Chapter 2
Edits to the Draft EIS/EIR

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Introduction

This chapter shows the edits to text in the SDIP Draft EIS/EIR in response to comments provided on the SDIP Draft EIS/EIR. The pages where edits have been made are included in this chapter with the additions of text underlined and the deletion of text in strikeout.

Changes were made in the following sections:

- Executive Summary
- Chapter 1
- Chapter 2
- Chapter 3
- Chapter 4
- Section 5.1
- Section 5.3
- Section 6.1
- Section 7.1
- Section 7.10
- Chapter 8
- Chapter 9
- Chapter 10
- Chapter 12
- Chapter 13
- Appendix J

Executive Summary

for exporting CVP supplies via CCF and SWP Banks Pumping Plant (SWP Banks). Of the remaining three, one was modified after discussions with CVP and SWP contractors in the summer of 2003 to improve integrated operation of the SWP and CVP. Each of these operational scenarios is evaluated in combination with at least one proposed physical/structural component in the Draft EIS/EIR.

SDIP Decision Stages

After certifying and filing the Final EIS/EIR for the SDIP, DWR and Reclamation will each adopt a project and issue a decision during each of two stages of the SDIP decision-making process. Stage 1 will include making a decision on the physical/structural component. For this decision, DWR will assume the existing operational rules including the Corps permitted limit for SWP diversions at CCF, and the existing regulations and constraints such as ~~JPOD,~~ D-1641, ESA, and CESA. DWR will issue a Notice of Determination (NOD) and Reclamation will issue a Record of Decision (ROD) for the decision regarding the actions and mitigation needed to implement any physical/structural component adopted during the Stage 1 decision-making process. The added flexibility and adaptability provided by the physical/structural component alone will achieve, to some extent, each of the SDIP objectives, regardless of the operational decision made during Stage 2.

The decision-making process for Stage 2 will begin after the Stage 1 decision is made. Assuming a physical/structural component is selected in Stage 1, Stage 2 will include the selection of the preferred operational component, based upon the operational scenarios presented in the Draft EIS/EIR and incorporating public input, and additional information collected on the condition of pelagic organisms in the Delta. During this stage, and prior to the selection of the preferred operational component, the public will be provided the opportunity to comment on the preferred operational component. A supplemental document for NEPA and CEQA compliance describing the preferred operational component will be made available for public review for at least 45 days prior to finalizing the decision on the operational component. A second NOD from DWR and an ROD from Reclamation regarding the selection of the preferred operational component will complete the environmental analysis for Stage 2 of the SDIP. More information about this process is presented below in the 'Public Involvement and Next Steps' section.

The Need, Purpose, and Objectives of the SDIP

The SDIP is being pursued to address the needs of the Delta aquatic environment, as well as longstanding statewide, regional, and local water supply needs. Flows into and out of the Delta can have a major effect on these resources. Fish survival as well as water quality and quantity in the south Delta is affected by the natural split of San Joaquin River flow at the head of Old River; tidal fluctuation;

in the Draft EIS/EIR and are shown in Table ES-1. The alternative physical/structural components are shown as 2, 3, and 4. The preferred physical/structural component is identified as 2. The alternative operational components are shown in Table ES-1 as A, B, and C. There is no preferred operational component identified in the Draft EIS/EIR. The selected physical/structural component combined with the existing operational rules as described above, including the Corps permitted limit for SWP diversions at CCF, will be used to develop appropriate mitigation measures for the Stage 1 decision. The preferred operational component and any additional appropriate mitigation measures will be developed during Stage 2 and will not be selected until after the Stage 1 decision is made.

The following describes the basic actions related to the physical/structural component and the operational component of the SDIP:

Physical/Structural Component Actions

- *Replace the seasonal barrier with a permanent operable fish control gate on Old River*

  Where Old River splits from the San Joaquin River, a permanent operable fish control gate will be constructed and operated to keep young salmon in the San Joaquin River as they migrate to the ocean in the spring. In the fall, and in coordination with other water management needs in the south Delta, the gate will be operated to improve dissolved oxygen in the San Joaquin River for adult salmon in the river as they migrate upstream.

- *Replace inefficient seasonal barriers with permanent operable flow control gates on Middle River, Grant Line Canal and Old River*

  Up to three permanent operable flow control gates will be constructed and operated to allow water to flow during times of high water and flooding, while maintaining water levels in Delta channels for local water users during the irrigation season. The flow control gates will also improve water circulation, helping to manage water quality in the south Delta.

- *Dredge portions of Middle River, Old River, and West, Grant Line, Victoria and North Canals to improve flows in the south Delta channels*

  Portions of Middle River, Old River, and West Canal would be dredged to improve conveyance and the operation of private local agricultural siphons and pumps for irrigation. Siphons and pumps in Old River, Grant Line, North, and Victoria Canals would be extended and dredged around to ensure diversion capability.

Operational Component Action

- *Increase permitted limit for diversions into Clifton Court Forebay*

  SWP Banks Pumping Plant (SWP Banks) has an existing installed pumping capacity of 10,300 cfs. Flow diverted from the Delta into Clifton Court Forebay, which is pumped by SWP Banks, is limited by permit to 6,680 cfs except in July-September when an additional 500 cfs is allowed for the

Chapter 1

- Dredge and install operable barriers to ensure water of adequate quantity and quality to agricultural diverters within the south Delta. This would include installation of an operable Grant Line Canal barrier, which would be constructed and operated in accordance with conditions and directions specified by the USFWS, DFG, and NOAA Fisheries. The CALFED ROD commits to seeking funding and authority to complete barriers on Middle River, Old River, and Grant Line Canal by the end of 2007.

- Design and construct floodway improvements on the lower San Joaquin River to provide conveyance, flood control, and ecosystem benefits.
- Reduce agricultural drainage in the Delta.

Currently, two of the above actions are proposed in the SDIP:

- Increase SWP pumping from the current limit from March 15 to December 15 to 8,500 cfs; and modify existing pumping criteria from December 15 to March 15 to allow greater use of SWP export capacity.
- Dredge and install operable barriers (now referred to as "gates") to ensure water of adequate quantity and quality to agricultural diverters within the south Delta.

The remaining actions are being pursued as separate projects or will be pursued in the future. These actions are:

- As noted in footnote 1, increasing SWP pumping to the maximum capability of 10,300 cfs would require fish screens to protect threatened, endangered, and other sensitive fish species. The Tracy Fish Collection Facility project as described in the CALFED ROD has not been implemented, and has been delayed indefinitely, primarily because of concerns about costs. However, Reclamation and other CALFED agencies are currently considering improvement of the existing Tracy Fish Collection Facility. The salvage performance of the existing Tracy Fish Collection Facility could be improved through actions such as improved debris management methods, improved hydraulic control, and improved predation management. Studies are presently underway to help determine the best method for achieving the improvement objectives listed above. No improvements have been formulated at this time. ~~It is expected that some improvements will be implemented as soon as 2006. Others will likely not be implemented until future years.~~
- Specific floodway improvements on the San Joaquin River have not yet been determined. DWR is coordinating with the Corps as the Corps develops the feasibility study.
- The Old River and Rock Slough Water Quality Improvements Project is currently underway to reduce agricultural drainage in the Delta. The Contra Costa Water District (CCWD) published a public draft Mitigated Negative Declaration for the Old River–Byron Tract Water Quality Improvement Project in winter 2003, and for the Rock Slough–Veale Tract Water Quality Improvement Project in January 2004. These projects are expected to be implemented by fall 2005.

The CALFED ROD (page 52) also lists Complementary Actions to the SDIP. They are:

- Install and operate temporary barriers in the south Delta until fully operable barriers (now referred to as "gates") are constructed as the SDIP is implemented.
- Take actions to protect navigation and protect local diverters in the south Delta who are not adequately protected by the Temporary Barriers Program. Action that needs to be taken to protect these diverters may include installation and operation of portable pumps, limited project-specific dredging of intakes, and/or project-specific modification to diversion structures including the conversion of siphons to pumps.

DWR intends to continue to implement the Temporary Barriers Program until permanent gates are operable and to extend and dredge around existing agricultural diversions.

All the components of the SDIP are discussed in greater detail in Chapter 2, "Project Description."

The operational changes at the pumps, channel dredging, and operational gates that are part of the SDIP were contemplated as part of the through-Delta approach to conveyance in the CALFED ROD. However, SDIP, independent of other through-Delta conveyance actions, could contribute to the overall CALFED Program objectives even if other elements of the Program change and evolve over time. (CALFED Bay Delta Program 2000a, p. 23.) At the same time, the proposed physical/structural component for the SDIP (consisting of operable gates, modification of local agricultural diversions, and dredging) would have independent utility as a program identified in State Water Board D-1641 to help DWR and Reclamation meet conditions of their water right permits to implement water quality objectives for agricultural beneficial uses in the south Delta (D-1641, p. 87, 159–161), and to comply with the Central Valley Project Improvement Act (CVPIA), Pub. L. 102-575, to construct a fish control gate at the head of Old River.

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, & Appendix A.) Further, the SDIP is consistent with the recently enacted California Bay-Delta Act, which charges DWR with implementing the conveyance element of the CALFED Program.

~~error.: <http://www.baydelta.ca.gov>.~~

Relationship to the Delta Improvements Package

The Delta Improvements Package (DIP) was developed by the California Bay Delta Authority (State Agency providing coordination and oversight for the CALFED Program), in coordination with stakeholders in 2004 to outline the process for implementing a series of projects, including the SDIP. The DIP clarifies the roles, responsibilities, and commitments of the state and federal agencies in the implementation of programs, projects, evaluations, and other undertakings focused on the Delta region that advance the CALFED Program goals in the areas of water delivery reliability, water quality, ecosystem restoration, Delta levee integrity, and science. The SDIP cannot itself provide all of these CALFED goals.

The state and federal agencies are coordinating their assumptions and schedules to move forward with a set of activities focused on the Delta that are consistent with the CALFED Program's principle of balanced implementation. Coordination of these key activities, including the SDIP, will help the state and federal agencies avoid the conflict and gridlock that the CALFED program was created to address. Readers who desire more information about the DIP may wish to review the web page resources at < http://calwater.ca.gov/>.

Relationship to the CALFED Bay-Delta Programmatic Environmental Impact Statement/ Environmental Impact Report

The Programmatic EIS/EIR provides an analysis of the general effects of implementing the multiple components of the CALFED Program over a 30-year period, across two-thirds of the state. The impacts analysis in the Programmatic EIS/EIR was not intended to address site-specific environmental effects of individual projects. Accordingly, the direct, indirect, and cumulative impacts analysis of the Programmatic EIS/EIR is not sufficiently detailed for purposes of making a decision on SDIP. The SDIP EIS/EIR focuses on a specific project and specific affected geographic areas over a different time frame. The Programmatic EIS/EIR was used only to develop background information and provide mitigation guidance. This SDIP EIS/EIR stands alone, and includes an independently developed analysis of the impacts of the SDIP, including direct, indirect, and cumulative impacts, alternatives, and avoidance/mitigation measures.

Readers who desire more information about the CALFED Program, the Programmatic EIS/EIR, the Programmatic ROD, or the new California Bay-Delta Authority (CBDA) may wish to review the following web page resources and documents, which are available from CBDA at 650 Capitol Mall, 5th Floor, Sacramento, CA 95814, (916) 445-5511:

- Local south Delta water users downstream of the head of Old River are affected by water quality and tidal water levels at each intake location. Tidal ~~W~~water levels are influenced by many factors, one of which is diversions in the south Delta by the SWP and CVP. In addition, there are opportunities to improve circulation and, therefore, water quality in the south Delta.
- There are unmet water supply needs, with respect to quantity and reliability of deliveries, south of the Delta for agricultural, M&I, and environmental beneficial uses.

Project Objectives/Purpose

DWR and Reclamation have, therefore, identified the following project objectives and purposes:

- reduce the movement of San Joaquin River watershed Central Valley fall-/late fall–run juvenile Chinook salmon into the south Delta via Old River;
- maintain adequate water levels and, through improved circulation, water quality available for agricultural diversions in the south Delta, downstream of the head of Old River; and
- 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 daily diversion through the existing intake gates at CCF to 8,500 cfs.

Meeting these objectives by implementing the SDIP will provide increased operational flexibility and the ability to respond to real-time fish conditions while maintaining water delivery reliability.

Background of the Purpose and Need

The following background and historical information provides additional context for understanding the SDIP purpose and need. DWR developed the SDIP project physical/structural and operational components (as analyzed in this EIS/EIR) through many related state and federal efforts to improve Delta water conveyance capabilities and water quality in a manner that takes into consideration multiple beneficial uses of a unique Delta resource. The SDIP project is being pursued to address the needs of the Delta aquatic environment, as well as longstanding regional and local water supply needs. The major factors that have influenced water resources decision-making, uses, and regulatory constraints in the south Delta are presented below.

Ongoing Protection of Fish Resources and Other Environmental Resources

The operations of the SWP and CVP export facilities in the south Delta can cause direct losses of ~~the Central Valley fall-/late fall–run Chinook salmon evolutionarily significant unit (ESU), a candidate for listing under the ESA, and other~~ several special-status species. The SWP and CVP exports change preproject flow patterns in several Delta channels, affecting migration habitat conditions. The SWP and CVP Delta export facilities also result in the increased exposure of these fish species to predation. Additional losses occur when fish are entrained to varying degrees by the SWP and CVP Delta export facilities and other diversions in the Delta and Central Valley rivers.

South Delta Fish Protection

Flows of the San Joaquin River typically divide downstream of Mossdale at the head of Old River, with part of the flow entering Old River. During the 1960s, low levels of dissolved oxygen were observed in the Stockton area and were identified as a source of delay or blockage to the upstream migration of adult San Joaquin River watershed Central Valley fall-/late fall–run Chinook salmon (Hallock 1968). ~~. Several Two measures (to be used alone or in combination) were identified as needed to improve conditions (Lee and Lee 2003, p. 13):~~

~~□ increased flow through the Stockton area and~~

~~□ improved sewage treatment.~~

~~□ supplemental aeration;~~

~~□ upstream oxygen demand load control; and~~

- ~~and increased flow~~

In response to flow concerns and to improve conditions for salmon, DWR has constructed a temporary fish barrier at the head of Old River near Mossdale ~~each fall since 1968.~~ in the majority of years (28 of 39) since 1968. The spring barrier has been installed in 9 of 15 years since 1992 (not installed in high-flow years). The fall barrier is installed and operated ~~April through mid-May~~June ~~and possibly extended to June~~ly ~~1 if warranted, and~~ mid-September through November. In the spring (generally mid-April to mid-May), the barrier is constructed ~~10 feet high~~ with six culverts to allow ~~only minima~~some diversion of flow into Old River and prevent downstream-migrating salmon smolts in the San Joaquin River from entering Old River, which would expose them to SWP and CVP diversion operations and unscreened agricultural diversions. In the fall, the barrier ~~impedes~~ reduces the flow from the San Joaquin River entering Old River. This ~~impediment~~ increased flow in the San Joaquin River past Stockton helps maintain adequate dissolved oxygen concentrations for adult salmon migrating upstream (Hayes 1995). The barrier is notched at the top in the fall to

allow passage of salmon migrating up Old River to the San Joaquin River during high tide water levels.

Environmental Water Account

The Environmental Water Account (EWA) is a cooperative water management program, the purpose of which is to provide protection to ~~at-risk native~~ fish species of the Bay-Delta, without reducing~~hile improving~~ water delivery reliability for water users. The EWA actions involve the ~~development and~~ management of alternative sources of water supply, called EWA assets, to ~~address~~ maintain the water delivery reliability of the SWP and CVP while~~and~~ reducing fish entrainment. ~~ecosystem quality objectives.~~ The EWA program makes environmentally beneficial changes in the operations of the SWP and the CVP, at no uncompensated water loss to the CVP and SWP water users. Protective actions for ~~at-risk native~~ fish species range from reducing Delta export pumping to augmenting instream flows below CVP and SWP reservoirs. ~~and Delta outflows.~~

~~Beneficial changes in SWP and CVP operations could include changing the timing of some flow releases from storage and the timing of water exports from the Delta pumping plants to coincide with periods of greater or lesser vulnerability of various fish species to environmental conditions in the Delta.~~ For example, the EWA might alter the timing of water diversions from the Delta and carry out water transfers in order to reduce fish entrainment at the pumps and provide migratory cues for specific anadromous fish species. The EWA program is designed to replace any regular water supply interrupted by the environmentally beneficial changes to SWP and CVP operations beyond the regulatory baseline. The timing of the protective actions and operational changes vary from year to year, depending on many factors such as hydrology and real-time monitoring that indicates fish presence at the pumps. The EWA program obtains its water assets by acquiring, banking, ~~transferring,~~ or borrowing water and then arranging for its conveyance. Water has~~is~~ been acquired substantially through voluntary purchases in the water transfer market. ~~and by developing additional assets over time.~~ The EWA program also obtains water through operational flexibility of Delta objectives~~facilities~~.

