquatic	63.06 [a]	NA	NA
Giant reed stand	0.17 [b]	NA	NA
Mason's lilaeopsis	0 stands	NA	NA
Delta mudwort	0 stands	NA	NA
Rose mallow	2 stands	Create 2–3 linear feet of habitat per linear foot of habitat lost	

[a] The proposed dredging would occur on the channel bottom below 0.0 feet msl, and would avoid levee toes and banks. It is not expected that there would actually be an effect on tidal perennial aquatic habitat and no mitigation is proposed.

[b] Giant reed is considered an invasive species. Removal of giant reed stands would be a beneficial effect.

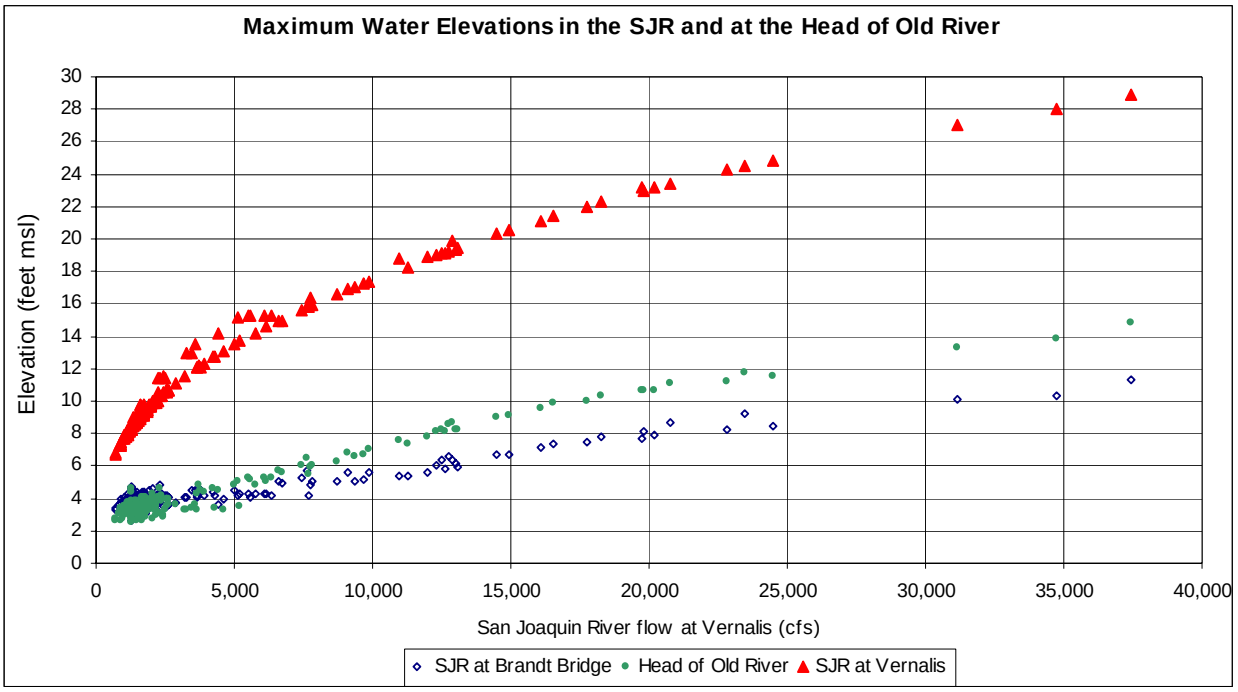


Figure 3-4. DSM2-Simulated Maximum Water Levels in the San Joaquin River at the Head of Old River and at Brandt Bridge, as a Function of the San Joaquin River Flow at Vernalis

