# APPENDIX E3

## Sierra Vista Specific Plan EIR
## Technical Memorandum:
## *Effects of Changed Water Management Operations on Fisheries and Water Quality Impacts Previously Disclosed in the Water Form Agreement EIR*

# SIERRA VISTA SPECIFIC PLAN EIR TECHNICAL MEMORANDUM: EFFECTS OF CHANGED WATER MANAGEMENT OPERATIONS ON FISHERIES AND WATER QUALITY IMPACTS PREVIOUSLY DISCLOSED IN THE WATER FORUM PROPOSAL EIR

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# 1. Introduction

## *1.1 Background*

### 1.1.1 Sierra Vista Specific Plan

The Sierra Vista Specific Plan (SVSP) is an approximately 2,064 acre mixed-use development project plan proposed in Placer County, California, south and west of the City of Roseville (City). The project site is located approximately 5 miles west of downtown Roseville, 6 miles west of Interstate 80 and State Route 65, and 10 miles northeast of the City of Sacramento. The proposed specific plan project (Project) would include development of a mix of land uses, including 6,650 residential units, approximately 216 acres of commercial and office uses, approximately 61 acres of public/quasi-public, 267 acres of open space uses, and 97 acres of parks. The majority of the proposed project site, which is currently undeveloped annual grasslands that were historically used for seasonal cattle grazing, is within the City's Sphere of Influence, which was expanded in 2004, as part of the West Roseville Specific Plan (WRSP) annexation.

### 1.1.2 Water Supply for the Sierra Vista Development

The City is a signatory to the Water Forum Agreement (WFA), which provides a framework for future surface water and groundwater supplies in the region through the year 2030. The City's WFA specifies the maximum allowable surface water diversions based on unimpaired flows into Folsom Lake with diversions by the City restricted during drier and driest years, with the objective of supporting environmental needs in the lower American River (LAR).

Although the City's water contract entitlements total 66,000 acre-feet per year (AFY), the diversions from the American River are limited by the WFA to 58,900 AFY in normal/wet years. This includes 54,900 AFY of diversion by the City of Roseville plus 4,000 AFY of San Juan Water District water from PCWA's Middle Fork Project that is reallocated to the City during normal/wet years. In critically dry years, the maximum City diversion from the American River is limited to 39,800 AFY with a requirement for an additional 20,000 AFY of water to be made available for release by Placer County Water Agency (PCWA) through re-operation of its Middle Fork project. In drier years, the City may divert an amount between 58,900 and 39,800 AFY from the American River based on unimpaired flow into Folsom Lake with similar release requirements from PCWA.

At buildout of the City's current General Plan, water demands are estimated to reach approximately 58,582 AFY. The Project would include development of new residential, commercial, business professional, and school uses that would require water. The total water demand for the Project is estimated to be 3,612 AFY, which includes 2% for system loss, 4 AFY (with losses) for the Urban Reserve parcels, and a water demand reduction of 729 AFY for water conservation measures. Implementation of the SVSP project in combination with projected water demand for buildout of the City would be 62,194 AFY (58,582 AFY + 3,612 AFY). By subtracting the City's anticipated recycled water usage at buildout of 4,388 AFY (i.e., 563 AFY for SVSP and 3,825 AFY for other City areas) from the City's "with-Project" demand of 62,194 AFY, the net with-SVSP surface water demand is 57,806 AFY.

In a normal water year, the WFA assumes there is 58,900 AFY available from the American River. Although buildout demand are not expected to reach 58,900 AFY (but rather 57,806 AFY), to allow for a conservative CEQA approach, the City assumes a buildout 58,900 AFY, the amount allotted to the City via the WFA, as the City plus Project net buildout water demand.

Based on over 107 years of historical hydrology (and WFA restrictions), the 58,900 AFY contract surface water supply is assumed to be available to the City in about 83 percent of the years. In about 17 percent of the years, quantities from 58,900 AFY to a minimum of 39,800 AFY of surface water would be available per the WFA. Thus, in drought years, supplemental supplies potentially totaling up to 19,100 AFY (the difference between the average/wet year supply and the dry year supply) is needed to make up for the dry year and critically dry year deficiencies.