The EWA, per the CALFED ROD, was an essential commitment for meeting ESA requirements for the CALFED Program for the first four years (through September 2004). Extension of the EWA required additional environmental documentation. The Draft EIS/EIR was circulated for public review on July 23, 2003. Environmental documentation for this program was completed in March 2004. The EWA EIS/EIR assumes that current EWA actions will be implemented through 2007. ~~(unless significant changes in existing circumstances require additional environmental analysis) and explains the potential for extending the program. Unless renewed by agreement, the EWA will expire on December 31, 2007.~~

This EWA program reduces the effects of the SWP and CVP current operations on fish. The SDIP analysis assumes that this current EWA program is in place for all alternatives, including the No Action. However, the proposed SDIP could result in impacts on the current EWA. Section 6.1 describes the magnitude of these impacts expected to result from the SDIP. It also describes in detail the mitigation that can be implemented to reduce the impacts on the current EWA program, and reduce SDIP fish entrainment impacts to less than significant. More discussion of the current and future expanded EWA is included in Section 5.1 and in Appendix B.

~~In addition,~~ Reclamation, DWR, USFWS, NOAA, and DFG are currently analyzing a Long-Term EWA (LTEWA) program. Should the LTEWA be adopted, it is expected that it would mitigate the operational impacts of SDIP.

Central Valley Project Improvement Act

The CVPIA is a federal statute passed in 1992 with the following purposes:

> To protect, restore, and enhance fish, wildlife, and associated habitats in the Central Valley and Trinity River basins of California; to address impacts of the CVP on fish, wildlife and associated habitats; to improve the operational flexibility of the CVP; to increase water-related benefits provided by the CVP to the state of California through expanded use of voluntary water transfers and improved water conservation; to contribute to the state of California's interim and long-term efforts to protect the San Francisco Bay/Sacramento–San Joaquin Delta Estuary; to achieve a reasonable balance among competing demands for use of CVP water, including the requirements of fish and wildlife, agricultural, municipal and industrial and power contractors.

The CVPIA modified the priorities for managing water resources of the CVP, a major link in California's water supply network. CVPIA amended previous authorizations of the CVP to include fish and wildlife protection, and habitat restoration and enhancement as project purposes, having equal priority with agricultural, municipal, and industrial water supply, and power purposes. A major feature of CVPIA is that it requires acquisition of water for protecting, restoring, and enhancing fish and wildlife populations. As a result, CVP contractors experienced a reduction in average annual deliveries from approximately 2 maf to approximately 1.4 maf.

CVPIA Section 3406 (b)(1) authorizes and directs Reclamation to double the natural production of anadromous fish in Central Valley rivers and streams. To meet this goal, USFWS developed the Anadromous Fish Restoration Program (AFRP), which includes recommendations for increasing flows to complement other habitat restoration activities intended to improve conditions for anadromous fish.

Section 3406 (b)(3) of the CVPIA mandates the development of a program that acquires water for 3406 (b)(1) needs to supplement the quantity of water dedicated to fish and wildlife purposes.

CVPIA Section 3406 (b)(2) (CVPIA [b][2]) authorizes and directs the Secretary of the Interior to dedicate and manage 800,000 acre-feet of CVP yield annually for the primary purpose of implementing the fish, wildlife, and habitat restoration purposes and measures authorized in CVPIA, to assist the State of California in its efforts to protect the waters of the Bay-Delta and to help meet obligations legally imposed on the CVP under state or federal law following the date of enactment of the CVPIA. This dedicated 800,000 acre-feet of water, known as (b)(2) water, was included as a component of the Programmatic EIS/EIR existing regulatory baseline for fishery protection conditions for environmental and fisheries protection measures.

Section 3406 (d) mandates that the Secretary of the Interior "shall provide firm water supplies of suitable quality to maintain wetland habitat areas on units of the National Wildlife Refuge System in the Central Valley of California; on the Gray Lodge, Los Banos, Volta, North Grasslands, and Mendota state wildlife management areas; and on the Grasslands Resources Conservation District in the Central Valley of California." The statute also directs Reclamation to meet specific goals for water supplied to these sites within a specified amount of time.

To meet water acquisition needs under CVPIA, DOI has developed a Water Acquisition Program (WAP), a joint effort of Reclamation and the USFWS. The WAP acquires water to meet two purposes: (1) refuge water supplies, and (2) instream flows. CVPIA requires DOI to acquire additional water supplies (known as Level 4) to meet optimal waterfowl habitat management needs at national wildlife refuges in California's Central Valley, certain state wildlife management areas, and the Grasslands Resource Conservation District. The WAP acquires water from willing sellers to increase instream flows for fish in support of the AFRP.

Vernalis Adaptive Management Plan

The Vernalis Adaptive Management Plan (VAMP) is a 12-year experimental program that stipulates flows on the San Joaquin River and export curtailments at the CVP and SWP for 31 days during the months of April and May. VAMP was included in D-1641 and was in its sixth year in 2005. The purpose of VAMP is to identify the effects of San Joaquin River flows, reduced exports and the barrier at the head of Old River on ~~the true~~ fall-/late fall–run Chinook salmon smolt ~~and delta smelt populations and~~ survival in the lower San Joaquin River ~~, and improve aquatic habitat conditions in the Delta, through the installation of the head of Old River barrier and pulse flows on the San Joaquin River, for fall-/late fall-run Chinook salmon and delta smelt~~. Currently, CVPIA (b)(2) water can be used to reduce exports at the CVP. These export reductions are taken, and (b)(2) water is used to account for the reduction. The EWA can reduce exports at the SWP and CVP as well. If export reductions are taken, the EWA transfers water in the

summer to make up for the earlier export reductions. ~~The reductions in exports combined with the pulse flows down the San Joaquin River during VAMP allow larval and juvenile smelt to avoid becoming entrained at the export facilities and to move downstream to Suisun Bay.~~ The potential effects of VAMP on delta smelt are unknown.

Recent Fish Declines in the Delta and Estuary

In the last few years, the abundance indices calculated by the Interagency Ecological Program (IEP) Fall Midwater Trawl survey (MWT) demonstrated significant declines in numerous pelagic fishes in the upper San Francisco Bay-Delta Estuary. The abundance indices for 2002–2004~~5~~ were measured at record low levels for delta smelt and age-0 striped bass and near-record lows for longfin smelt and threadfin shad (www.delta.dfg.ca.gov). Data from another IEP monitoring survey, the Summer Townet Survey (TNS), corroborate the MWT findings. In contrast, however, the San Francisco Bay Study MWT did not show significant declines in its catches of marine/lower estuary species. Based on these findings, the problem appears to be limited to fish dependent on the upper portion of the Bay-Delta estuary.

While several of the declining species—including Delta smelt, longfin smelt, juvenile striped bass, and calanoid copepods—previously showed evidence of a long-term decline, there appears to have been a precipitous "step-change" to very low abundance during 2002–2004~~5~~. This observation is supported by initial statistical analyses of the MWT data. ~~Moreover, the record or near-record low abundance levels are surprising in view of the fact that the hydrological regime in the San Francisco Bay-Delta Estuary was relatively moderate (no extreme dry or wet periods) during 2002–2004.~~ Some~~Many~~ estuarine organisms, including longfin smelt and striped bass, typically produce poor year classes in dry years (Jassby et al. 1995); delta smelt abundance is generally lowest in very wet or very dry years (Moyle et al. 1992). Thus, the moderate hydrology during the past ~~3~~4 years would be expected to produce at least modest population indices.

The ~~current~~ initial conceptual model for why fish abundance has declined abruptly in recent years assumes at least three general factors that may be acting individually or in combination to lower pelagic productivity: (1) toxins; (2) invasive species; and (3) water project operations. DFG, NOAA Fisheries, and USFWS ~~are~~ assisted~~ing~~ with the development of a screening-level study ~~being implemented~~ in summer 2005. The results of this study were~~ill be~~ made available in November 2005. It is expected that this study will better define the degree to which each of these factors may be responsible individually, or in combination. The study is designed to identify the most likely causes and to assign priorities on the basis of where funds and resources can be best used. Results also may provide additional information on causes of long-term declines in several affected species. Several of the studies are expected to be conducted based on an "adaptive management" approach, where information is analyzed as it is made available and, depending on the results, supplementary studies are conducted in ~~2006~~2006,~~and~~ 2007 and perhaps later years.

Scientific studies, such as described above, are underway~~needed~~ to determine the cause of the decline in pelagic fish. Until a determination can be made, no specific reason should be assumed at this time. These types of studies will be ongoing and will likely lead to new scientific evidence about the relationships among various species in the Delta. Although design, fabrication, and construction of the gates may begin before these studies are complete, the SWP export limit increase will not be fully implemented until after the gates are constructed and operable (2009). This provides DWR and Reclamation time to sort out the cause of the decline in some pelagic fish in the Delta before additional~~substantial~~ pumping due to 8,500 cfs permit changes takes place.

More information regarding the potential causes of the declines and actions to investigate and solve this issue is described in Appendix J.

South Delta Water Agency Water Reliability

South Delta Water Agency (SDWA) members have a need to improve reliability of water diversions to meet consumptive use needs. SDWA is a public agency formed by law to enter into contracts with the United States and the State of California to protect the water rights of landowners within the agency's jurisdiction from salinity intrusion and to ensure a dependable water supply. Water for lands within SDWA boundaries is supplied almost exclusively from Delta channels. Water supply in the south Delta is dependent on water quality and levels, which are influenced by a variety of factors, including natural tidal fluctuation; San Joaquin River inflow; local diversions; local agricultural return flows; channel capacity resulting in restricted circulation; fluctuations in barometric pressure; local wind direction and velocity; and water exports.

In July 1982, SDWA filed a lawsuit over the effects of SWP and CVP operations on the south Delta. The suit sought a declaration of the rights of the parties as well as preliminary and permanent injunctions requiring that the projects be operated to protect the south Delta. SDWA alleged that: (1) CVP operations on the San Joaquin River, primarily Friant Dam, unlawfully reduce the quantity and degrade the quality of water flowing in the San Joaquin River to the south Delta; (2) SWP and CVP pumping operations violate SDWA rights by lowering water levels, reversing flows, and diminishing the influence of the tides; and (3) the Secretary of the DOI's designation of the Stanislaus River basin for allocation of water from New Melones Reservoir violates SDWA rights by not including the south Delta in the basin.

DWR's involvement in the suit is a result of the alleged effects of the SWP and CVP pumps on south Delta water levels and circulation. The other issues involve only Reclamation.

placed into the main channel bed at each location along with overflow weirs and several gated culverts. These barriers are installed in the spring and removed in the fall. The fourth barrier, a fish control barrier at the head of Old River, was~~is~~ discussed ~~below~~ under South Delta Fish Protection. While it is unrelated to the SDWA lawsuit, it has become part of the Temporary Barriers Program for purposes of coordinating construction and permitting activities. The Temporary Barriers Program continues to be implemented on an annual basis as an interim solution to water levels and circulation until a permanent solution can be implemented. Several state and federal permits have been issued for the Temporary Barriers Program. These permits are valid through 2007, with the exception of the 1601 permit issued by the DFG, which expires in November 2005. All necessary permits will be renewed to extend the program until a permanent solution, such as SDIP, is implemented.

Mismatch between Supplies and Beneficial Uses

The Bay-Delta system provides the water supply for a wide range of instream, riparian, and other beneficial uses such as drinking water for millions of Californians and irrigation water for one-third of California's agricultural land. Some of these beneficial uses depend on the Bay-Delta system for only a portion of their water needs while others are highly or totally dependent on Bay-Delta water supplies. As water use and competition among uses have increased during the past several decades, conflicts have increased among users of Bay-Delta water. Heightened competition for the water during certain seasons or during water-short years has magnified the conflicts. As a result, demands for reliable water supplies south of the Delta continue to increase (CALFED Bay-Delta Program 2000).

Further compounding the issue, water flow and timing requirements have been established for certain fish and wildlife species with critical life stages that depend on freshwater flows. These requirements have reduced water supplies and flexibility to meet the quantity and timing of water delivered from the Bay-Delta system. Water suppliers and users are concerned that additional restrictions that may be needed to protect species would increase the uncertainty and further reduce the availability of the Bay-Delta system for agricultural and M&I purposes (CALFED Bay-Delta Program 2000b).

Currently, the amount of water available for M&I, agriculture, and environmental use in any given year depends on rainfall, snow pack, runoff, carryover storage, pumping capacity from the Delta, regulatory constraints, and the amount requested. In average years, such as 2000, California receives close to 200 million acre-feet (maf) of water from precipitation and imports. Of this total supply, about 50 to 60% is used by native vegetation, evaporates into the atmosphere, provides some water for agricultural crops and managed wetlands, or flows to Oregon, Nevada, the Pacific Ocean, and salt sinks like saline groundwater aquifers and the Salton Sea. The remaining 40 to 50%, called the

Table 1-3. California Water Balance Summary for Water Years 1998, 2000, and 2001

	1998 (Wet Year)	2000 (Average Year)	2001 (Drier Year)
Total Supply (Precipitation and Imports)	336.9 maf	194.7 maf	145.5 maf
Dedicated Supply (Includes Reuse)	94.5 maf	82.5 maf	64.7 maf
Distribution of Dedicated Supply to Various Applied Water Uses			
Urban Uses	7.8 maf	8.9 maf	8.6 maf
Agricultural Uses	27.3 maf	34.2 maf	33.7 maf
Environmental Water*	59.4 maf	39.4 maf	22.5 maf

* Environmental water includes instream flows, wild and scenic flows, required Delta outflow, and managed wetlands water use.

Source: California Department of Water Resources Public Review Draft Water Plan Update 2005, Volume 3.

To balance the needs of all beneficial users as well as the needs of the environment, CALFED agencies analyzed four different alternatives, all of which included differing operational and structural components for the SWP and CVP facilities (as well as other water conservation efforts, transfers, etc.) to reduce the mismatch between Bay-Delta water supplies and current and projected beneficial uses dependent on the Bay-Delta system.

The SDIP project is one component identified in the CALFED Programmatic Preferred Alternative that will enable the CALFED preferred alternative goals to be met. Increasing the permitted daily diversion capability at the SWP's 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. As a result, reductions in exports could be made during times when those criteria are in effect. On balance, this would provide SWP and CVP more flexibility and therefore improve predictability of water supply from the Bay-Delta system for beneficial use needs.

State Water Project

DWR operates and maintains the SWP, which delivers water to 29 agricultural and M&I contractors in the northern California, San Joaquin Valley, the San Francisco Bay Area, and central coast and southern California. The SWP delivers water for agricultural, municipal, and industrial uses, providing water to 20 million Californians and 660,000 acres of irrigated farmland. It comprises 20 pumping plants, five hydroelectric power plants, 33 storage facilities, and more than 660 miles of aqueducts and pipelines. These facilities include its major diversion and pumping facility (CCF and SWP Banks) in the south Delta,

and the California Aqueduct extending from the south Delta to SWP facilities in southern California.

The SWP began its deliveries in the 1960s, during a time when environmental concerns began to shape legislation. Throughout the 1970s, regulations intending to protect, conserve, and restore environmental resources were enacted. These laws, in turn, have shaped the way DWR manages and operates SWP facilities. Freshwater releases are made from upstream reservoirs, pumping operations are scheduled to minimize impacts on fish, programs were established and facilities were built to protect fish and wildlife.

Twenty-nine water agencies (contractors), of which The Metropolitan Water District of Southern California (Metropolitan) is the largest, contract with DWR for project water. The amount of each contract is specified in "Table A." Table A amounts are used to define each contractor's proportion of the available water supply that DWR will allocate and deliver to that contractor. Each year, contractors may request an amount not to exceed their Table A amount. The Table A amounts are used as a basis for allocations to contractors, and the actual supply to contractors is variable and depends on the amount of water available. The total Table A contract amount is 4.2 maf a year. Approximately 3 maf of the Table A amount is provided each year. Under the terms of the SWP's $1.75 billion bond issue, users for the most part pay all costs of the project, including interest. SWP contractors also pay energy costs and a transmission charge based on the distance the water is transported. Although SWP water is more expensive than federal water, it is not subject to an acreage limit.