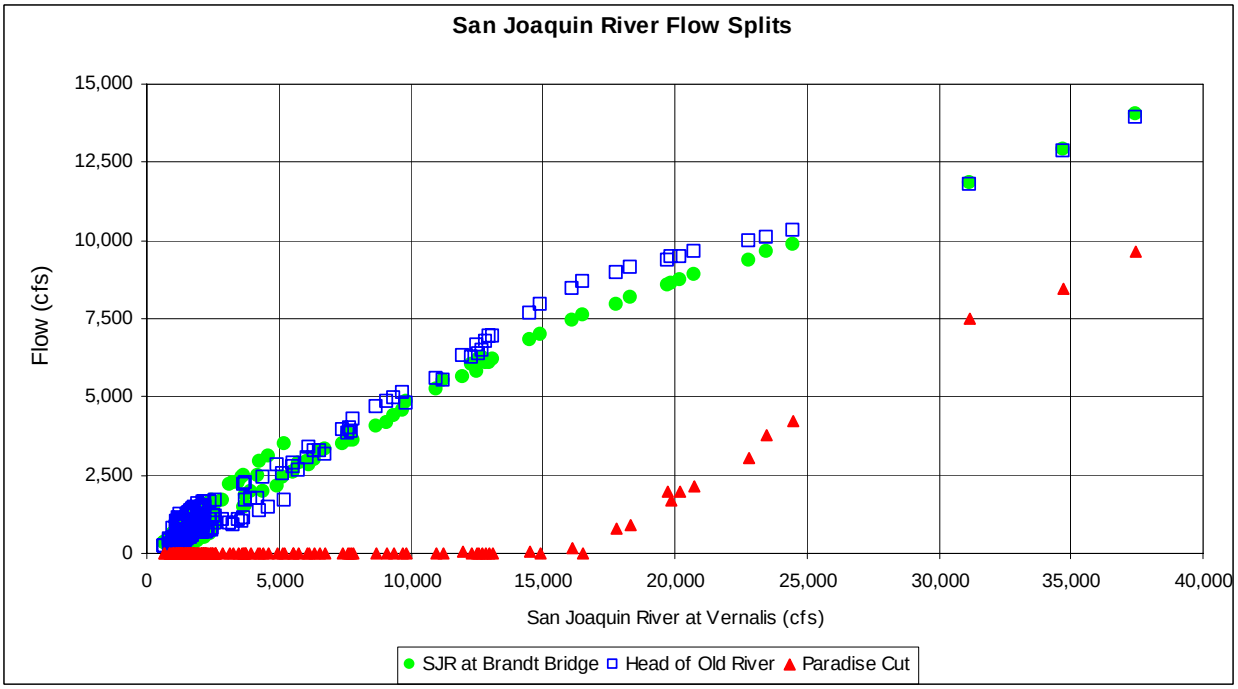


Figure 3-5. DSM2-Simulated San Joaquin River Flow Diversions at Paradise Cut and the Head of Old River as a Function of San Joaquin River Flows at Vernalis