To meet water supply demands during dry and critically dry years, the City may utilize other supplies like recycled water and groundwater and implement the water conservation strategies outlined in the Roseville Municipal Code (RMC). Recycled water offsets the use of surface water supplies by reducing the City's reliance on American River supplies by filling irrigation demands that would otherwise use surface water supplies. Groundwater is used to make up any additional water supply shortfall. The RMC identifies "stages" of conservation designed to achieve a specific amount of reduction in water use to match available supplies for that year and outlines five drought stages with specific actions a water customer can implement to achieve a 10 to 50 percent water reduction.

Because the City's "with-Project" net buildout water demand is less than the amount of water allotted to the City in the WFA, and because the City can utilize recycled water, groundwater and water conservation strategies to offset potential decreases in American River water during dry and critically dry years, the water supply for the Project falls within the City's 2030 demand as agreed to under the WFA and as assessed, for CEQA purposes, under the Water Forum Proposal Environmental Impact Report (WFP EIR) which was certified in 1999.

### 1.1.3 Sierra Vista Specific Plan (Project) EIR

Pursuant to CEQA, the City is preparing an EIR for the Project that evaluates the environmental impacts of the Project. The SVSP EIR examines the potential effects of a proposed project that includes: 1) amending a 2,064-acre area, immediately west of the City corporate boundaries, north of Baseline Road, west of Fiddyment Road in unincorporated Placer County into the City's jurisdiction (annexation); 2) expanding approximately 353 acres of the City's sphere of influence (SOI) over a small portion of the western boundary, and 3) adopting the SVSP and associated entitlements. The EIR includes extensive analysis of the potential environmental impacts of the water supply strategy for the Project.

The water supply section of the Administrative Draft SVSP EIR (ADEIR) relies heavily upon the WFP EIR, which was certified in October 1999, for addressing project-specific impacts associated with supplying water to the Sierra Vista development, as discussed above. Although water supply for the City at buildout, including the 3,612 AFY for the Project, still fall within the 58,900 AFY American River demand allocated to the City under the Water Forum Agreement,

the ADEIR needs to include discussion that fully complies with the California Supreme Court's 2007 decision in *Vineyard Area Citizens for Responsible Growth, Inc. v. City of Rancho Cordova* (40 Cal.4th 412) and confirms or updates the impact determinations of the WFP EIR based upon current regional water supply issues/changed conditions.

## 1.2 Purpose and Intended Use of this Document

This Technical Memorandum (TM) addresses changed water supply/water management conditions in the region and evaluates whether these changed conditions and Central Valley Project (CVP) and State Water Project (SWP) operations would make the impacts to fisheries resources and water quality from the WFA demands (which include diversion of the City's full American River demand) more severe than previously disclosed in the WFP EIR. Specifically, this TM has two main purposes:

- Identify potential and reasonably foreseeable changes in CVP/SWP operations resulting from changed water supply/water management conditions and decisions (such as the recent NOAA Fisheries and USFWS Biological Opinions on the Operations Criteria and Plan (OCAP)), and any associated changes in:
    - system hydrology, and
    - the probable quantity and dry-year reliability of deliveries under the WFA, and Roseville's purveyor-specific agreement in particular.
- Identify, on a qualitative basis, any changes in the severity of the project-specific fisheries and water quality impacts that were identified in the WFP EIR, and identify any new and thus previously undisclosed fisheries or water quality impacts associated with the City's use of its American River supply, part of which will be used to meet the SVSP Project demand.

Findings from these assessments will be used to either validate the reliance of the SVSP EIR on the WFP EIR for assessing the fisheries and water quality impacts of the City's full buildout water supply demand on the American River, lower Sacramento River, and Delta, or determine that updates to the previous WFA project-specific impacts determinations are warranted, due to changed regional hydrologic and water supply conditions.

# 2 Recent Regulatory Decisions and other Proposed Actions that may Affect Future CVP/SWP Operations

The one constant in the universe of California water is that there is constant change responding to policy, regulatory, and judicial decisions. The ten years that have passed since the WFP EIR was prepared in 1999 have been a particularly dynamic period in the history of Central Valley Project (CVP) water operations. A listing of significant events during this period that affected CVP operations includes the following.