~~The Monterey Agreement signed by 26 of 29 SWP water contractors in 1994 restructured SWP contracts to allocate water based on contractual Table A amounts instead of the amount of water requested for the given year. In times of shortages, the SWP agricultural and M&I contractors will be cut equally. Typically, however, water delivery capabilities are lower than Table A amounts.~~

The SWP operates under long-term contracts with public water agencies throughout the state extending from Sutter, Butte, and Plumas Counties in the north to Alameda, Santa Clara, and Napa in the Bay area, through the San Joaquin Valley and San Luis Obispo and Santa Barbara Counties, and finally to southern California. These agencies, in turn, deliver water to wholesalers or retailers or deliver it directly to agricultural and M&I water users (California Department of Water Resources 1999a). There are five divisions within the SWP: Oroville, Delta, San Luis, San Joaquin, and Southern Field Divisions. Each division within the SWP contains several facilities including dams, pumping plants, canals, power plants, lakes, and reservoirs. Service areas for SWP contracting agencies are shown in Figure 1-1 and region, contractors, and full Table A amounts in 2003 are outlined in Table 1-4.

SWP supplies water to the northern Delta and Napa and Solano Counties from water stored in Oroville Reservoir and distributed through the North Bay Aqueduct. The Bethany Reservoir is fed by the SWP Banks facility in the

Action	Year	Description
Bay-Delta Plan Accord ~~and State Water Board Order WR 95-06~~	1994 ~~and 1995~~	Agreement ~~and associated State Water Board order~~ to provide for operations of the CVP and SWP to protect Bay-Delta water quality. Also provided for further evaluation of Bay-Delta operations, which is being pursued under the CALFED process.
1995 Water Quality Control Plan and State Water Board Order WR 95-06	1995	~~[~~Revised water quality objectives in the Delta to protect water supply and environmental resources. Included new objectives for the 2 ppt salinity gradient location (X2) and limited exports with an Export/Inflow objective. ~~need description]~~
Monterey Agreement and Amendments	1995	Agreement between DWR and SWP contractors to revise water supply allocation and management under the SWP water supply contracts.
NOAA Fisheries Biological Opinions	1996 and 1997	Established criteria to protect coho salmon and steelhead in coastal streams.
NOAA Fisheries ESA listing	1999	Spring-run Chinook listing.
State Water Board Revised WR Decision 1641	2000	Revised order to provide for the operations of the CVP and SWP to protect Bay-Delta water quality.
Trinity ROD and related decisions	2001 and 2004	Restored flows on the Trinity River. The ROD was upheld by the Federal Court in 2004.
NOAA Fisheries Biological Opinion for salmonids	2004	NOAA Fisheries issued a BO stating a finding of no jeopardy on the effects of the system-wide CVP/SWP operations (OCAP).
USFWS Biological Opinion for Delta smelt	2004 and 2005	USFWS issued a BO stating a finding of no jeopardy on the effects of the system-wide CVP/SWP operations (OCAP).

BO = biological opinion.
CVP = Central Valley Project
ESA = federal Endangered Species Act.
NOAA Fisheries = National Marine Fisheries Service.
ROD = Record of Decision.
SWP = State Water Project.
State Water Board = State Water Resources Control Board.
USFWS = U.S. Fish and Wildlife Service.
WR = water right.

Source: California Department of Water Resources, unpublished.

The Monterey Agreement and Amendments to State Water Project Contracts

When the SWP began operations in the 1960s, DWR signed contracts with water contractors throughout the state to manage the allocation of the water. The contracts set forth the conditions and regulations that were to be followed in both wet years and critical years. Article 18 addresses the allocation of shortages in water supply, and particularly under what circumstances the initial reductions to agricultural use should be imposed prior to reducing allocations to urban contractors. Article 18(a) deals with temporary shortages that occur due to droughts and other temporary causes. Article 18(b) deals with the possibility of

specified types of permanent shortages of supply of project water. In the droughts of 1987–1992, water supply was severely reduced, and as a result, Article 18(a) became the center of SWP allocation controversy. The agricultural diverters, who sustained the most drastic cuts during the drought, argued that such cuts were not equitable and that the shortage was a result of both undeveloped SWP project allocations and hydrological events. Because M&I contractors did not face the same supply reduction, they held different opinions about the implementation of Article 18. As disagreement persisted with the growing water shortage, DWR and SWP contractors entered into discussions and negotiations to resolve the problem.

These discussions were threatening to enter legislative and judicial arenas, so DWR initiated a fulltime effort to resolve the problems by hiring a mediator in October and November and setting a deadline of December 1, 1994. With the mediator, the group of contractors and DWR found that the issue of water shortage could not be resolved through negotiations, but rather their contracts, specifically Article 18, needed amendment and modification. They felt that amended contracts would allow greater flexibility in water deliveries and would make the SWP and the DWR more responsive to changing water supply and needs.

When the 2-month period with the mediator had ended, the SWP contractors and the DWR had come to an agreement. Because these discussions were held in Monterey, the result became known as the Monterey Agreement. It consisted of several principles, from which amendments to contracts would form. The principles were developed to satisfy the following goals:

- Goal 1—Increase reliability of existing water supplies;
- Goal 2—Provide stronger financial management; and
- Goal 3—Increase water management flexibility, providing more tools to local water agencies to maximize existing facilities.

Based on these goals and principles, several SWP contracts were amended. The benefits were designed to increase contractor certainty about allocations and facilities use. The agreement also helps~~allows~~ contractors to increase their own supply outside of SWP contracts through:

- water transfers,
- water banking,
- storage outside service areas,
- transport of nonproject water,
- permanent sales of water among contractors,
- annual turn-back program,
- use of Kern Water Bank property by agricultural contractors for water banking, and
- access by M&I water contractors to Kern Water Bank.

The Planning and Conservation League (PCL) filed a lawsuit on December 27, 1995, against DWR and Central Coast Water Authority (CCWA), challenging compliance under CEQA for the Monterey Amendment and the transfer of Kern Water Bank (KWB) to Kern County Water Agency (KCWA). The Sacramento County Superior Court ruled in favor of DWR and CCWA, and PCL appealed the decision. The Court of Appeal held that the EIR was inadequate and that DWR should have acted as the lead agency for the project. In addition, the Court reinstated the validation claim in the complaint, providing a forum for review of the entire Monterey Amendment, including the transfer of a portion of the KWB. The Court also directed DWR to prepare a new EIR. In July 2000, the parties reached an agreement on principles for settling the lawsuit. DWR commenced preparing a new EIR and the interested parties continued mediation to prepare a Settlement Agreement. The Superior Court approved the Settlement Agreement on May 20, 2003. Under this Settlement Agreement, the Monterey Agreements remain in effect. Implementation of the Settlement Agreement and preparation of the new EIR are underway.

State Water Resources Control Board Water Quality Control Plan and Decision 1641

The State Water Board issued D-1641 on December 29, 1999, revised March 15, 2000 (State Water Resources Control Board 1999). D-1641 is the water rights decision implementing water quality objectives in the 1995 Delta Water Quality Control Plan (WQCP) ~~objectives, including the water quality standards on the San Joaquin and Mokelumne Rivers and Cache and Putah Creeks.~~ D-1641 also approved a petition to change points of diversion of the CVP and SWP in the southern Delta and approved a petition to change places and purposes of use of the CVP. The final phase of implementation focused on how water right holders in the Sacramento Valley should contribute to meeting the 1995 Delta WQCP objectives. A negotiated settlement between Sacramento Valley water users and DWR and Reclamation resolved this issue with ~~by creating~~ the Sacramento Valley Water Management Agreement (SVWMA) and Program. D-1641 applies to DWR and Reclamation water rights permits through terms and conditions affecting SWP and CVP operations.

The State Water Board adopted its WQCP for the Bay-Delta and ~~incorporated~~ took into consideration several ~~elements of~~ U.S. Environmental Protection Agency (EPA), NOAA Fisheries, and USFWS ~~regulatory~~ suggested requirements~~objectives~~ for water salinity and endangered species protection. The WQCP identifies the beneficial uses of the Bay-Delta that are to be protected and includes water quality objectives that are intended to protect those beneficial uses. The plan also includes an implementation program for achieving the water quality objectives. Under the CWA, the water quality standards comprise the uses and the objectives established to protect them. Features of the current WQCP implemented by D-1641 affect the SDIP by requiring certain Delta outflows and by regulating actions that may be used to protect fish and benefit the environment. Requirements of D-1641 that are relevant to SDIP are:

- ~~water-year classificationsexport limits that affect~~ outflow requirements and, consequently, export limitations;
- water quality/salinity ~~standards~~ objectives for protection of agricultural and M&I uses;
- the Delta outflow requirements for flow from the Delta to San Francisco Bay; and
- limitations on combined SWP and CVP Delta exports.~~—~~ as a fraction of Delta inflow. ~~Sufficient Delta outflow is provided based on available water.~~ Exports ~~(diversion of water from its natural course to San Francisco Bay)~~ are limited to a percentage of the measured Delta ~~inflow~~ inflows.~~(that does not include rainfall).~~ These percentages ~~range~~ are~~from~~ 35% ~~to 45%~~ from February through June, ~~depending on the Delta inflow,~~ and 65% during the remainder of the year.

- limitations on combined SWP and CVP exports to equal the San Joaquin River inflow during a 30-day period in April and May. This limitation was modified to the current VAMP requirements, which include specific San Joaquin River inflow and combined export targets.

- DCC closure periods were increased to provide more protection for Sacramento Chinook and steelhead, by allowing a smaller fraction of the migrating fish to be diverted into the central Delta.

Coordinated Operations Agreement

Recognizing the connection between their two major water projects and the need to jointly comply with a combination of federal, state, and regional laws, policies, agency decisions, permit requirements, and agreements relating to water rights and biological resource protection, in 1986 DWR and Reclamation entered into a COA to manage California's water through the operations of their respective SWP and CVP water projects (see descriptions of the SWP and CVP below). Through this agreement and program, DWR and Reclamation coordinate the operations of the SWP and CVP to meet Delta regulatory requirements under D-1641 and the ESA.

The COA replaced earlier similar agreements between the United States and the State of California. The COA specifies how the SWP and CVP operate to meet SWP and CVP requirements described in the 1986 WQCP and under D-1485 (predecessor to D-1641) without adversely affecting the rights of other parties. The COA identifies two types of conditions in the Delta under which the SWP and CVP should operate: *balanced water conditions* and *excess water conditions.*

Balanced water conditions occur when releases from upstream reservoirs plus unregulated flow equal the water supply needed to meet Sacramento Valley in-basin uses plus exports. During balanced water conditions, but when water is

available to be stored in reservoirs, storage releases required to meet the Sacramento in-basin uses are made 55% from the CVP and 45% from the SWP. Under this condition, flow through the Delta is deemed adequate to meet all needs, and the CVP and SWP are operated to store and export as much water as possible up to the physical and contractual limits. Excess water conditions occur when the Delta inflows (combined releases from upstream reservoirs and unregulated flow) are greater than needed to meet the in-basin uses plus export. Under this condition, flow through the Delta is adequate to meet all needs, and no coordinated operation between the CVP and SWP is required.

The COA does not cover all circumstances that occur in Delta operations or all regulatory requirements (e.g., water quality requirements in the 1995 Delta WQCP and stipulations of biological opinions, the EWA, and others). DWR and Reclamation are able to make real time adjustments to the COA accounting to accommodate for theses changes in operational and regulatory requirements.

Issues of Known Controversy

NEPA requires that project proponents identify issues of known controversy that have been raised in the scoping process and throughout the development of the project. DWR and Reclamation considered these concerns in the development of the SDIP. All significant environmental impacts resulting from constructing and operating the SDIP will be mitigated. The following list outlines those issues that have been identified by agencies and the public relative to SDIP.

Effects on Delta Aquatic Resources

The effects on fish and the bay tidal system as a result of water project operations are an issue of concern to the public and government agencies. Recent data indicate that there has been a decline in abundance of pelagic fish species (as described above). Details regarding this information are provided in Appendix J.

DWR and Reclamation are working with other resource agencies to help determine the reasons for the apparent decline of pelagic fish species. In 2005, DWR ~~and Reclamation are~~ redirected~~ing~~ resources (~~$~~1.8 million) to evaluate the potential causes of this decline including toxics, invasive species, and water project operations. DWR and Reclamation have committed an additional $3.5 million for 2006 and $3.5 million for 2007 to continue these pelagic organism investigations. The Stage 2 decision will ~~not be made until this~~ incorporate any information that is collected and evaluated for these studies. ~~The results of this evaluation will be used to determine and direct additional studies and actions.~~ Therefore, no increase in diversions at CCF beyond that currently permitted will occur due to SDIP implementation until the effects that additional exports may have on this issue are more clearly understood.

Chapter 2

- Middle River (near the confluence of Middle River with Victoria Canal),
- Grant Line Canal (near the confluence of Grant Line Canal and Old River), and
- Old River (east of the DMC approximately 4,000 feet southeast of the intersection of the Alameda, Contra Costa, and San Joaquin County lines).

- Dredge various channels in the south Delta to improve conveyance and dredge areas surrounding agricultural diversions to improve their function.
- Extend up to 24 agricultural diversion intake facilities to improve their function.

Operational Component Potential Scenarios

- Modify operations to increase the monthly average diversion rate into CCF up to 8,500 cfs.
- Convey up to 100,000 acre-feet of CVP Level 2 Refuge water through CCF and SWP Banks by September 1, and provide a north-of-Delta supply up to 75,000 acre-feet from CVP storage facilities to reduce SWP's obligation to comply with Bay-Delta water quality and flow requirements.
- As part of the Stage 2 decision, ~~i~~implement an interim operations regime between December 15 and March 15 until the selected Stage 1 tidal gates are ~~operational component is~~ fully operational~~implemented~~ to achieve the greater of:
  - maximum diversions under existing Corps authorization which is 6,680 cfs plus 1/3 the flow of the San Joaquin River when flows at Vernalis are greater than 1,000 cfs, or
  - maximum diversions of up to 8,500 cfs when (1) water quality standards (salinity at south Delta stations as defined by D-1641) are met and the dissolved oxygen (DO) in the San Joaquin River at Stockton is at or above the objective of 5 milligrams per liter (mg/l); (2) the south Delta water levels are at least 0.0 feet above mean sea level (feet msl) if needed for agricultural diversions; (3) there would be no unacceptable effects on special-status species; and (4) there would be no impact on EWA.

California Environmental Quality Act/ National Environmental Policy Act Requirements

CEQA and NEPA generally require consideration of a range of alternatives to a proposed project that would attain most of the basic project objectives while avoiding or substantially lessening project impacts and accomplish the project purpose and need. A range of reasonable alternatives is analyzed to sharply

implement a physical/structural component or to continue installing temporary barriers will be made. A decision for Stage 1 will be made based on this EIS/EIR. The decision-making process for Stage 2 will begin after the Stage 1 decision has been documented in an NOD/ROD. The added flexibility and adaptability provided by the physical/structural component alone will achieve, to some extent, each of the SDIP objectives, regardless of the operational decision made during Stage 2. If the Stage 1 decision is to continue the installation of the temporary barriers, proceeding with Stage 2 and addressing both the physical/structural component and the operational component would be considered.

Assuming the Stage 1 decision is to implement a physical/structural component, Stage 2 would include the selection of the preferred operational component, based upon the operational scenarios presented in the Draft EIS/EIR and incorporating public input, and additional information collected on the condition of pelagic organisms in the Delta. During this stage, and prior to the selection of the preferred operational component, the public will again be provided the opportunity to comment on the preferred operational component.

CEQA and NEPA compliance for the decision made under Stage 2 will follow the preparation and circulation of supplemental information as directed by the CEQA Guidelines (see Article 11) and CEQ NEPA Regulations (40 CFR 1502.9(c)). DWR and Reclamation will issue the necessary supplemental document for CEQA and NEPA compliance explaining the preferred operational component, the rationale for its selection, and any additional environmental effects. This document would be available for public comment and review for a period of at least 45 days, consistent with CEQA and NEPA, and will provide opportunity for the public to submit additional comments on the environmental analysis of the operational component of the SDIP. A second Notice of Determination from DWR and an ROD from Reclamation regarding the selection of the preferred operational component will be filed to complete the environmental compliance requirements for Stage 2 of the SDIP.

Parties concerned about the operational component in Stage 2 should participate early in the EIS/EIR process and review and comment on this Draft EIS/EIR. With respect to the future decision for Stage 2 that relies upon the SDIP EIS/EIR certified at the time of the NOD for Stage 1, and any supplements to the EIS/EIR, a new CEQA challenge period will commence at the time of the Stage 2 decision for parties to request judicial review of DWR's decision based on any cause of action under CEQA related to the Stage 2 decision. In any decision for Stage 2, DWR will state in the Notice of Determination that DWR has relied in part upon the SDIP EIS/EIR certified in Stage 1 and intends that those aspects of the SDIP EIS/EIR relied upon in the Stage 2 decision will be subject to further judicial review.