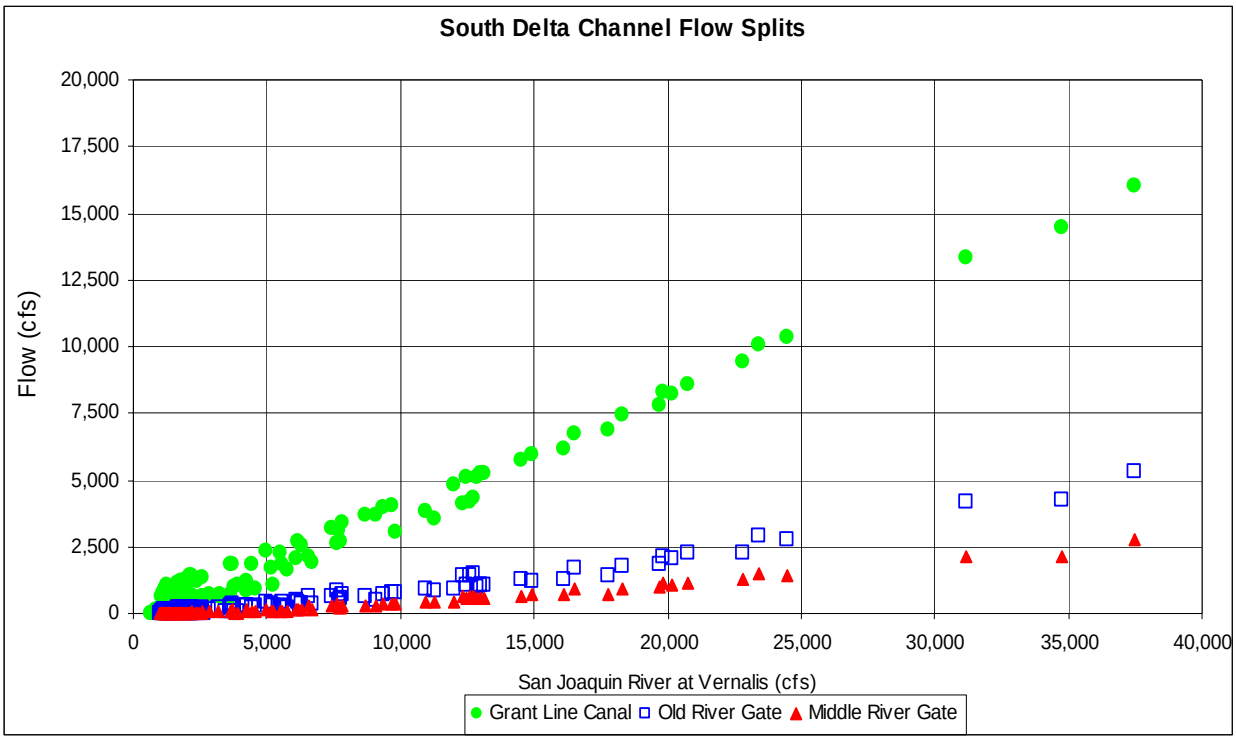


Figure 3-6. DSM2-Simulated Flow Distribution in Old River, Middle River, and Grant Line Canal as a Function of San Joaquin River Flows at Vernalis

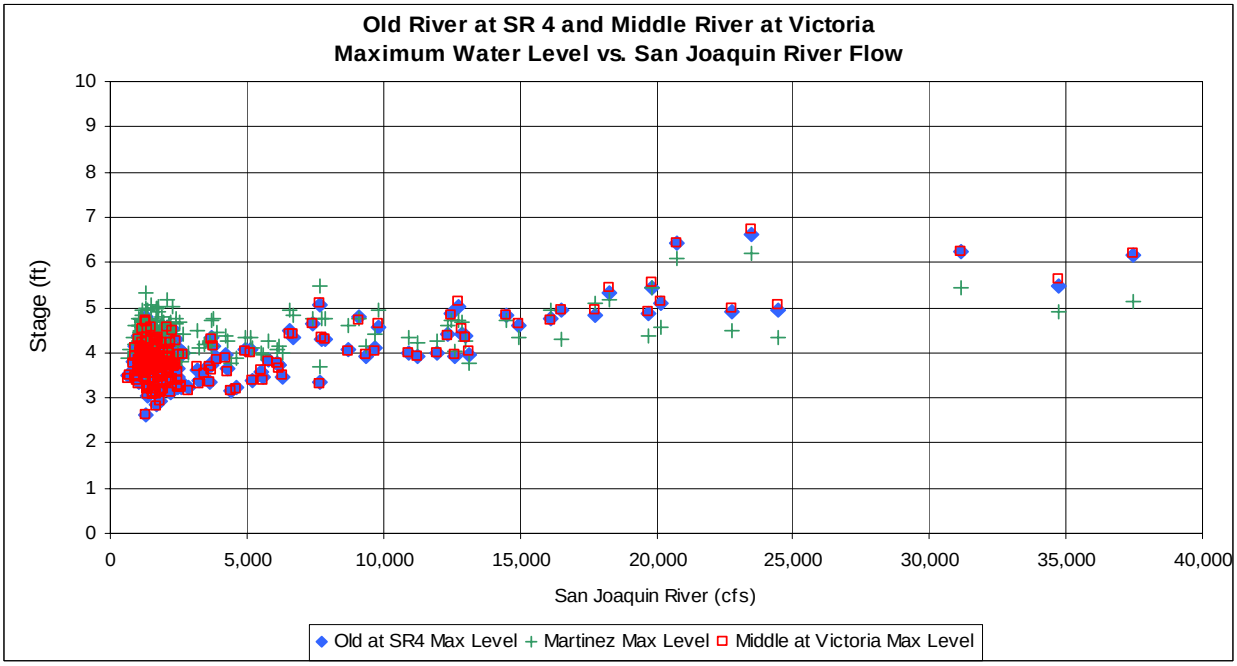


Figure 3-7. DSM2-Simulated Maximum (High Tide) Water Elevation (feet msl) in Old River and Middle River as a Function of San Joaquin River Flow at Vernalis (cfs) and High Tide Elevation at Martinez (Suisun Bay)