- 1999 - San Joaquin River Agreement; Agreement for providing San Joaquin River flows and exports
- 1999 - Department of Interior (DOI) Final Decision Accounting of Central Valley Improvement Project (CVPIA) 3406 (b)(2); Defined metrics and accounting for CVPIA 3406(b)(2) operations
- 2000 - State Water Resources Control Board (SWRCB) Revised Water Right Decision 1641; Revised order to provide for operations of the CVP and SWP to protect Bay-Delta water quality
- 2000 - CALFED Record of Decision (ROD); Presented a long-term plan and strategy designed to fix the Bay-Delta
- 2000 - Trinity River ROD; Defined minimum flow regime of 369,000 acre-feet in critical dry years ranging up to 816,000 acre-feet in wet years
- 2001 - CVPIA ROD; Implemented provisions of CVPIA including allocating 800,000 acre-feet of CVP yield for environmental purposes
- 2001 - National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries) Biological Opinion for Spring-Run Chinook Salmon and Steelhead; Established criteria for operations to protect spring-run chinook salmon and steelhead
- 2002 - NOAA Fisheries Biological Opinion for Spring-Run Chinook Salmon and Steelhead; Established criteria for operations to protect spring-run chinook salmon and steelhead
- 2003 - Revised DOI Final Decision Accounting of CVPIA 3406 (b)(2); Defined metrics and accounting for CVPIA 3406(b)(2) operations
- 2004 - NOAA Fisheries Biological Opinion for Spring-Run Chinook Salmon and Steelhead; Established criteria for operations to protect spring-run chinook salmon and steelhead
- 2005 - U.S. Fish and Wildlife Service (USFWS) Biological Opinion for Reinitiation of Formal and Early Section 7 Endangered Species Consultation on the Coordinated Operations of the Central Valley Project and State Water Project and the Operational Criteria and Plan to Address Potential Critical Habitat Issues
- 2007 - Judge Wanger issued a summary judgment that invalidated the 2005 USFWS Biological Opinion and ordered a new biological opinion be developed by September 15, 2008
- 2007 - Judge Wanger issued an interim order to direct actions at the export facilities to protect delta smelt until a new biological opinion is completed
- 2008 - USFWS Biological Opinion on the effects of the continued operation of the Federal Central Valley Project and the California State Water Project on the delta smelt and its designated critical habitat
- 2008 - Judge Wanger issued a memorandum decision and order that invalidated the 2004 NOAA Fisheries Biological Opinion and ordered a new biological opinion be developed
- 2009 – NOAA Fisheries Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project

While this inventory of actions illustrates the many changes affecting operations of the CVP and SWP, implementation of most of them have been shown through quantitative analyses, to be

achievable within the flexibility of CVP/SWP operations contemplated in the WFP EIR. However, effects of the most recent actions, specifically the 2008 and 2009 OCAP Biological Opinions and the 2007 Wanger Decision are not yet quantifiable (at the time this Technical Memorandum was prepared) with existing analysis tools and, therefore, can only be assessed on a qualitative basis at this time.

## 2.1 USFWS Biological Opinion on the OCAP and Wanger Decisions

The operation of CVP/SWP is described in the OCAP. As updated in 2004, the OCAP provides a detailed description of the coordinated operations of the CVP and SWP based on historical data and serves as a starting point for planning project operations in the future. Under the federal Endangered Species Act (ESA), USFWS must produce formal Biological Opinions analyzing the impact of OCAP implementation on ESA-listed species (including the delta smelt). In effect, the ESA authorizes USFWS to require changes to the OCAP for the protection of the delta smelt and other federally listed species.

In 2005, USFWS issued a Biological Opinion for OCAP, and concluded that CVP/SWP operations did not jeopardize delta smelt populations. However, that opinion was struck down by a federal judge (Judge Wanger) following a lawsuit filed by environmentalists. USFWS was ultimately ordered to revise the Biological Opinion. The court also severely restricted CVP and SWP pumping in the Delta (Wanger Decision) pending the USFWS's completion of the new Biological Opinion. Those restrictions took effect in December 2007.

In December 2008, USFWS released a new Biological Opinion concluding that CVP and SWP operations would jeopardize the continued existence of endangered delta smelt. USFWS further detailed a "reasonable and prudent alternative" (RPA) to the proposed OCAP protocol that would, it claimed, protect the delta smelt and its habitat from the adverse effects of pumping operations. The "reasonable and prudent alternative" would restrict Delta pumping operations and would thus limit deliveries of water to CVP/SWP contractors south of the Delta. Extrapolating from the text of the RPA there are several Actions (1, 2, and 3) that will affect Delta exports by virtue of limitations on Old and Middle River ("OMR") flows, and Action 4 requiring additional X2[1] flows in the fall months that will affect reservoir releases.