Other permitting requirements may follow a similar staging process whereby a responsible or cooperating agency may issue a permit based on the Stage 1 decision and later amend the permit to include the Stage 2 decision. For

diversions. Stage 2 of Alternative 2A would involve implementation of Operational Scenario A for the operational component of SDIP. Specific timing and additional detail for Operational Scenario A are provided later under the discussion of Operational Scenarios.

Interim Operations

~~Alternative 2A also includes the implementation of~~ Interim Operations may be considered as part of the Stage 2 decision. Interim Operations would begin only after an SDIP Stage 2 decision is made and may be implemented before the permanent gates are fully operable, if the Stage 2 decision is made while the gates are under construction. The interim operations would be compatible with the Stage 2 selected pumping operations and limits.

~~, which would allow increased diversions prior to the full implementation of the operational component.~~ Interim Operations would be used only between December 15 and March 15, as specified in the Corps Public Notice dated October 13, 1981. During this period there are generally no local diversions, so fish entrainment is likely to be 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 to not 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.

Interim Operations would include the greater of the maximum diversions of ~~6,680 cfs plus 1/3 the flow of the San Joaquin River when flows at Vernalis exceed 1,000 cfs (i.e.,~~the existing limit~~);~~ or maximum diversions of 8,500 cfs when (1) water quality standards (salinity at south Delta stations as defined by D-1641) are met and the DO in the San Joaquin River at Stockton is at or above the objective of 5 mg/l; (2) the south Delta water levels are at least 0.0 msl if needed for agricultural diversions; (3) there would be no unacceptable effects on special-status fish species; and (4) there would be no impact on EWA.

Alternative 2B

Alternative 2B would be implemented in 2 stages. Stage 1 would involve the implementation of the physical/structural component including the construction and operation of the head of Old River fish control gate and Old River, Middle River, and Grant Line Canal flow control gates; channel dredging in Old River, Middle River, and West Canal; spot dredging in Victoria, North, and Grant Line Canals, and in Old River and Middle River; and extension of agricultural diversions. Stage 2 of Alternative 2B would involve implementation of Operational Scenario B for the operational component of SDIP. Specific timing and additional detail for Operational Scenario B are provided later under the discussion of Operational Scenarios.

Gate Operations

Gate Operations Review Team

A federal and state interagency team will be convened to discuss constraints and provide input to the existing Data Assessment Team (DAT). The Gate Operations Review Team will make recommendations for the operations of the fish control and flow control gates to minimize impacts on~~of~~ resident threatened and endangered species and to meet water level and water quality requirements of south Delta water users. The interagency team will include representatives of DWR, Reclamation, USFWS, NOAA Fisheries, and DFG, and possibly others as needs change. The interagency team will meet through a conference call, approximately once a week. DWR will be responsible for providing predictive modeling, and SWP will provide operations forecasts and the conference call line. Reclamation will be responsible for providing CVP operations forecasts, including San Joaquin River flow, and data on current water quality conditions. Other members will provide the team with the latest information related to south Delta fish species and conditions for crop irrigation.

The Gate Operations Review Team will use information shared at the weekly meetings to determine gate operations for that week. Although there are numerous ways the gates could be operated to address the many issues in the south Delta, it is assumed that the Gate Operations Review Team will make recommendations that attempt to balance these needs. A likely gate operation is described below, and in more detail in Sections 5.2 and 5.3. It is assumed that the gate operations adopted by the GORT under varying circumstances would be the same or similar to this description.

Head of Old River Fish Control Gate Operations

The operation (or closing) of the head of Old River fish control gate is intended to benefit the San Joaquin River watershed Central Valley fall-/late fall–run Chinook salmon by reducing the downstream movement of the salmon into the south Delta channels via Old River. Because the gate is functional, operations can be more flexible in response to the detection of fish presence and/or water quality. Operation of the gates in Middle River and Old River at DMC could provide more net flows from Victoria Canal into Middle River and from Old River at Clifton Court Ferry into the Old River channel upstream of the CVP Tracy facility. The operation of the head of Old River fish control gate for fish protection and during other times of the year would lower the electrical conductivity (EC) of the western portion of these channels. This gate can have the largest effect on south Delta salinity. The salinity in the south Delta channels can be reduced to approach the EC of the SWP exports if the San Joaquin River diversion flow into the head of Old River is reduced.

Spring Operations/Vernalis Adaptive Management Plan

Operation (closing) of the head of Old River fish control gate is proposed to begin on April 15. Spring operation is generally expected to continue through May 15~~31~~, to protect outmigrating salmon and steelhead. During this time, the head of Old River gate would be fully closed.

If, in the opinion of the USFWS, NOAA Fisheries, and DFG, the gate needs to be operated at a different time or for a longer period (e.g., just prior to and/or after the VAMP period), it may be operated provided the following criteria are met:

- it is estimated that such operation would not increase take of species in excess of the take authorized by the original proposed operation;
- outmigrating salmon or steelhead are present; and
- SDWA agricultural diverters are able to divert water of adequate quality and quantity.

Summer and Fall Operations

During June 1 through November 30, the gate would be operated to improve flow in the San Joaquin River, thus assisting in avoiding historically present hypoxic (i.e., low dissolved oxygen) conditions in the lower San Joaquin River near Stockton. During this period, partial operation of the gate (partial closure to allow approximately 500 cfs of San Joaquin River flow into Old River) may be warranted to protect water quality in the South Delta channels. Gate operations during this period would be at the request of DFG, NOAA Fisheries, and USFWS. Operations would not occur if the San Joaquin River flow at Vernalis is greater than 5,000 cfs because it is expected that this flow would maintain sufficient DO in the San Joaquin River.

During other low-flow periods on the San Joaquin River, there may be some need to operate the gate to improve the hypoxic conditions. If, in the opinion of USFWS, NOAA Fisheries, and DFG, the gate needs to be operated at a different time or for a longer period, it may be operated provided the following criteria are met:

- it is estimated that such operation would not increase take of species in excess of the take authorized by the original proposed operation;
- there is a verified presence of outmigrating salmon or steelhead.

The exact timing of both the fall and spring operations could be modified annually, in coordination with the Gate Operations Review Team. Operations may also be modified in response to varying conditions to avoid impacts on winter-run salmon and delta smelt. During non-operational times of the year, the gates would remain fully lowered (open).

Flow Control Gates

The three flow control gates, Middle River, Grant Line Canal, and Old River near the DMC, would be operated (closed during some portion of the tidal cycle) throughout the agricultural season (April 15 through November 30) and on an as-needed basis during the rest of the year to protect water quality and levels.

Reclamation and DWR have committed to maintaining water levels during these times at 0.0 foot msl in Old River near the CVP Tracy facility, 0.0 foot msl at the west end of Grant Line Canal, and 0.5 foot msl in Middle River at Mowry Bridge. It is anticipated that the target level in Middle River would be lowered to 0.0 foot msl following extension of some agricultural diversions. Water levels are based on 1929 National Geodetic Vertical Datum [NGVD].

Proposed flow control gate operations would require forecasting of water levels and potential changes in water quality in south Delta channels and operating the gates to maintain the agreed-upon water levels and water quality objectives. Forecasting would be performed on a weekly basis using the Delta Simulation Model 2 (DSM2), using forecasted tides, and proposed diversion rates of the projects.

DSM2 calculates hydraulic parameters for hundreds of points in Delta channels at 15-minute intervals. DSM2 uses simulation of pumping rates, release schedules, and forecast tides to predict the water levels, tidal flows, and EC throughout the south Delta channels. Where level is predicted to be below the criteria or water quality conditions are predicted to approach the objectives, the gates would be operated to maintain the specified water level, and increase tidal circulation in the south Delta channels. The gates would be opened to enhance flow through these channels during all flood-tide (i.e., rising water level) periods, once the downstream water level was greater than 0.0 feet.

Actual gate operations would likely vary from this general circulation plan and would be discussed on a weekly basis by the Gate Operations Review Team.

The extension of agricultural diversions in the south Delta that are currently shallower than –2 feet msl (1929 NGVD) may lower the water level response criteria and subsequently further reduce the need to operate gates.

Winter Operations

For the period from December through April 14~~March~~, the Middle River, Grant Line Canal, and Old River near the DMC gates may be operated only with permission from USFWS, NOAA Fisheries, and DFG if the following criteria are met:

- USFWS, NOAA Fisheries, and DFG determine that such operation would not increase take of species in excess of the take authorized by the biological opinion (BO) for SDIP;
- USFWS, NOAA Fisheries, and DFG determine that any impacts associated with gate operation during this period would not result in additional impacts

- environmental commitments, and
- emergency procedures.

Boater Awareness

DWR would operate the gates, control facilities, and boat ramp and boat locks, and will also implement a Boating Educational Program in an effort to educate boaters regarding the new structures in the area. Education for boaters would be to improve recreation in the project area and would reduce misconceptions regarding perceived difficulty of navigating past the new structures. DWR's education of boaters could occur through a variety of methods, including, but not limited to:

- posting clearly readable instructional signs on the banks and waterways at all approaches to a gate site (in multiple languages),
- distributing educational flyers containing maps and operation schedules (in multiple languages),
- offering classes at local marinas regarding the use of the lock facility,
- providing an information telephone hotline (in multiple languages), and
- providing information via an Internet homepage regarding operation of the gates (in multiple languages).

Noise Compliance

DWR and Reclamation and/or their contractors will comply with local noise regulations by limiting construction to the hours specified by relevant counties, except during conveyance dredging activities which would occur 24 hours a day. It is assumed that construction activities would occur during normal working hours, between 7:00 a.m. and 7:00 p.m., Monday through Friday, and between 8:00 a.m. and 5:00 p.m., Saturday and Sunday. In San Joaquin County, construction activities that occur between the hours of 6:00 a.m. and 9:00 p.m. Sunday and Saturday are exempt from the County's noise ordinance. In Alameda County, construction activities that occur between the hours of 7:00 a.m. and 7:00 p.m. Monday through Friday and between 8:00 a.m. and 5:00 p.m. Saturday and Sunday are exempt from the County's noise ordinance.

Compliance with Existing Regulations

DWR and Reclamation would operate the SDIP components in compliance with existing regulations and water rights requirements and restrictions, except for those changes described in the project description, including those for water quality, flows, and fish protection. Therefore, DWR and Reclamation will

continue to comply with the terms and conditions set forth in their water rights permits (and Reclamation's license) for diversion and use of water, including water quality and flow requirements.

Invasive Vegetation

DWR and Reclamation would require the contractor to clean all vegetation, to the extent practicable, from any equipment used in the water. This will reduce the risk of spreading invasive vegetation by the equipment from one area to another.

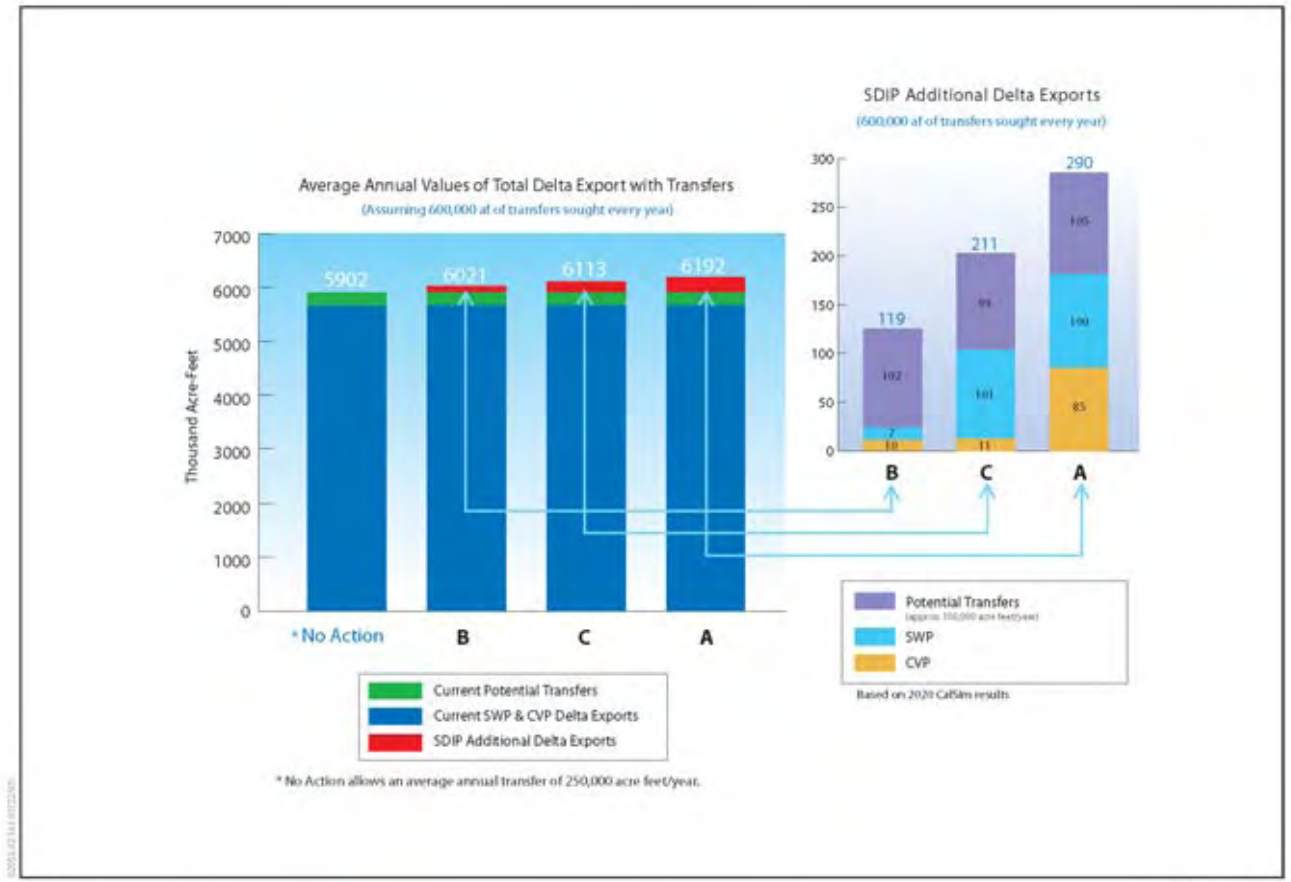
Chapter 3

irretrievable impact or commitment of resources occurs when a resource is removed or consumed. These types of impacts are evaluated to ensure that consumption is justified. The discussion of Irreversible and Irretrievable Commitments can be found in Chapter 4, "Summary Comparison of Environmental Consequences."

Mitigation Measures

Mitigation measures include actions such as implementation of plans to minimize effects. For example, dust as a result of construction activities may be identified as a significant impact to air quality, but the implementation of a Dust Suppression Plan will mitigate the impact to a less-than-significant level. The CALFED Programmatic EIS/EIR identifies program-wide mitigation measures that may be used to avoid, minimize, restore, or compensate for potentially significant adverse impacts. Those CALFED mitigation measures that are relevant to SDIP impacts have been incorporated into the SDIP EIS/EIR. Not all of the programmatic mitigation measures are implemented in this document; however, where feasible, they are integrated into the SDIP mitigation measures. The Social Issues and Economics, Growth-Inducing, and Cumulative sections do not contain a separate mitigation measures section.

Chapter 4



Jones & Stokes

Figure 4-2
Delta Exports Under No Action and SDIP Operational Scenarios (2020 Conditions)

Increase Water Deliveries to SWP and CVP Water Contractors South of the Delta and Provide Opportunities to Convey Water for Fish and Wildlife Purposes

Alternative 1 (No Action)

Alternative 1A would not result in changes to operations or pumping capacity limits and, therefore, would not result in any change to south Delta water supply conditions. Additional SWP or CVP deliveries would not be possible. The No Action baseline unused SWP pumping capacity would allow an average of 250 taf/yr of potential water transfers, assuming a 600 taf/yr demand and supply for water transfers in each year. Figure 4-2 indicates that the total CVP and SWP exports of 5,655 taf/yr together with the potential water transfers of 247 taf/yr would average 5,902 taf/yr for the 2020 No Action conditions.

Alternative 2A

Stage 1

It is likely that the operation of permanent gates, through the improved management of Delta water quality and water levels, would allow conditions for JPOD to be more easily satisfied, thereby increasing SWP and CVP flexibility.

Stage 2

Implementation of Stage 2 of Alternative 2A would result in improvement in average annual CVP water deliveries of approximately 100 thousand acre-feet per year (taf/yr) compared to 2001 and 2020 baseline conditions. Moreover, Alternative 2A would result in improvement in SWP Table A and SWP Article 21 deliveries. An average of an additional 20 to 40 taf/yr for Table A deliveries and an additional average of 50 taf/yr for Article 21 deliveries, compared to 2001 and 2020 baseline conditions would be available. Additionally, DWR would annually convey up to 100,000 acre-feet of CVP Level 2 Refuge water through CCF and SWP Banks by September 1, and Reclamation would provide SWP a north-of-Delta storage amount of up to 75,000 acre-feet from CVP storage facilities to reduce the SWP obligation to comply with Bay-Delta water quality and flow requirements. Additional unused pumping capacity would allow an average of approximately 100~~5~~ taf of additional potential water transfers. The CVP Tracy pumping would be reduced by 19 taf/yr, and the SWP exports would increase by 204 taf/yr, for a net increase of 185 taf/yr (85 taf/yr for CVP and 100 taf/yr for SWP).

Alternative 2B

Stage 1

It is likely that the operation of permanent gates, through the improved management of Delta water quality and water levels, would allow conditions for JPOD to be more easily satisfied, thereby increasing SWP and CVP flexibility.

Stage 2

Implementation of Stage 2 of Alternative 2B would not result in substantial improvement in average annual CVP water deliveries. Marginal increases in deliveries of approximately an average 15 to 20 taf/yr compared to 2001 and 2020 baseline conditions would provide some additional water to CVP contractors. Similarly, Alternative 2B would not result in substantial improvement in average annual SWP Table A or Article 21 deliveries. Resultant SWP Table A deliveries would range from a decrease in average deliveries of 19 taf/yr (–19 taf/yr) and an increase of only an average 2 taf/yr under 2001 and 2020 baseline conditions, respectively. Additional unused pumping capacity would allow an average of approximately 10~~0~~2 taf of additional potential water transfers. The CVP Tracy pumping would be reduced by 19 taf/yr, and the SWP exports would increase by 36 taf/yr, for a net increase of 17 taf/yr (10 taf/yr for CVP and 7 taf/yr for SWP).

Alternative 2C

Stage 1

It is likely that the operation of permanent gates, through the improved management of Delta water quality and water levels, would allow conditions for JPOD to be more easily satisfied, thereby increasing SWP and CVP flexibility.

Stage 2

Implementation of Stage 2 of Alternative 2C would result in improvement in average annual CVP water deliveries. Marginal increases in deliveries of approximately an average 23 and 24 taf/yr compared to 2001 and 2020 baseline conditions would provide some additional water to CVP contractors. Alternative 2C would result in improvement in average annual SWP Table A or Article 21 deliveries. Resultant SWP Table A delivery increases would range from an average 6 to 40 taf/yr compared to 2001 and 2020 baseline conditions, respectively. Resultant SWP Article 21 deliveries would increase on average by

55 taf/yr compared to baseline conditions. Additional unused pumping capacity would allow an average of approximately ~~100~~99 taf of additional potential water transfers. The CVP Tracy pumping would be reduced by 29 taf/yr, and the SWP exports would increase by 141 taf/yr, for a net increase of 112 taf/yr (11 taf/yr for CVP and 101 taf/yr for SWP).

Alternative 3B

Implementation of Alternative 3B would result in CVP and SWP delivery improvements similar to those described for Alternative 2B.

Alternative 4B

Implementation of Alternative 4B would result in CVP and SWP delivery improvements similar to those described for Alternative 2B.

Summary

All alternatives would be similar for Stage 1. For Stage 2, Alternative 2A would allow for diversions of 8,500 (on a 3-day average) year-round and would result in the greatest flexibility in maximizing diversions into CCF. It results in the greatest increase in south of Delta water deliveries for both the SWP and CVP. Therefore Alternative 2A would fulfill this export objective most often, compared to the other alternatives. Figure 4-2 shows the annual average increase in Delta exports and potential water transfers for each ~~alternative.~~operational scenario, as simulated with CALSIM for the 2020 conditions. The greatest potential increase in Delta exports would be 290 taf/yr for operational scenario A. Operational scenario B would allow an average increase of 119 taf/y, and operational scenario C would allow an average increase of 211 taf/yr. These estimates of water supply changes for 2020 conditions are summarized from Table 5.1-13. Similar estimates of water supply changes for 2001 conditions are given in Table 5.1-12.

Table 4-1. Continued

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Resource Topic/Impact	Stage 1	Stage 2	Applicable Alternative	Level of Significance before Mitigation	Mitigation Measure	Level of Significance after Mitigation
Fish-32: Construction-Related Loss of Striped Bass to Direct Injury.	X		2A–2C, 3B, 4B	Less than significant	None required.	Less than significant
Fish-33: Construction-Related Loss of Striped Bass to Predation.	X		2A–2C, 3B, 4B	Less than significant	None required.	Less than significant
Fish-34: Effects of Gate Operation on Striped Bass Migration.	X		2A–2C, 3B, 4B	Beneficial		Beneficial impact
Fish-35: Construction-Related Loss of Spawning Habitat Area for Green Sturgeon.	X		2A–2C, 3B, 4B	Less than significant	None required.	Less than significant
Fish-36: Construction-Related Loss of Rearing Habitat Area for Green Sturgeon.	X		2A–2C, 3B, 4B	Less than significant	None required.	Less than significant
Fish-37: Construction-Related Reduction in Food Availability for Green Sturgeon.	X		2A–2C, 3B, 4B	Less than significant	None required.	Less than significant
Fish-38: Construction-Related Loss of Green Sturgeon to Accidental Spill of Contaminants.	X		2A–2C, 3B, 4B	Less than significant	None required.	~~Beneficial impact~~Less than significant
Fish-39: Construction-Related Loss of Green Sturgeon to Direct Injury.	X		2A–2C, 3B, 4B	Less than significant	None required.	Less than significant
Fish-40: Construction-Related Loss of Green Sturgeon to Predation.	X		2A–2C, 3B, 4B	Less than significant	None required.	Less than significant
Fish-41: Effects of Gate Operation on Green Sturgeon Migration.	X		2A–2C, 3B, 4B	Less than significant	None required.	Less than significant
Fish-42: Operations-Related Loss of Spawning Habitat Area for Chinook Salmon.		X	2A–2C, 3B, 4B	Less than significant	None required.	Less than significant
Fish-43: Operations-Related Loss of Rearing Habitat Area for Chinook Salmon.		X	2A–2C, 3B, 4B	Less than significant	None required.	Less than significant

Section 5.1

Several tables in Section 5.1 show three panels, with the top panel showing the monthly distribution of A, "Baseline Conditions," and the middle panel showing the monthly distribution of B, "Scenario Conditions," with the bottom panel showing the monthly distribution of the scenario changes from the baseline. This third panel was labeled as (A–B) and should have been labeled as (B–A). This correction should be made to Tables 5.1-4, -6, -8, -9, -10, and -11.

1995 Water Quality Control Plan and D-1641

The State Water Board's 1995 WQCP (adopted May 1995(b)) and the State Water Board's ~~and Reclamation's~~ Final EIR for implementation (November 1999) incorporated several ~~elements~~ changes recommended by ~~of the~~ EPA, NOAA Fisheries, and USFWS to the ~~regulatory~~ objectives for salinity and endangered species protection. The changes from D-1485 regulatory limits for CVP and SWP Delta operations are substantial. The State Water Board implemented the 1995 WQCP with decision 1641 in March 2000. The new provisions for X2, export/inflow ratio, and the VAMP that are implemented in D-1641 will be described in the section on Delta water operations because these are the basis for the 2001 and 2020 baseline operations assumed in CALSIM.

California Water Resources

California's water supplies come from surface water and groundwater sources that vary in distribution and volume depending on the annual climatic conditions throughout the state. California's Mediterranean climate provides wet winters and dry summers throughout most of the state. Pacific storms bring rain and snow, typically from October through April. Average annual statewide precipitation is about 23 inches corresponding to a water volume of nearly 200 maf over California's land surface. About 60% of this precipitation is retained as soil moisture until returned to the atmosphere through evaporation from the soils and transpiration from trees and other vegetation. Some precipitation (5%) recharges the groundwater basins that underlie much of California's land surface. The remaining 35% represents the state's average annual runoff of about 70 maf. Less than half this runoff is diverted for M&I or agricultural water supplies. The other half of California's runoff water provides the streamflow and shallow groundwater that maintain diverse aquatic ecosystems in California's rivers, estuaries, and wetlands (California Department of Water Resources 1998a).

Because agricultural and M&I demands are highest during summer, there is an imbalance between when water supply is available in California and when most of it is needed. Another water supply imbalance is created by the differences in runoff and demand between northern and southern California. More than 70% of the runoff comes from northern California but more that 75% of M&I and agricultural demand is south of the Delta.

California water supply development includes many local water supply projects, the CVP, the SWP and the Corps reservoir projects. Because of the seasonal pattern of runoff, storage reservoirs are generally needed for effective development of surface supplies in California. Some of these surface supplies are now used for required environmental flows below reservoirs and as outflow from the Delta. All of the SWP and CVP upstream-of-the-Delta stored water that is appropriated for use in south-of-Delta export areas must pass through the Delta and the CVP or SWP Delta pumping plants. The following discussions of CVP

14a and I-14b include the annual flow volumes (taf) and the annual variation between the 2001 values and the 2020 values.

The CALSIM 2001 baseline annual flow volumes for the San Joaquin River at Vernalis ranged from a minimum of 833 taf to a maximum of 13,927 taf, with an average of 2,660 taf/yr (3,674 cfs). The CALSIM 2020 annual values ranged from 832 taf to 13,854 taf, with an average of 2,587 taf/yr (3,573 cfs). The average change was a decrease of 73 taf/yr. Some of this reduction can be attributed to the lower initial storage value for New Don Pedro Reservoir used in the 2020 CALSIM simulations. This represents a decrease of 2.7% of the long-term 2001 baseline value. The CALSIM 2020 annual values were changed by more than 5% of the annual baseline value in 9 years. Table I-14c shows the differences in Vernalis monthly flow (cfs) between the 2020 baseline and the 2001 baseline values.

Although there may be a considerable number of months with changes of more than 10% of the 2001 baseline monthly flow, and a few years with more than a 5% change from the 2001 baseline flow, the long-term CALSIM 2020 Vernalis flow was reduced by just 2% (adjusted for the different initial New Don Pedro storage value) from the CALSIM 2001 results.

The total inflow to the Delta, represented by the Freeport and Vernalis flows, is just 0.5% less than the 2001 baseline. This suggests that the 2020 CALSIM-simulated Delta inflow future no action conditions are similar to the 2001 CALSIM-simulated baseline existing conditions.

Water Transfers

The passage of the CVPIA in 1992 changed the operating rules of the CVP contractors to allow water transfers among users in prescribed situations. In 1996, the SWP negotiated the "Monterey Agreement" which changed the operating rules of the SWP to help facilitate~~allow~~ banking and limited water transfers among SWP contractors. These changes allow a limited water market within these projects.

The California Legislature passed several laws in the 1980s and 1990s making it easier to transfer water beyond the boundaries of historical water service areas. These laws are aimed at protecting water users who are not a party to the transfer and also protect fish and wildlife from being "injured" or "unreasonably affected" by the transfer. These laws developed an expedited process for the State Water Board to expand the water rights (i.e., place of use) of those conducting a short-term (i.e., 1-year) water transfer.

In recent years, extensive water transfers across the Delta have occurred. Almost 800 taf were purchased for transfer in 1991 as a part of DWR's Drought Water Bank, still the largest water transfer year of record. Beginning in 1995, California experienced a series of higher-than-normal runoff years, and the need for water transfers decreased substantially. In 2001 (a dry year) EWA transferred

Mountains through the Edmonston Pumping Plant (maximum capacity of 3,250 taf/yr). The Edmonston Pumping Plant therefore provides a limit for the SWP deliveries to southern California, since a maximum of 3.25 maf can be pumped. When operating all 14 units, the plant can pump 320 cfs per unit, or 4,480 cfs, each day of the year. One unit is normally held in reserve, so the maximum delivery over the Tehachapi Mountains to Southern California contractors is limited to about 3 maf. Delivery of the maximum Table A entitlements of 2.58 maf would require operating the Edmonston pumping units at about 85% of capacity.

The San Joaquin Valley agricultural contractors have a combined entitlement of about 1.2 maf (the Kern County Water Authority has an entitlement of 1 maf). The South Bay aqueduct has a total entitlement demand of 220 taf. The North Bay aqueduct supplies an entitlement demand of about 76 taf, but this is not pumped at the SWP Banks facility.

The highest annual delivery made by the SWP (through 2002) was about 3.5 maf in 2000 (California Department of Water Resources 2002b). As the SWP contractor requests for the full Table A amount increase with ~~population growth~~increasing demand, the need to use the SWP facilities at their full design capacity will also increase. The SDIP will increase the operating flexibility of the SWP Banks facility and allow a greater fraction of the SWP Table A entitlements to be delivered to SWP contractors (i.e., increased water supply reliability).

The SDIP is expected to make some improvements in SWP water supply reliability, without having any major impacts on the CVP or on local water supplies, including the water diversions that supply agricultural water needs in the south Delta. This water supply section presents information to document the magnitude of the expected improvement in water supply reliability (based on the CVP and SWP planning model CALSIM II results), and describe the potential effects of increased SWP pumping on CVP exports and local south Delta diversions.

Example of Central Valley Project and State Water Project Delivery Patterns for Water Year 1994

CVP and SWP Delta operations and deliveries for WY 1994 are shown to illustrate the actual daily patterns of CVP and SWP operations. WY 1994 is the last in the CALSIM hydrology sequence, but was prior to the 1995 WQCP and D-1641 that changed the Delta objectives substantially. The 1994 pumping and delivery patterns illustrate the typical variations that occur within each water year. WY 1994 was classified as a critical year, and the SWP allocations were 50% of Table A contract amounts. The CVP allocations were also quite limited for 1994.

CVP Tracy is unable to directly supply the CVP demands of about 3,300 taf/yr because the CVP demands occur predominantly in the summer irrigation season.

Table 5.1-4. CALSIM–Simulated Scenario A CVP Tracy Pumping Monthly Distribution, for 2001 and 2020 Conditions (cfs) Page 1 of 2

A. 2001 Baseline

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,616	800	351	691	641	800	800	800	800	800	800	800	868	1,410	
10	2,585	1,251	1,193	2,389	1,389	1,240	800	800	800	800	1,220	857	2,048	2,912	
20	2,998	2,431	2,889	2,999	2,877	1,865	800	800	800	800	1,734	2,571	3,718	4,275	
30	3,309	3,412	3,002	3,007	3,137	2,403	1,125	800	800	800	2,012	3,745	4,467	4,366	
40	3,914	4,217	3,212	3,026	3,679	2,772	1,500	800	800	800	2,339	4,536	4,505	4,448	
50	4,315	4,247	4,209	4,122	4,020	3,352	2,919	800	800	1,125	2,540	4,570	4,531	4,468	
60	4,344	4,250	4,221	4,222	4,224	3,685	3,564	1,125	800	1,500	2,852	4,577	4,535	4,470	
70	4,355	4,253	4,222	4,226	4,237	4,230	4,200	1,125	1,125	1,500	3,000	4,588	4,543	4,475	
80	4,365	4,256	4,224	4,228	4,245	4,274	4,544	1,500	1,500	2,692	3,000	4,600	4,553	4,481	
90	4,374	4,260	4,225	4,229	4,247	4,286	4,600	1,500	1,500	3,000	3,000	4,600	4,562	4,485	
Max	4,391	4,265	4,227	4,232	4,254	4,308	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,781	3,541	3,415	3,504	3,479	3,088	2,737	1,019	1,011	1,507	2,365	3,790	4,021	4,183	2,312

B. 2001 Scenario A

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,566	800	184	596	641	800	800	800	800	800	800	800	800	1,397	
10	2,537	1,401	1,090	2,372	1,384	867	800	800	800	800	1,251	1,271	2,049	2,912	
20	3,005	2,345	2,690	2,991	2,670	1,930	800	800	800	800	1,762	2,553	3,541	3,991	
30	3,157	2,999	2,997	3,001	3,209	2,421	1,125	800	800	800	2,027	4,006	4,381	4,352	
40	3,556	3,941	3,007	3,010	3,641	2,870	1,500	800	800	800	2,338	4,539	4,497	4,417	
50	4,098	4,237	4,215	4,056	4,152	3,467	2,842	800	800	1,125	2,562	4,574	4,532	4,468	
60	4,368	4,258	4,222	4,222	4,229	4,217	3,564	1,125	800	1,500	2,923	4,600	4,557	4,482	
70	4,377	4,261	4,226	4,229	4,236	4,275	4,451	1,125	1,125	1,500	3,000	4,600	4,565	4,487	
80	4,391	4,265	4,226	4,231	4,249	4,292	4,544	1,500	1,500	2,692	3,000	4,600	4,578	4,494	
90	4,391	4,265	4,227	4,232	4,252	4,302	4,600	1,500	1,500	3,000	3,000	4,600	4,578	4,494	
Max	4,391	4,265	4,227	4,232	4,254	4,321	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,718	3,456	3,389	3,470	3,476	3,156	2,748	1,019	1,011	1,509	2,385	3,827	4,010	4,140	2,304