## 2.2 NOAA Fisheries Biological Opinion on the OCAP

Like the USFWS, under the ESA, NOAA Fisheries must produce a formal Biological Opinion analyzing the impact of OCAP implementation on ESA-listed species under NOAA's jurisdiction, in this case including; endangered Sacramento River winter-run chinook salmon, threatened Central Valley spring-run chinook salmon, threatened Central Valley steelhead, and threatened Southern Distinct Population Segment (DPS) of North American green sturgeon. As

[1] X2 is the location of the 2 parts per thousand salinity contour (isohaline), one meter off the bottom of the estuary, as measured in kilometers upstream from the Golden Gate Bridge. The abundance of several estuarine species has been correlated with X2. Maintaining the location of X2 is accomplished via Project reservoir releases that increase inflow to the Delta thus "pushing" X2 towards the Golden Gate Bridge.

stated earlier, in effect, the ESA authorizes NOAA Fisheries to require changes to the OCAP for the protection of the federally listed species identified above.

In October 2004, NOAA Fisheries issued a Biological Opinion for OCAP, and concluded that CVP/SWP operations were not likely to jeopardize the continued existence of the Sacramento River winter-run chinook salmon, spring-run chinook salmon, and Central Valley steelhead populations. In April, 2008, that opinion was struck down by a federal judge (Judge Wanger) following a lawsuit filed by Pacific Coast Federation of Fishermen's Associations, Institute for Fisheries Resources, and others. The court found that NOAA Fisheries failed to analyze multiple factors and the 2004 Biological Opinion was remanded to NOAA Fisheries and the Reclamation for further consultation.

In June 2009, NOAA Fisheries released a new Biological Opinion concluding that CVP and SWP operations would jeopardize the continued existence of endangered Sacramento River winter-run chinook salmon, threatened Central Valley spring-run chinook salmon, threatened Central Valley steelhead, threatened Southern Distinct Population Segment (DPS) of North American green sturgeon, and Southern Resident killer whales. NOAA Fisheries further detailed a "reasonable and prudent alternative" to the proposed OCAP protocol that would, it claimed, protect these species and their habitat from the adverse effects CVP/SWP. The "reasonable and prudent alternative" would restrict Delta pumping operations and NOAA Fisheries estimated that deliveries of water to CVP/SWP contractors south of the Delta would be reduced by 5% to 7% of average annual exports. The RPA includes multiple actions applied to various CVP-influenced watersheds.

## 2.3 Other Reasonably Foreseeable Actions that may Affect CVP/SWP Operations

The foregoing listed and described actions are primarily the result of federal regulatory requirements. Other, reasonably foreseeable actions and initiatives that can potentially affect CVP/SWP operations include:

- El Dorado Water & Power Authority (EDWPA) Supplemental Water Supply Project. This project proposes to perfect water rights senior to U.S. Bureau of Reclamation (Reclamation) water rights, and would divert 40,000 acre-feet of water upstream of, or directly from Folsom Reservoir, thereby potentially reducing the CVP water supply to others in the American River basin.
- Bay Delta Conservation Plan (BDCP). The Bay Delta Conservation Plan is a planning and environmental permitting process to restore habitat for Delta fisheries in a way that reliably delivers water supplies to 25 million Californians. The BDCP is:
    - identifying conservation strategies to improve the overall ecological health of the Delta;
    - identifying ecologically friendly ways to move fresh water through and/or around the Delta; and
    - addressing toxic pollutants, invasive species, and impairments to water quality.

The BDCP is being developed under the federal ESA and the California Natural Community Conservation Planning Act (NCCPA) and will undergo extensive environmental analysis that will include opportunities for public review and comment. As the BDCP evaluates alternatives necessary to restore the Delta ecosystem while providing water supply reliability, state and federal agencies are developing a joint Environmental Impact Report/Statement (EIR/EIS) to determine the environmental impacts of the BDCP. Presently, the alternatives are being formulated but are not yet public. The draft EIR/EIS is expected to be ready for public review and comment no sooner than early 2010.

- Folsom Flood Control. The Corps of Engineers has been directed by Congress to update the Folsom Dam and Reservoir Water Control Manual to recognize the Auxiliary Spillway presently under construction at Folsom Dam. The implementation of the new spillway will reduce the risk of flooding in Sacramento, compared to the existing interim flood control operation, while potentially increasing water supplies to CVP contractors.