C. 2001 Scenario A Changes (~~A—B~~B – A)

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	-50	0	-167	-95	0	0	0	0	0	0	0	0	-68	-13	
10	-48	150	-103	-17	-5	-373	0	0	0	0	31	414	1	0	
20	7	-86	-199	-8	-207	65	0	0	0	0	28	-18	-177	-284	
30	-152	-413	-5	-6	72	18	0	0	0	0	15	261	-86	-14	
40	-358	-276	-205	-16	-38	98	0	0	0	0	-1	3	-8	-31	
50	-217	-10	6	-66	132	115	-77	0	0	0	22	4	1	0	
60	24	8	1	0	5	532	0	0	0	0	71	23	22	12	
70	22	8	4	3	-1	45	251	0	0	0	0	12	22	12	
80	26	9	2	3	4	18	0	0	0	0	0	0	25	13	
90	17	5	2	3	5	16	0	0	0	0	0	0	16	9	
Max	0	0	0	0	0	13	0	0	0	0	0	0	0	0	
Avg	-63	-85	-26	-34	-3	68	10	0	0	2	20	37	-11	-43	-8

Table 5.1-4. Continued

D. 2020 Baseline

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,664	800	723	715	641	800	800	800	800	800	800	800	898	1,198	
10	2,401	1,333	1,353	2,183	1,417	1,194	800	800	800	800	1,179	1,244	2,345	2,867	
20	3,016	2,233	2,755	2,998	2,594	2,064	800	800	800	800	1,541	2,449	3,577	4,080	
30	3,154	3,301	2,999	3,004	3,289	2,576	1,297	800	800	800	2,008	3,434	4,290	4,349	
40	3,679	3,728	3,079	3,008	3,904	2,929	2,561	800	800	800	2,260	4,533	4,503	4,442	
50	4,259	4,225	4,211	4,214	4,218	3,424	3,127	800	800	1,125	2,523	4,561	4,523	4,463	
60	4,339	4,249	4,220	4,224	4,232	3,980	3,817	1,125	800	1,500	2,908	4,578	4,535	4,471	
70	4,353	4,253	4,223	4,226	4,242	4,240	4,544	1,125	1,125	1,620	3,000	4,587	4,542	4,475	
80	4,359	4,255	4,223	4,228	4,245	4,274	4,544	1,500	1,500	2,859	3,000	4,594	4,547	4,477	
90	4,370	4,259	4,225	4,229	4,248	4,287	4,600	1,500	1,500	3,000	3,000	4,600	4,558	4,483	
Max	4,391	4,265	4,227	4,232	4,254	4,308	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,723	3,487	3,417	3,498	3,487	3,152	2,895	1,021	1,011	1,543	2,326	3,720	3,990	4,152	2,305

E. 2020 Scenario A

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,803	800	741	706	641	800	800	800	800	800	800	800	898	1,185	
10	2,235	1,287	1,241	1,653	1,388	1,167	800	800	800	800	1,123	1,121	1,821	2,880	
20	2,921	2,208	2,719	2,995	2,397	2,017	800	800	800	800	1,548	2,559	3,061	3,939	
30	3,186	3,016	2,995	3,000	3,375	2,435	1,125	800	800	800	1,977	3,302	4,358	4,341	
40	3,588	3,769	3,007	3,008	3,715	3,216	2,561	800	800	800	2,256	4,465	4,504	4,382	
50	3,903	4,167	4,209	3,900	4,188	3,516	3,131	800	800	1,125	2,522	4,569	4,528	4,467	
60	4,339	4,238	4,221	4,223	4,231	3,979	3,931	1,125	800	1,500	2,911	4,598	4,550	4,478	
70	4,370	4,257	4,224	4,228	4,241	4,265	4,544	1,125	1,125	1,647	3,000	4,600	4,559	4,484	
80	4,384	4,263	4,226	4,231	4,248	4,291	4,544	1,500	1,500	2,807	3,000	4,600	4,571	4,490	
90	4,391	4,265	4,227	4,232	4,252	4,300	4,600	1,500	1,500	3,000	3,000	4,600	4,578	4,494	
Max	4,391	4,265	4,227	4,232	4,254	4,315	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,667	3,441	3,387	3,417	3,467	3,183	2,883	1,021	1,011	1,543	2,343	3,705	3,914	4,124	2,286

F. 2020 Scenario A Changes (~~D—E~~)E – D)

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	139	0	18	-9	0	0	0	0	0	0	0	0	0	-13	
10	-166	-46	-112	-530	-29	-27	0	0	0	0	-56	-123	-524	13	
20	-95	-25	-36	-3	-197	-47	0	0	0	0	7	110	-516	-141	
30	32	-285	-4	-4	86	-141	-172	0	0	0	-31	-132	68	-8	
40	-91	41	-72	0	-189	287	0	0	0	0	-4	-68	1	-60	
50	-356	-58	-2	-314	-30	92	4	0	0	0	-1	8	5	4	
60	0	-11	1	-1	-1	-1	114	0	0	0	3	20	15	7	
70	17	4	1	2	-1	25	0	0	0	27	0	13	17	9	
80	25	8	3	3	3	17	0	0	0	-52	0	6	24	13	
90	21	6	2	3	4	13	0	0	0	0	0	0	20	11	
Max	0	0	0	0	0	7	0	0	0	0	0	0	0	0	
Avg	-56	-46	-30	-81	-20	31	-12	0	0	0	17	-15	-76	-28	-19

Table 5.1-6. CALSIM–Simulated Scenario A SWP Exports Monthly Distribution, for 2001 and 2020 Conditions (cfs)

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A. 2001 Baseline

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	723	300	300	1,246	762	300	300	300	300	300	300	1,445	300	837	
10	1,235	980	2,643	2,645	1,674	1,121	304	304	606	606	842	3,367	1,639	1,658	
20	2,666	2,255	3,135	3,893	3,016	2,570	700	700	700	1,125	2,271	3,829	5,480	3,881	
30	3,675	2,571	3,966	4,556	3,482	3,175	1,500	700	700	1,868	2,886	4,123	5,819	4,851	
40	4,210	3,229	4,472	5,272	4,111	4,234	2,904	700	700	2,692	3,475	4,745	6,524	5,782	
50	4,984	4,208	5,193	5,967	5,176	5,260	3,679	700	700	2,976	4,112	5,418	6,680	6,209	
60	5,467	5,022	5,705	6,775	6,668	6,914	4,527	700	700	3,926	4,347	6,083	6,680	6,630	
70	6,371	6,588	7,001	7,296	7,735	7,228	5,500	1,125	1,125	4,521	5,266	6,658	6,749	6,680	
80	6,680	6,680	7,047	7,465	8,437	7,561	5,640	1,500	1,500	5,639	6,072	7,180	7,003	7,180	
90	6,680	6,680	7,195	8,493	8,500	7,561	5,697	1,500	1,500	5,640	6,680	7,180	7,180	7,180	
Max	6,680	6,680	7,678	8,500	8,500	7,561	5,697	1,500	1,500	5,687	6,680	7,180	7,180	7,180	
Avg	4,583	4,172	5,110	5,769	5,409	5,006	3,413	905	916	3,214	3,991	5,350	5,767	5,457	3,312

B. 2001 Scenario A

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	349	300	300	1,247	652	300	300	300	300	300	300	1,493	300	909	
10	1,163	1,216	2,525	2,630	1,850	1,004	300	300	425	425	1,247	3,276	2,071	1,669	
20	2,552	2,012	2,888	3,988	3,023	2,570	700	700	700	899	2,354	4,423	5,160	3,974	
30	3,593	2,378	3,715	4,810	3,476	3,174	1,500	700	700	1,868	2,982	4,756	6,301	4,938	
40	4,065	2,837	4,343	4,971	4,146	4,232	2,851	700	700	2,676	3,485	5,251	7,049	5,422	
50	4,983	4,002	5,170	6,003	5,596	6,049	3,679	700	700	2,984	4,015	6,160	7,379	6,208	
60	5,478	4,909	6,319	6,341	6,368	6,922	4,523	700	700	3,945	4,361	6,559	7,648	6,840	
70	5,959	5,620	7,239	8,500	8,500	8,234	5,500	1,125	1,125	4,521	5,263	6,978	7,858	7,019	
80	7,721	7,021	8,500	8,500	8,500	8,500	6,274	1,500	1,500	5,817	6,048	7,713	8,032	7,533	
90	8,500	8,500	8,500	8,500	8,500	8,500	6,551	1,500	1,500	6,549	7,116	8,500	8,310	8,500	
Max	8,500	8,500	8,500	8,500	8,500	8,500	6,608	1,500	1,500	6,598	8,500	8,500	8,500	8,500	
Avg	4,843	4,301	5,457	5,960	5,571	5,384	3,578	894	910	3,338	4,162	5,869	6,470	5,786	3,514

C. 2001 Scenario A Changes (~~A—B~~B – A)

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	-374	0	0	1	-110	0	0	0	0	0	0	48	0	72	
10	-72	236	-118	-15	176	-117	-4	-4	-181	-181	405	-91	432	11	
20	-114	-243	-247	95	7	0	0	0	0	-226	83	594	-320	93	
30	-82	-193	-251	254	-6	-1	0	0	0	0	96	633	482	87	
40	-145	-392	-129	-301	35	-2	-52	0	0	-16	10	506	525	-360	
50	-1	-206	-23	36	420	789	0	0	0	8	-97	742	699	-1	
60	11	-113	614	-434	-300	8	-4	0	0	19	14	476	968	210	
70	-412	-968	238	1,204	765	1,006	0	0	0	0	-3	320	1,109	339	
80	1,041	341	1,453	1,035	63	939	634	0	0	178	-24	533	1,029	353	
90	1,820	1,820	1,305	7	0	939	854	0	0	909	436	1,320	1,130	1,320	
Max	1,820	1,820	822	0	0	939	911	0	0	911	1,820	1,320	1,320	1,320	
Avg	260	129	347	191	162	378	165	-11	-6	124	171	519	703	329	202

Table 5.1-6. Continued

D. 2020 Baseline

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	586	301	1,065	1,358	778	300	300	300	300	300	300	1,781	302	801	
10	1,141	1,188	2,599	2,890	1,994	1,182	320	320	700	700	333	2,740	1,859	1,532	
20	2,362	1,957	3,562	4,160	3,104	2,823	1,560	700	700	700	2,292	3,856	4,842	3,983	
30	3,083	2,666	4,125	4,625	3,867	3,555	2,749	700	700	1,799	3,038	4,111	6,102	4,884	
40	4,003	3,192	4,326	4,929	4,478	4,476	3,450	700	700	2,653	3,717	4,691	6,594	5,380	
50	4,624	4,234	5,131	6,354	5,686	6,135	4,172	700	700	3,033	3,973	5,768	6,680	5,946	
60	5,394	5,354	5,501	7,296	7,431	7,060	4,964	700	700	3,804	4,538	6,680	6,749	6,380	
70	6,464	6,357	6,713	7,405	8,171	7,254	5,640	1,125	1,125	4,416	5,302	7,180	7,026	6,550	
80	6,680	6,680	7,032	8,070	8,437	7,561	5,640	1,500	1,500	5,639	5,969	7,180	7,180	6,686	
90	6,680	6,680	7,157	8,500	8,500	7,561	5,697	1,500	1,500	5,640	6,680	7,180	7,180	7,180	
Max	6,680	6,680	7,678	8,500	8,500	7,561	5,697	1,500	1,500	5,687	6,680	7,180	7,180	7,180	
Avg	4,436	4,220	5,122	5,987	5,692	5,201	3,763	914	920	3,160	3,981	5,433	5,861	5,290	3,357

E. 2020 Scenario A

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	300	300	300	1,358	778	300	300	300	300	300	300	1,592	300	776	
10	1,130	1,263	2,772	3,069	1,782	1,174	525	525	300	300	828	2,901	1,977	1,532	
20	2,293	1,904	3,477	4,296	3,113	2,805	1,650	700	700	700	2,348	4,196	4,422	3,879	
30	3,316	2,609	4,274	4,809	3,893	3,420	2,704	700	700	1,500	3,107	4,752	6,310	4,775	
40	3,801	3,336	4,814	5,115	5,166	4,477	3,450	700	700	2,696	3,723	5,053	6,870	5,353	
50	4,522	3,817	5,535	6,322	6,117	6,315	4,171	700	700	3,035	3,989	6,009	7,441	5,858	
60	5,397	4,563	5,984	7,874	7,793	7,600	4,964	700	700	3,804	4,688	6,446	7,716	6,420	
70	6,120	5,381	6,610	8,500	8,500	8,500	5,903	1,125	1,125	4,418	5,307	7,326	7,961	6,905	
80	7,963	6,788	8,239	8,500	8,500	8,500	6,551	1,500	1,500	5,798	5,958	8,473	8,129	7,282	
90	8,500	8,500	8,500	8,500	8,500	8,500	6,551	1,500	1,500	6,549	6,960	8,500	8,467	8,500	
Max	8,500	8,500	8,500	8,500	8,500	8,500	6,608	1,500	1,500	6,598	8,500	8,500	8,500	8,500	
Avg	4,831	4,335	5,535	6,253	5,762	5,639	4,045	921	891	3,263	4,155	5,906	6,408	5,532	3,559

F. 2020 Scenario A Changes (~~D —~~E – D)

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	-286	-1	-765	0	0	0	0	0	0	0	0	-189	-2	-25	
10	-11	75	173	179	-212	-8	205	205	-400	-400	495	161	118	0	
20	-69	-53	-85	136	9	-18	90	0	0	0	56	340	-420	-104	
30	233	-57	149	184	26	-135	-44	0	0	-299	69	641	208	-109	
40	-202	144	488	186	688	1	0	0	0	43	6	362	276	-27	
50	-102	-417	404	-32	431	180	-1	0	0	2	16	241	761	-88	
60	3	-791	483	578	362	540	0	0	0	0	150	-234	967	40	
70	-344	-976	-103	1,095	329	1,246	263	0	0	2	5	146	935	355	
80	1,283	108	1,207	430	63	939	911	0	0	158	-11	1,293	949	596	
90	1,820	1,820	1,343	0	0	939	854	0	0	909	280	1,320	1,287	1,320	
Max	1,820	1,820	822	0	0	939	911	0	0	911	1,820	1,320	1,320	1,320	
Avg	395	115	413	266	70	438	282	7	-29	104	174	473	547	242	202

Table 5.1-8. CALSIM–Simulated Scenario B CVP Tracy Pumping Monthly Distribution, for 2001 and 2020 Conditions (cfs) Page 1 of 2

A. 2001 Baseline

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,616	800	351	691	641	800	800	800	800	800'	800	800	868	1,410	
10	2,585	1,251	1,193	2,389	1,389	1,240	800	800	800	800	1,220	857	2,048	2,912	
20	2,998	2,431	2,889	2,999	2,877	1,865	800	800	800	800	1,734	2,571	3,718	4,275	
30	3,309	3,412	3,002	3,007	3,137	2,403	1,125	800	800	800	2,012	3,745	4,467	4,366	
40	3,914	4,217	3,212	3,026	3,679	2,772	1,500	800	800	800	2,339	4,536	4,505	4,448	
50	4,315	4,247	4,209	4,122	4,020	3,352	2,919	800	800	1,125	2,540	4,570	4,531	4,468	
60	4,344	4,250	4,221	4,222	4,224	3,685	3,564	1,125	800	1,500	2,852	4,577	4,535	4,470	
70	4,355	4,253	4,222	4,226	4,237	4,230	4,200	1,125	1,125	1,500	3,000	4,588	4,543	4,475	
80	4,365	4,256	4,224	4,228	4,245	4,274	4,544	1,500	1,500	2,692	3,000	4,600	4,553	4,481	
90	4,374	4,260	4,225	4,229	4,247	4,286	4,600	1,500	1,500	3,000	3,000	4,600	4,562	4,485	
Max	4,391	4,265	4,227	4,232	4,254	4,308	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,781	3,541	3,415	3,504	3,479	3,088	2,737	1,019	1,011	1,507	2,365	3,790	4,021	4,183	2,312

B. 2001 Scenario B

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,958	800	17	592	641	800	800	800	800	800	800	800	800	1,402	
10	2,584	1,266	1,086	1,921	1,386	1,202	800	800	800	800	1,220	856	1,799	2,911	
20	2,980	2,385	2,352	2,991	2,208	2,035	800	800	800	800	1,784	2,554	3,513	4,259	
30	3,150	3,218	2,999	3,002	3,082	2,520	1,125	800	800	800	2,027	4,393	4,463	4,362	
40	3,622	3,819	3,005	3,008	3,426	2,643	1,500	800	800	800	2,326	4,539	4,511	4,448	
50	4,294	4,218	4,209	3,568	3,925	3,059	2,939	800	800	1,125	2,557	4,573	4,531	4,468	
60	4,342	4,250	4,222	4,220	4,222	3,651	3,564	1,125	800	1,500	2,885	4,582	4,538	4,472	
70	4,355	4,253	4,222	4,226	4,236	4,245	4,202	1,125	1,125	1,500	3,000	4,590	4,544	4,476	
80	4,366	4,257	4,224	4,228	4,245	4,276	4,544	1,500	1,500	2,692	3,000	4,600	4,553	4,481	
90	4,372	4,259	4,225	4,229	4,247	4,284	4,600	1,500	1,500	3,000	3,000	4,600	4,559	4,484	
Max	4,391	4,265	4,227	4,232	4,254	4,308	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,752	3,482	3,344	3,434	3,366	3,060	2,736	1,019	1,011	1,510	2,379	3,816	4,020	4,165	2,291

C. 2001 Scenario B Changes (~~A—B~~B – A)

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Pos-t VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	342	0	-334	-99	0	0	0	0	0	0	0	0	-68	-8	
10	-1	15	-107	-468	-3	-38	0	0	0	0	0	-1	-249	-1	
20	-18	-46	-537	-8	-669	170	0	0	0	0	50	-17	-205	-16	
30	-159	-194	-3	-5	-55	117	0	0	0	0	15	648	-4	-4	
40	-292	-398	-207	-18	-253	-129	0	0	0	0	-13	3	6	0	
50	-21	-29	0	-554	-95	-293	19	0	0	0	17	3	0	0	
60	-2	0	1	-2	-2	-34	0	0	0	0	33	5	3	2	
70	0	0	0	0	-1	15	2	0	0	0	0	2	1	1	
80	1	1	0	0	0	2	0	0	0	0	0	0	0	0	
90	-2	-1	0	0	0	-2	0	0	0	0	0	0	-3	-1	
Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Avg	-29	-59	-71	-70	-113	-28	-1	0	0	3	14	26	-1	-18	-21

Table 5.1-8. Continued

D. 2020 Baseline

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,664	800	723	715	641	800	800	800	800	800	800	800	898	1,198	
10	2,401	1,333	1,353	2,183	1,417	1,194	800	800	800	800	1,179	1,244	2,345	2,867	
20	3,016	2,233	2,755	2,998	2,594	2,064	800	800	800	800	1,541	2,449	3,577	4,080	
30	3,154	3,301	2,999	3,004	3,289	2,576	1,297	800	800	800	2,008	3,434	4,290	4,349	
40	3,679	3,728	3,079	3,008	3,904	2,929	2,561	800	800	800	2,260	4,533	4,503	4,442	
50	4,259	4,225	4,211	4,214	4,218	3,424	3,127	800	800	1,125	2,523	4,561	4,523	4,463	
60	4,339	4,249	4,220	4,224	4,232	3,980	3,817	1,125	800	1,500	2,908	4,578	4,535	4,471	
70	4,353	4,253	4,223	4,226	4,242	4,240	4,544	1,125	1,125	1,620	3,000	4,587	4,542	4,475	
80	4,359	4,255	4,223	4,228	4,245	4,274	4,544	1,500	1,500	2,859	3,000	4,594	4,547	4,477	
90	4,370	4,259	4,225	4,229	4,248	4,287	4,600	1,500	1,500	3,000	3,000	4,600	4,558	4,483	
Max	4,391	4,265	4,227	4,232	4,254	4,308	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,723	3,487	3,417	3,498	3,487	3,152	2,895	1,021	1,011	1,543	2,326	3,720	3,990	4,152	2,305

E. 2020 Scenario B

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,693	800	682	735	641	800	800	800	800	800	800	800	898	1,193	
10	2,313	1,262	1,366	2,169	1,060	1,197	800	800	800	800	1,164	910	2,308	2,860	
20	3,024	2,199	2,656	2,998	2,575	1,792	800	800	800	800	1,502	2,559	3,119	4,031	
30	3,062	2,939	2,992	3,004	2,997	2,561	1,500	800	800	800	1,860	3,537	4,370	4,346	
40	3,564	3,731	3,004	3,008	3,580	2,849	2,601	800	800	800	2,261	4,531	4,500	4,419	
50	4,220	4,217	4,209	4,002	3,943	3,293	3,127	800	800	1,125	2,523	4,561	4,523	4,464	
60	4,334	4,247	4,220	4,220	4,231	3,952	3,856	1,125	800	1,500	2,908	4,578	4,535	4,470	
70	4,352	4,253	4,223	4,225	4,235	4,242	4,544	1,125	1,125	1,666	3,000	4,587	4,542	4,475	
80	4,361	4,255	4,223	4,228	4,245	4,274	4,544	1,500	1,500	2,846	3,000	4,597	4,549	4,478	
90	4,370	4,259	4,225	4,229	4,248	4,281	4,600	1,500	1,500	3,000	3,000	4,600	4,558	4,483	
Max	4,391	4,265	4,227	4,232	4,254	4,305	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,684	3,403	3,368	3,470	3,404	3,095	2,911	1,021	1,011	1,543	2,324	3,750	3,991	4,138	2,286

F. 2020 Scenario B Changes (~~D—E~~ E – D)

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-Vamp 4/1–4/15	Vamp 4/16–4/30	Vamp 5/1–5/15	Post-Vamp 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	29	0	-41	20	0	0	0	0	0	0	0	0	0	-5	
10	-88	-71	13	-14	-357	3	0	0	0	0	-15	-334	-37	-7	
20	8	-34	-99	0	-19	-272	0	0	0	0	-39	110	-458	-49	
30	-92	-362	-7	0	-292	-15	203	0	0	0	-148	103	80	-3	
40	-115	3	-75	0	-324	-80	40	0	0	0	1	-2	-3	-23	
50	-39	-8	-2	-212	-275	-131	0	0	0	0	0	0	0	1	
60	-5	-2	0	-4	-1	-28	39	0	0	0	0	0	0	-1	
70	-1	0	0	-1	-7	2	0	0	0	47	0	0	0	0	
80	2	0	0	0	0	0	0	0	0	-14	0	3	2	1	
90	0	0	0	0	0	-6	0	0	0	0	0	0	0	0	
Max	0	0	0	0	0	-3	0	0	0	0	0	0	0	0	
Avg	-39	-84	-49	-28	-83	-57	16	0	0	1	-2	30	1	-14	-19

Table 5.1-9. CALSIM–Simulated Scenario B SWP Exports Monthly Distribution, for 2001 and 2020 Conditions (cfs)

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A. 2001 Baseline

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	723	300	300	1,246	762	300	300	300	300	300	300	1,445	300	837	
10	1,235	980	2,643	2,645	1,674	1,121	304	304	606	606	842	3,367	1,639	1,658	
20	2,666	2,255	3,135	3,893	3,016	2,570	700	700	700	1,125	2,271	3,829	5,480	3,881	
30	3,675	2,571	3,966	4,556	3,482	3,175	1,500	700	700	1,868	2,886	4,123	5,819	4,851	
40	4,210	3,229	4,472	5,272	4,111	4,234	2,904	700	700	2,692	3,475	4,745	6,524	5,782	
50	4,984	4,208	5,193	5,967	5,176	5,260	3,679	700	700	2,976	4,112	5,418	6,680	6,209	
60	5,467	5,022	5,705	6,775	6,668	6,914	4,527	700	700	3,926	4,347	6,083	6,680	6,630	
70	6,371	6,588	7,001	7,296	7,735	7,228	5,500	1,125	1,125	4,521	5,266	6,658	6,749	6,680	
80	6,680	6,680	7,047	7,465	8,437	7,561	5,640	1,500	1,500	5,639	6,072	7,180	7,003	7,180	
90	6,680	6,680	7,195	8,493	8,500	7,561	5,697	1,500	1,500	5,640	6,680	7,180	7,180	7,180	
Max	6,680	6,680	7,678	8,500	8,500	7,561	5,697	1,500	1,500	5,687	6,680	7,180	7,180	7,180	
Avg	4,583	4,172	5,110	5,769	5,409	5,006	3,413	905	916	3,214	3,991	5,350	5,767	5,457	3,312

B. 2001 Scenario B

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	300	300	300	1,246	328	300	300	300	300	300	300	1,929	300	1,150	
10	1,180	921	2,211	2,622	1,672	1,122	316	316	486	486	612	3,083	1,810	1,656	
20	2,563	2,051	2,856	3,492	3,012	2,720	700	700	700	903	2,138	4,226	5,162	3,846	
30	3,363	2,394	3,769	4,316	3,481	3,174	1,500	700	700	1,868	2,849	4,775	6,418	4,787	
40	3,904	3,014	4,314	4,972	4,111	4,375	2,849	700	700	2,682	3,481	5,480	6,848	5,413	
50	4,874	3,820	5,218	5,372	5,296	5,327	3,679	700	700	2,978	4,112	6,146	7,080	6,232	
60	5,260	4,744	5,330	6,531	6,368	6,468	4,527	700	700	3,926	4,440	6,611	7,334	6,568	
70	5,979	5,673	6,726	7,180	7,180	7,180	5,502	1,125	1,125	4,519	5,266	6,899	8,055	6,832	
80	7,713	6,788	7,180	7,180	7,180	7,180	5,891	1,500	1,500	5,827	6,072	7,748	8,307	7,448	
90	8,500	8,500	7,180	7,180	7,180	7,180	5,891	1,500	1,500	5,890	7,111	8,186	8,310	8,500	
Max	8,500	8,500	7,180	7,180	7,180	7,180	5,948	1,500	1,500	5,937	7,180	8,500	8,500	8,500	
Avg	4,816	4,252	4,892	5,401	4,934	4,890	3,455	903	912	3,221	4,002	5,877	6,373	5,660	3,345

C. 2001 Scenario B Changes (~~A—B~~B – A)

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	-423	0	0	0	-434	0	0	0	0	0	0	484	0	313	
10	-55	-59	-432	-23	-2	1	12	12	-120	-120	-230	-284	171	-2	
20	-103	-204	-279	-401	-4	150	0	0	0	-222	-133	397	-318	-35	
30	-312	-177	-197	-240	-1	-1	0	0	0	0	-37	652	599	-64	
40	-306	-215	-158	-300	0	141	-54	0	0	-10	6	735	324	-369	
50	-110	-388	25	-595	120	67	0	0	0	2	0	728	400	23	
60	-207	-278	-375	-244	-300	-446	0	0	0	0	93	528	654	-62	
70	-392	-915	-275	-116	-555	-48	2	0	0	-2	0	241	1,306	152	
80	1,033	108	133	-285	-1,257	-381	251	0	0	187	0	568	1,304	268	
90	1,820	1,820	-15	-1,313	-1,320	-381	194	0	0	250	431	1,006	1,130	1,320	
Max	1,820	1,820	-498	-1,320	-1,320	-381	251	0	0	250	500	1,320	1,320	1,320	
Avg	233	80	-218	-368	-475	-116	42	-2	-4	7	11	527	606	203	33

Table 5.1-9. Continued

D. 2020 Baseline

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	586	301	1,065	1,358	778	300	300	300	300	300	300	1,781	302	801	
10	1,141	1,188	2,599	2,890	1,994	1,182	320	320	700	700	333	2,740	1,859	1,532	
20	2,362	1,957	3,562	4,160	3,104	2,823	1,560	700	700	700	2,292	3,856	4,842	3,983	
30	3,083	2,666	4,125	4,625	3,867	3,555	2,749	700	700	1,799	3,038	4,111	6,102	4,884	
40	4,003	3,192	4,326	4,929	4,478	4,476	3,450	700	700	2,653	3,717	4,691	6,594	5,380	
50	4,624	4,234	5,131	6,354	5,686	6,135	4,172	700	700	3,033	3,973	5,768	6,680	5,946	
60	5,394	5,354	5,501	7,296	7,431	7,060	4,964	700	700	3,804	4,538	6,680	6,749	6,380	
70	6,464	6,357	6,713	7,405	8,171	7,254	5,640	1,125	1,125	4,416	5,302	7,180	7,026	6,550	
80	6,680	6,680	7,032	8,070	8,437	7,561	5,640	1,500	1,500	5,639	5,969	7,180	7,180	6,686	
90	6,680	6,680	7,157	8,500	8,500	7,561	5,697	1,500	1,500	5,640	6,680	7,180	7,180	7,180	
Max	6,680	6,680	7,678	8,500	8,500	7,561	5,697	1,500	1,500	5,687	6,680	7,180	7,180	7,180	
Avg	4,436	4,220	5,122	5,987	5,692	5,201	3,763	914	920	3,160	3,981	5,433	5,861	5,290	3,357

E. 2020 Scenario B

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	300	300	300	1,359	778	300	300	300	300	300	300	2,060	302	817	
10	1,109	1,166	2,509	3,002	1,838	1,238	700	700	700	700	546	2,779	1,525	1,523	
20	2,426	1,998	3,138	4,009	3,194	2,827	1,541	700	700	700	2,262	4,420	4,699	3,674	
30	3,135	2,676	3,957	4,321	3,765	3,368	2,749	700	700	1,799	2,887	4,752	6,227	4,843	
40	3,705	3,289	4,316	4,931	4,309	4,476	3,450	700	700	2,686	3,734	5,129	6,978	5,331	
50	4,480	3,928	5,233	6,077	5,329	5,900	4,171	700	700	3,031	3,963	6,242	7,441	5,865	
60	5,335	4,490	5,332	7,180	7,180	7,180	4,973	700	700	3,804	4,533	6,687	7,688	6,156	
70	6,147	5,342	6,138	7,180	7,180	7,180	5,772	1,125	1,125	4,416	5,305	7,443	7,988	6,724	
80	8,003	6,745	7,180	7,180	7,180	7,180	5,891	1,500	1,500	5,805	5,969	8,214	8,189	7,229	
90	8,500	8,500	7,180	7,180	7,180	7,180	5,948	1,500	1,500	5,890	7,029	8,500	8,310	8,500	
Max	8,500	8,500	7,180	7,180	7,180	7,180	5,948	1,500	1,500	5,937	7,180	8,500	8,500	8,500	
Avg	4,749	4,244	4,957	5,622	5,167	5,092	3,854	923	918	3,212	4,024	5,997	6,372	5,477	3,393

F. 2020 Scenario B Changes (~~D—E~~ E – D)

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	-286	-1	-765	1	0	0	0	0	0	0	0	279	0	16	
10	-32	-22	-90	112	-156	56	380	380	0	0	213	39	-334	-9	
20	64	41	-424	-151	90	4	-19	0	0	0	-30	564	-143	-309	
30	52	10	-168	-304	-102	-187	0	0	0	0	-151	641	125	-41	
40	-298	97	-10	2	-169	0	0	0	0	33	17	438	384	-49	
50	-144	-306	102	-277	-357	-235	-1	0	0	-2	-10	474	761	-81	
60	-59	-864	-169	-116	-251	120	9	0	0	0	-5	7	939	-224	
70	-317	-1,015	-575	-225	-991	-74	132	0	0	0	3	263	962	174	
80	1,323	65	148	-890	-1,257	-381	251	0	0	166	0	1,034	1,009	543	
90	1,820	1,820	23	-1,320	-1,320	-381	251	0	0	250	349	1,320	1,130	1,320	
Max	1,820	1,820	-498	-1,320	-1,320	-381	251	0	0	250	500	1,320	1,320	1,320	
Avg	313	24	-165	-365	-525	-109	92	9	-1	52	43	564	511	187	37

Table 5.1-10. CALSIM–Simulated Scenario C CVP Tracy Pumping Monthly Distribution, for 2001 and 2020 Conditions (cfs)

A. 2001 Baseline

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,616	800	351	691	641	800	800	800	800	800	800	800	868	1,410	
10	2,585	1,251	1,193	2,389	1,389	1,240	800	800	800	800	1,220	857	2,048	2,912	
20	2,998	2,431	2,889	2,999	2,877	1,865	800	800	800	800	1,734	2,571	3,718	4,275	
30	3,309	3,412	3,002	3,007	3,137	2,403	1,125	800	800	800	2,012	3,745	4,467	4,366	
40	3,914	4,217	3,212	3,026	3,679	2,772	1,500	800	800	800	2,339	4,536	4,505	4,448	
50	4,315	4,247	4,209	4,122	4,020	3,352	2,919	800	800	1,125	2,540	4,570	4,531	4,468	
60	4,344	4,250	4,221	4,222	4,224	3,685	3,564	1,125	800	1,500	2,852	4,577	4,535	4,470	
70	4,355	4,253	4,222	4,226	4,237	4,230	4,200	1,125	1,125	1,500	3,000	4,588	4,543	4,475	
80	4,365	4,256	4,224	4,228	4,245	4,274	4,544	1,500	1,500	2,692	3,000	4,600	4,553	4,481	
90	4,374	4,260	4,225	4,229	4,247	4,286	4,600	1,500	1,500	3,000	3,000	4,600	4,562	4,485	
Max	4,391	4,265	4,227	4,232	4,254	4,308	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,781	3,541	3,415	3,504	3,479	3,088	2,737	1,019	1,011	1,507	2,365	3,790	4,021	4,183	2,312