- Climate Change. Two aspects of climate change directly affecting CVP/SWP operations are of concern: 1) sea level rise, and 2) changes to the temporal/spatial/state (rain or snow) distribution of precipitation. The CALFED has a strong science program that assists in narrowing uncertainty in climate impacts so the best information is available on water issues to policy-makers. For example, the CALFED Independent Science Board (ISB) recently prepared a memo recommending which sea level rise projections are most appropriate for ongoing Delta planning. In addition, the CALFED Science Program has funded an effort to develop and apply a model-based approach for evaluating plausible future scenarios of the Bay-Delta-River-Watershed system. The Department of Water Resources (DWR) is developing a policy considering its existing demands in managing water resources for the state with meeting the state's climate policy goals. Despite the numerous on-going activities, this information cannot yet be quantified as effects on the CVP/SWP.

- Interagency Ecological Program (IEP). A consortium of nine state and federal agencies has been monitoring aquatic organisms and water quality in the San Francisco estuary for decades. Since late 2004, scientific and public attention has focused on the unexpected decline of several pelagic (open-water) fishes (delta smelt, longfin smelt, striped bass, and threadfin shad) in the freshwater portion of the estuary known as the Delta.

  This decline has collectively become known as the Pelagic Organism Decline (POD). In 2005, the IEP formed a multi-agency POD Management Team tasked with designing and managing a comprehensive study to evaluate the causes of the decline and to synthesize and report the results. The causes under investigation include stock-recruitment effects, a decline in habitat quality; increased mortality rates; and reduced food availability due to invasive species.

  The SWRCB continues to hold workshops and receive information regarding POD, climate change, and San Joaquin salinity and flows, and will coordinate updates of the Bay-Delta Plan with on-going development of the comprehensive Salinity Management Plan.

The effects of the preceding list of actions and initiatives on the CVP/SWP are, at this time, insufficiently defined to allow quantifiable identification of probable effects on CVP/SWP operations.

# 3 Implications of Recent Regulatory Decisions and Other Proposed Actions to CVP/SWP Operations and Resulting System Hydrology

## *3.1 Effects on CVP/SWP Operations*

In the years following the certification of the WFP EIR, numerous regulatory and development actions have occurred that altered, to some extent, the operation of the CVP/SWP, and a list of many of those actions is presented in Section 2. This section reviews changes in operations with respect to a baseline consistent with that described as the "Water Forum Agreement" in the WFP EIR.

Defining the changes would be straightforward if unambiguous modeling studies were available to describe the progression of events from 1999 to present. Unfortunately, such is not the case. So many changes have been made to the modeling tools and basic underlying hydrologic input during the last ten years, that quantitative comparisons to identify the effects of a single action are not possible. Consequently, we are left with bits and pieces of information gleaned from previous analyses and inferences based on the opinions of Project operators and professional opinion. Where possible, quantifiable effects are reported in the following sections; however, much of what is expressed is, by necessity, qualitative, though it reflects the professional opinions of sophisticated observers immediately familiar with the CVP/SWP operations.

### 3.1.1 Key Changes to Existing Condition CVP/SWP Operations Compared to that Used for the WFP EIR

Identifying assumption changes in the modeled Base Condition for the WFP EIR, with those applied in present "Current Condition" modeling, can be achieved by looking at the modeling technical support documents. For this purpose it is appropriate to compare the PROSIM Model WFP EIR assumptions with the CALSIMII 2008 OCAP Biological Assessment Study 7.0 assumptions (**Table 3-1**). Study 7.0 captures all of the intervening regulatory changes occurring between 1999 and 2008, but does not include the Wanger Decision, USFWS 2008 OCAP Biological Opinion, or NOAA Fisheries 2009 OCAP Biological Opinion.

Because this study was prepared during the development of Reclamation's Biological Assessment for the OCAP, it does not contain the subsequent RPAs identified by USFWS and NOAA Fisheries in their respective Biological Opinions. Reclamation in concert with DWR, USFWS, and NOAA Fisheries is presently working on modifying the CALSIMII analytical model to incorporate the RPAs into the modeling code. This activity is not yet complete and is, therefore, unavailable for operations analyses. Thus, the best model information available is that contained in Study 7.0., consequently, this best available information was used in support of this TM.