B. 2001 Scenario C

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,751	800	16	603	641	800	800	800	800	800	800	800	800	1,394	
10	2,623	1,280	1,087	1,921	1,014	872	800	800	800	800	1,220	859	1,753	2,911	
20	2,989	2,380	2,426	2,993	2,445	1,990	800	800	800	800	1,779	2,556	3,517	4,262	
30	3,157	3,005	2,999	3,004	3,096	2,325	1,125	800	800	800	2,027	3,985	4,463	4,362	
40	3,638	3,819	3,083	3,009	3,426	2,635	1,500	800	800	800	2,327	4,540	4,508	4,455	
50	4,294	4,203	4,209	4,042	3,941	2,867	2,939	800	800	1,125	2,557	4,573	4,531	4,469	
60	4,343	4,250	4,222	4,222	4,225	3,509	3,564	1,125	800	1,500	2,921	4,583	4,539	4,473	
70	4,355	4,253	4,223	4,226	4,237	4,230	4,202	1,125	1,125	1,500	3,000	4,588	4,543	4,475	
80	4,366	4,255	4,224	4,228	4,245	4,276	4,544	1,500	1,500	2,596	3,000	4,600	4,553	4,481	
90	4,374	4,260	4,225	4,229	4,247	4,291	4,600	1,500	1,500	3,000	3,000	4,600	4,562	4,486	
Max	4,391	4,265	4,227	4,232	4,254	4,307	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,751	3,465	3,364	3,450	3,383	3,003	2,737	1,019	1,011	1,505	2,385	3,809	4,012	4,165	2,289

C. 2001 Scenario C Changes (~~A—B~~B – A)

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	135	0	-335	-88	0	0	0	0	0	0	0	0	-68	-16	
10	38	29	-106	-468	-375	-368	0	0	0	0	0	2	-295	-1	
20	-9	-51	-463	-6	-432	125	0	0	0	0	45	-15	-201	-13	
30	-152	-407	-3	-3	-41	-78	0	0	0	0	15	240	-4	-4	
40	-276	-398	-129	-17	-253	-137	0	0	0	0	-12	4	3	7	
50	-21	-44	0	-80	-79	-485	19	0	0	0	17	3	0	1	
60	-1	0	1	0	1	-176	0	0	0	0	69	6	4	3	
70	0	0	1	0	0	0	2	0	0	0	0	0	0	0	
80	1	-1	0	0	0	2	0	0	0	-96	0	0	0	0	
90	0	0	0	0	0	5	0	0	0	0	0	0	0	1	
Max	0	0	0	0	0	-1	0	0	0	0	0	0	0	0	
Avg	-30	-76	-51	-54	-96	-85	0	0	0	-2	20	19	-9	-18	-23

Table 5.1-10. Continued

D. 2020 Baseline

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,664	800	723	715	641	800	800	800	800	800	800	800	898	1,198	
10	2,401	1,333	1,353	2,183	1,417	1,194	800	800	800	800	1,179	1,244	2,345	2,867	
20	3,016	2,233	2,755	2,998	2,594	2,064	800	800	800	800	1,541	2,449	3,577	4,080	
30	3,154	3,301	2,999	3,004	3,289	2,576	1,297	800	800	800	2,008	3,434	4,290	4,349	
40	3,679	3,728	3,079	3,008	3,904	2,929	2,561	800	800	800	2,260	4,533	4,503	4,442	
50	4,259	4,225	4,211	4,214	4,218	3,424	3,127	800	800	1,125	2,523	4,561	4,523	4,463	
60	4,339	4,249	4,220	4,224	4,232	3,980	3,817	1,125	800	1,500	2,908	4,578	4,535	4,471	
70	4,353	4,253	4,223	4,226	4,242	4,240	4,544	1,125	1,125	1,620	3,000	4,587	4,542	4,475	
80	4,359	4,255	4,223	4,228	4,245	4,274	4,544	1,500	1,500	2,859	3,000	4,594	4,547	4,477	
90	4,370	4,259	4,225	4,229	4,248	4,287	4,600	1,500	1,500	3,000	3,000	4,600	4,558	4,483	
Max	4,391	4,265	4,227	4,232	4,254	4,308	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,723	3,487	3,417	3,498	3,487	3,152	2,895	1,021	1,011	1,543	2,326	3,720	3,990	4,152	2,305

E. 2020 Scenario C

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	1,661	800	740	720	641	800	800	800	800	800	800	800	898	1,187	
10	2,341	1,295	1,285	1,818	1,063	1,166	800	800	800	800	1,113	856	1,986	2,803	
20	2,921	2,181	2,690	2,995	2,252	1,762	800	800	800	800	1,577	2,248	3,486	4,018	
30	3,053	3,196	2,992	3,000	2,993	2,457	1,500	800	800	800	1,833	3,491	4,149	4,350	
40	3,619	3,694	3,004	3,008	3,562	2,644	2,608	800	800	800	2,261	4,529	4,500	4,436	
50	4,234	4,007	4,209	3,780	3,943	3,284	3,129	800	800	1,125	2,523	4,562	4,523	4,465	
60	4,326	4,240	4,220	4,218	4,229	3,963	3,843	1,125	800	1,500	2,908	4,579	4,536	4,472	
70	4,353	4,253	4,223	4,226	4,235	4,249	4,544	1,125	1,125	1,589	3,000	4,588	4,542	4,475	
80	4,359	4,255	4,223	4,228	4,245	4,277	4,544	1,500	1,500	2,813	3,000	4,598	4,551	4,479	
90	4,370	4,259	4,225	4,229	4,247	4,287	4,600	1,500	1,500	3,000	3,000	4,600	4,558	4,483	
Max	4,391	4,265	4,227	4,232	4,254	4,308	4,600	1,500	1,500	3,001	3,000	4,600	4,578	4,494	
Avg	3,677	3,407	3,380	3,417	3,385	3,083	2,910	1,021	1,011	1,542	2,316	3,695	3,971	4,134	2,276

F. 2020 Scenario C Changes (~~D—E~~ E – D)

Percentile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	-3	0	17	5	0	0	0	0	0	0	0	0	0	-11	
10	-60	-38	-68	-365	-354	-28	0	0	0	0	-66	-388	-359	-64	
20	-95	-52	-65	-3	-342	-302	0	0	0	0	36	-201	-91	-62	
30	-101	-105	-7	-4	-296	-119	203	0	0	0	-175	57	-141	1	
40	-60	-34	-75	0	-342	-285	46	0	0	0	1	-4	-3	-6	
50	-25	-218	-2	-434	-275	-140	2	0	0	0	0	1	0	2	
60	-13	-9	0	-6	-3	-17	26	0	0	0	0	1	1	1	
70	0	0	0	0	-7	9	0	0	0	-31	0	1	0	0	
80	0	0	0	0	0	3	0	0	0	-47	0	4	4	2	
90	0	0	0	0	-1	0	0	0	0	0	0	0	0	0	
Max	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
Avg	-46	-80	-37	-81	-102	-69	15	0	0	-1	-10	-25	-19	-18	-29

Table 5.1-11. CALSIM–Simulated Scenario C SWP Exports Monthly Distribution, for 2001 and 2020 Conditions (cfs)

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A. 2001 Baseline

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	723	300	300	1,246	762	300	300	300	300	300	300	1,445	300	837	
10	1,235	980	2,643	2,645	1,674	1,121	304	304	606	606	842	3,367	1,639	1,658	
20	2,666	2,255	3,135	3,893	3,016	2,570	700	700	700	1,125	2,271	3,829	5,480	3,881	
30	3,675	2,571	3,966	4,556	3,482	3,175	1,500	700	700	1,868	2,886	4,123	5,819	4,851	
40	4,210	3,229	4,472	5,272	4,111	4,234	2,904	700	700	2,692	3,475	4,745	6,524	5,782	
50	4,984	4,208	5,193	5,967	5,176	5,260	3,679	700	700	2,976	4,112	5,418	6,680	6,209	
60	5,467	5,022	5,705	6,775	6,668	6,914	4,527	700	700	3,926	4,347	6,083	6,680	6,630	
70	6,371	6,588	7,001	7,296	7,735	7,228	5,500	1,125	1,125	4,521	5,266	6,658	6,749	6,680	
80	6,680	6,680	7,047	7,465	8,437	7,561	5,640	1,500	1,500	5,639	6,072	7,180	7,003	7,180	
90	6,680	6,680	7,195	8,493	8,500	7,561	5,697	1,500	1,500	5,640	6,680	7,180	7,180	7,180	
Max	6,680	6,680	7,678	8,500	8,500	7,561	5,697	1,500	1,500	5,687	6,680	7,180	7,180	7,180	
Avg	4,583	4,172	5,110	5,769	5,409	5,006	3,413	905	916	3,214	3,991	5,350	5,767	5,457	3,312

B. 2001 Scenario C

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	300	300	300	1,248	752	300	300	300	300	300	300	1,483	300	915	
10	1,289	924	2,174	2,630	1,669	1,124	300	300	609	609	559	2,882	1,448	1,655	
20	2,425	1,867	2,820	3,682	2,984	2,570	700	700	700	1,125	2,456	4,182	5,134	3,351	
30	3,471	2,474	3,761	4,809	3,481	3,174	1,500	700	700	1,882	2,994	4,673	6,145	4,851	
40	3,727	3,014	4,348	4,958	4,148	4,375	2,849	700	700	2,690	3,590	5,253	6,621	5,278	
50	4,787	3,919	5,191	5,685	5,597	5,613	3,679	700	700	2,973	4,062	6,131	7,022	6,277	
60	5,338	5,000	6,319	6,391	6,320	6,442	4,527	700	700	3,926	4,338	6,565	7,266	6,563	
70	5,969	5,778	6,912	8,500	8,500	7,561	5,502	1,125	1,125	4,521	5,262	6,822	7,699	6,924	
80	8,190	6,748	8,500	8,500	8,500	7,561	5,640	1,500	1,500	5,639	6,071	7,741	8,308	7,433	
90	8,500	8,500	8,500	8,500	8,500	7,561	5,697	1,500	1,500	5,640	6,680	8,500	8,310	8,500	
Max	8,500	8,500	8,500	8,500	8,500	7,561	5,697	1,500	1,500	5,687	6,680	8,500	8,500	8,500	
Avg	4,815	4,269	5,338	5,927	5,477	5,003	3,390	900	916	3,201	4,029	5,858	6,299	5,680	3,437

C. 2001 Scenario C Changes (~~A—B~~B – A)

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	-423	0	0	2	-10	0	0	0	0	0	0	38	0	78	
10	54	-56	-469	-15	-5	3	-4	-4	3	3	-283	-485	-191	-3	
20	-241	-388	-315	-211	-32	0	0	0	0	0	185	353	-346	-530	
30	-204	-97	-205	253	-1	-1	0	0	0	14	108	550	326	0	
40	-483	-215	-124	-314	37	141	-54	0	0	-3	115	508	97	-504	
50	-197	-289	-2	-282	421	353	0	0	0	-4	-50	713	342	68	
60	-129	-22	614	-384	-348	-472	0	0	0	0	-9	482	586	-67	
70	-402	-810	-89	1,204	765	333	2	0	0	0	-4	164	950	244	
80	1,510	68	1,453	1,035	63	0	0	0	0	0	-1	561	1,305	253	
90	1,820	1,820	1,305	7	0	0	0	0	0	0	0	1,320	1,130	1,320	
Max	1,820	1,820	822	0	0	0	0	0	0	0	0	1,320	1,320	1,320	
Avg	232	97	228	158	68	-3	-23	-5	0	-13	38	508	532	223	126

Table 5.1-11. Continued

D. 2020 Baseline

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	586	301	1,065	1,358	778	300	300	300	300	300	300	1,781	302	801	
10	1,141	1,188	2,599	2,890	1,994	1,182	320	320	700	700	333	2,740	1,859	1,532	
20	2,362	1,957	3,562	4,160	3,104	2,823	1,560	700	700	700	2,292	3,856	4,842	3,983	
30	3,083	2,666	4,125	4,625	3,867	3,555	2,749	700	700	1,799	3,038	4,111	6,102	4,884	
40	4,003	3,192	4,326	4,929	4,478	4,476	3,450	700	700	2,653	3,717	4,691	6,594	5,380	
50	4,624	4,234	5,131	6,354	5,686	6,135	4,172	700	700	3,033	3,973	5,768	6,680	5,946	
60	5,394	5,354	5,501	7,296	7,431	7,060	4,964	700	700	3,804	4,538	6,680	6,749	6,380	
70	6,464	6,357	6,713	7,405	8,171	7,254	5,640	1,125	1,125	4,416	5,302	7,180	7,026	6,550	
80	6,680	6,680	7,032	8,070	8,437	7,561	5,640	1,500	1,500	5,639	5,969	7,180	7,180	6,686	
90	6,680	6,680	7,157	8,500	8,500	7,561	5,697	1,500	1,500	5,640	6,680	7,180	7,180	7,180	
Max	6,680	6,680	7,678	8,500	8,500	7,561	5,697	1,500	1,500	5,687	6,680	7,180	7,180	7,180	
Avg	4,436	4,220	5,122	5,987	5,692	5,201	3,763	914	920	3,160	3,981	5,433	5,861	5,290	3,357

E. 2020 Scenario C

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre-VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post-VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	300	300	300	1,358	778	300	300	300	300	300	300	1,593	300	806	
10	1,148	1,096	2,585	3,061	1,963	1,174	700	700	700	700	749	3,163	976	1,596	
20	2,222	1,809	3,287	4,191	3,045	2,826	1,538	700	700	700	2,162	4,450	4,750	4,001	
30	3,289	2,633	3,970	4,812	3,809	3,527	2,749	700	700	1,799	3,107	4,843	6,418	4,697	
40	3,679	2,981	4,811	4,981	4,363	4,677	3,448	700	700	2,655	3,725	5,347	6,775	5,314	
50	4,488	3,927	5,341	6,320	6,319	6,168	4,172	700	700	3,031	3,975	6,176	7,302	5,846	
60	5,285	4,622	5,995	7,767	6,737	7,232	4,971	700	700	3,804	4,534	6,506	7,725	6,246	
70	6,103	5,368	6,322	8,500	8,500	7,561	5,640	1,125	1,125	4,416	5,305	7,326	8,064	6,669	
80	8,500	6,755	8,044	8,500	8,500	7,561	5,640	1,500	1,500	5,639	5,969	8,458	8,310	7,045	
90	8,500	8,500	8,500	8,500	8,500	7,561	5,697	1,500	1,500	5,640	6,680	8,500	8,390	8,500	
Max	8,500	8,500	8,500	8,500	8,500	7,561	5,697	1,500	1,500	5,687	6,680	8,500	8,500	8,500	
Avg	4,769	4,271	5,434	6,167	5,721	5,256	3,775	923	919	3,158	3,992	6,055	6,347	5,507	3,498

F. 2020 Scenario C Changes (~~D—E~~E – D)

Per-centile	Oct	Nov	Dec	Jan	Feb	Mar	Pre VAMP 4/1–4/15	VAMP 4/16–4/30	VAMP 5/1–5/15	Post VAMP 5/16–5/31	Jun	Jul	Aug	Sep	taf/yr
Min	-286	-1	-765	0	0	0	0	0	0	0	0	-188	-2	5	
10	7	-92	-14	171	-31	-8	380	380	0	0	416	423	-883	64	
20	-140	-148	-275	31	-59	3	-22	0	0	0	-130	594	-92	18	
30	206	-33	-155	187	-58	-28	0	0	0	0	69	732	316	-187	
40	-324	-211	485	52	-115	201	-2	0	0	2	8	656	181	-66	
50	-136	-307	210	-34	633	33	0	0	0	-2	2	408	622	-100	
60	-109	-732	494	471	-694	172	6	0	0	0	-4	-174	976	-134	
70	-361	-989	-391	1,095	329	307	0	0	0	0	3	146	1,038	119	
80	1,820	75	1,012	430	63	0	0	0	0	0	0	1,278	1,130	359	
90	1,820	1,820	1,343	0	0	0	0	0	0	0	0	1,320	1,210	1,320	
Max	1,820	1,820	822	0	0	0	0	0	0	0	0	1,320	1,320	1,320	
Avg	333	51	312	180	29	55	13	8	-1	-2	11	622	486	217	141