**Table 3-1. Existing Conditions.**

| | WFP EIR 1999 | OCAP BA Study 7.0 2008 |
|---|---|---|
| **Model** | PROSIM | CALSIMII |
| **Period of Simulation** | 1922 - 1991 | 1922 - 2003 |
| **SWP Demands** | Variable 3.6 Million Acre Feet (MAF)/Yr | Variable 3.1 - 4.2 MAF/Yr |
| **CVP Demands** | | |
| North of Delta | Based on 1995 Land Use & Max Historic Use | Land-use based, limited by contract amounts |
| American River | WFA Current Use Estimate | Land-use based, limited by contract amounts |
| EBMUD | 0 | 0 |
| South of Delta | 3.1 MAF | 3.5 MAF |
| **CVP Water Allocation** | | |
| CVP Settlement / Exchange | 100% - 75% Based on Shasta Index | 100% - 75% Based on Shasta Index |
| CVP Ag | 100% - 10% Based on Supply | 100% - 0% Based on Supply |
| CVP M&I | 100% - 50% Based on Supply | 100% - 50% Based on Supply |
| Refuge | 100% - 50% Based on Supply | 100% - 75% Based on Shasta Index |
| **Instream Flow Requirements** | | |
| Trinity River | 340 Thousand Acre Feet (TAF) | Trinity EIS Preferred Alternative (369-815 TAF/year) |
| Sacramento River | November 20, 1997 AFRP | Flows for SWRCB WR 90-5 temperature control, and USFWS discretionary use of CVPIA 3406(b)(2) |
| Clear Creek | November 20, 1997 AFRP | Downstream water rights, 1963 USBR Proposal to USFWS and NPS, and USFWS discretionary use of CVPIA 3406(b)(2) |
| Yuba River | Available Yuba River Data | Yuba Accord Adjusted Data |
| American River | November 20, 1997 AFRP | Minimum Instream Flow Management Standard |
| **Delta Requirements** | Delta Accord | SWRCB D-1641 |
| **Temperature Modeling** | | |
| Optimal Cold Water Pool Management | Yes | Yes |
| Folsom Lake TCD | No | Yes |
| **Flood Control at Folsom** | 400/670 | 400/670 |
| **Hydrology** | 160-98 (PROSIM) | 160-98 (CALSIMII) |

EBMUD = East Bay Municipal Utility District.
AFRP = USFWS Anadromous Fish Restoration Program.
TCD = Urban water intake temperature control device.
OCAP BA + Operations Criteria and Plan Biological Assessment.

### 3.1.2 Key Changes to the 2030 Cumulative Condition CVP/SWP Operations Compared to that Used for the WFP EIR

Identifying assumption changes in the modeled Cumulative Condition for the WFP EIR, with those applied in present Future Condition modeling, can be achieved by looking at the modeling technical report descriptions. For this purpose it is appropriate to compare the PROSIM Model WFP EIR assumptions with the CALSIMII 2008 OCAP Biological Assessment Study 8.0 assumptions (**Table 3-2**). Study 8.0 captures all of the intervening regulatory changes occurring between 1999 and 2008, foreseeable future projects, but does not include the Wanger Decision, USFWS 2008 OCAP Biological Opinion, or NOAA Fisheries 2009 OCAP Biological Opinion. This is because the effects of the USWFS Biological Opinion on CVP/SWP operations were not fully understood or integrated into modeling Study 8.0 in 2008 when the modeling was performed, and because the NOAA Fisheries 2009 OCAP Biological Opinion was not available at the time.

Moreover, there are additional anticipated future events/actions that have been identified for which there is no explicit data available to compare, specifically the BDCP, EDWPA Supplemental Water Supply Project, and climate change. Therefore, quantifying their effects on CVP/SWP operations under the future cumulative conditions is not currently possible. **Because the BDCP, EDWPA Supplemental Water Supply Project and climate change would collectively have profound effects on CVP/SWP operations and resulting system hydrology, yet these effects remain unclear at this time, the future cumulative condition that includes these actions/phenomena remains speculative at this time.**

**Table 3-2. Cumulative Conditions.**

| | WFP EIR 1999 | Study 8.0 2008 |
|---|---|---|
| **Model** | PROSIM | CALSIMII |
| **Period of Simulation** | 1922 - 1991 | 1922 - 2003 |
| **SWP Demands** | Variable 4.2 MAF/Yr. | Variable 3.1 - 4.2 MAF/Yr |
| **CVP Demands** | | |
| North of Delta | Based on 2020 Land Use & Max Historic Use | Land-use based, full build out of CVP contract amounts |
| American River | WFA | Land-use based, limited by contract amounts |
| EBMUD | EBMUD 8/3/98 Proposal | 133 TAF |
| South of Delta | 3.1 MAF | 3.5 MAF |
| **CVP Water Allocation** | | |
| CVP Settlement / Exchange | 100% - 75% Based on Shasta Index | 100% - 75% Based on Shasta Index |
| CVP Ag | 100% - 10% Based on Supply | 100% - 0% Based on Supply |
| CVP M&I | 100% - 50% Based on Supply | 100% - 50% Based on Supply |
| Refuge | 100% - 50% Based on Supply | 100% - 75% Based on Shasta Index |
| **Instream Flow Requirements** | | |
| Trinity River | 390 - 750 TAF | Trinity EIS Preferred Alternative (369-815 TAF/year) |
| Sacramento River | November 20, 1997 AFRP | Flows for SWRCB WR 90-5 temperature control, and USFWS discretionary use of CVPIA 3406(b)(2) |
| Clear Creek | November 20, 1997 AFRP | Downstream water rights, 1963 USBR Proposal to USFWS and NPS, and USFWS discretionary use of CVPIA 3406(b)(2) |
| Yuba River | Available Yuba River Data | Yuba Accord Adjusted Data |
| American River | November 20, 1997 AFRP | Minimum Instream Flow Management Standard |
| **Delta Requirements** | Delta Accord | SWRCB D-1641 |
| **Temperature Modeling** | | |
| Optimal Cold Water Pool Management | Yes | Yes |
| Folsom Lake TCD | Yes | Yes |
| **Flood Control at Folsom** | 400/670 | 400/670 |
| **Hydrology** | 160-98 (PROSIM) | 160-98 (CALSIMII) |

EBMUD = East Bay Municipal Utility District.
AFRP = USFWS Anadromous Fish Restoration Program.
TCD = Urban water intake temperature control device.
OCAP BA = Operations Criteria and Plan Biological Assessment.
NPS= National Park Service.

## 3.2 *Anticipated Changes to System Hydrology Compared to that Used for the WFP EIR*

The information presented in **Table 3.1** identifies significant assumption changes between existing condition studies. Although the assumptions change, the effect on CVP/SWP operations may or may not be recognizable. In this section, quantitative and qualitative effects on current CVP/SWP operations are associated with the various assumption changes.

### 3.2.1 PROSIM to CALSIMII

Subsequent to the preparation of the 1999 WFP EIR, Reclamation and DWR completed the development and acceptance of a new CVP/SWP system-wide model that replaced the PROSIM model. The new model, now referred to as CALSIMII, incorporated new algorithms for surface and groundwater operations, as well as updated hydrology, which better characterized the CVP/SWP operations. The change in modeling tools affected CVP/SWP performance in a variety of ways due to hydrology and model logic differences. Work performed for the City of Roseville, at the time that the shift to CALSIMII occurred, concluded that:

- Statistically, Folsom Reservoir storage is lower in the PROSIM simulation during all examined periods of the year.
- Statistically, Nimbus Dam release is equivalent in the PROSIM and CALSIMII simulations during the October through November and July through September periods, and PROSIM releases are greater in the December through March and April through June periods.
- The two periods in which PROSIM releases are greater are those in which average monthly flows are greatest for both simulations.
- The frequency and magnitude of potential environmental impacts is typically relatively small during the December through June period.
- Statistically, Watt Avenue water temperature is higher in the PROSIM simulation during the April through June and July through September periods, equivalent to the CALSIMII simulation during the October through November period, and lower than the CALSIMII simulation during the December through March period.
- Every month of the December through March period is less than 54°F in both simulations. Although specific thermal requirements of anadromous salmonids vary by species and life stage, water temperatures $\leq$ 54°F are protective of all the life stages of anadromous salmonids present in the lower American River during this time period (Rich 1987; McCullough et al. 2001; NOAA Fisheries 1993, 2000, 2001, 2002);
- During the hottest months of the year (i.e., April through September), water temperatures are higher in the PROSIM simulation than the CALSIMII simulation. Because anadromous salmonids are coldwater species, the warmer temperatures of the PROSIM simulation suggest an increased number of negative effects on anadromous salmonids than would be identified in the CALSIMII simulation, therefore, providing a more conservative estimation of potential thermal impacts on these species.

In general, the switch from PROSIM to CALSIM affects simulated reservoir storages, reservoir releases and CVP/SWP deliveries to Project contractors. These changes, some of which are identified above, are mostly associated with the frequency for which a given storage/release/delivery parameter might be expected to occur. There is little difference in the

model results at the extremes of these parameters, but over the course of a modeled year or years, the balancing of available reservoir water sources and subsequent project operations are portrayed differently in response to the advances in modeling. CALSIMII best represents the current conditions/simulated operations for planning and assessment purposes.

### 3.2.2 Period of Simulation

The period of simulation for CALSIMII increased by 12 years by including the years 1992 through 2003. Of these 12 years, 2 years were classified as critical water years, 2 water years were dry, 0 (zero) were below normal, 3 years were above normal, and 5 were wet years. This distribution of year types is somewhat "wetter" than the 1922-1991 period, but the dry years were no drier than those in the 1922-1991 period and the wet years were no wetter than those in the 1922-1992 period.

- *Folsom Reservoir Storage:* not expected to have a significant effect on assumptions drawn from 1922-1991 period.
- *Lower American River Flows at Nimbus Dam:* not expected to have a significant effect on assumptions drawn from 1922-1991 period.
- *Other CVP Reservoir Storage:* not expected to have a significant effect on assumptions drawn from 1922-1991 period.
- *Lower Sacramento River Flow at Freeport:* not expected to have a significant effect on assumptions drawn from 1922-1991 period.
- *Delta Inflow:* not expected to have a significant effect on assumptions drawn from 1922-1991 period.

### 3.2.3 CVP Demands

CVP demands north of the Delta are essentially equivalent between the studies. South of Delta CVP demands are higher in recent modeling. These higher demands could affect Folsom Reservoir storage in some years by requiring additional release. However, because the inflow to storage ratio for Folsom Reservoir is quite high, Folsom is operated as an annual reservoir, meaning that it is not expected to store water for future years, but rather is operated to maintain at least minimally acceptable storage in the fall months in order to provide minimum levels of instream flows below Nimbus Dam, American River water rights deliveries, and flood protection for each upcoming winter. In nearly all years the storage will recover by the following spring. Other upstream CVP reservoirs do carry over storage as insurance for a following dry year. These reservoirs could experience lower storage but would remain within the range of operations identified in the WFP EIR.

- *Folsom Reservoir Storage:* not be expected to cause Folsom Reservoir storage levels to be outside the range identified in the WFP EIR.
- *Lower American River Flows at Nimbus Dam:* not be expected to cause American river flows outside the range identified in the WFP EIR.
- *Other CVP Reservoir Storage:* not be expected to cause other CVP reservoir storage levels to be outside the range identified in the WFP EIR.
- *Lower Sacramento River Flow at Freeport:* not be expected to cause Sacramento River flows at Freeport outside the range identified in the WFP EIR.

- *Delta Inflow:* not be expected to cause Delta Inflows outside the range identified in the WFP EIR.

### 3.2.4 SWP Demands

SWP demands south of the Delta are variable in recent modeling studies, being greater in some years and smaller in some years. SWP demands are met from surplus Delta inflow and releases from Oroville Reservoir. Effects of these demand changes on CVP operations are negligible.

- *Folsom Reservoir Storage:* effects on Folsom Reservoir storage are inconsequential.
- *Lower American River Flows at Nimbus Dam:* effects on American River flows are insignificant.
- *Other CVP Reservoir Storage:* effects on other CVP reservoir storages are insignificant.
- *Lower Sacramento River Flow at Freeport:* effects on Sacramento River flows at Freeport are insignificant.
- *Delta Inflow:* effects on Delta Inflow are insignificant.

### 3.2.5 CVP Water Allocations

CVP water allocations reflect the application of water shortages to CVP customers based on contract type. CVP water shortage policy has evolved through time in response in part to regulatory changes and to increased demands. Studies subsequent to the WFP EIR have assumed different shortage policies for agriculture and refuge water supplies. CVP M&I water shortage criteria has remained within the same 0% to 50% range; however, the frequency for which any given delivery allocation occurs within this range has changed. Generally, CVP allocations are higher in the WFP EIR as the result of the combination of modeling tool and assumption changes used for more recent modeling tends to reduce project flexibility in meeting system wide demands.

- *Folsom Reservoir Storage:* effects on Folsom Reservoir storage are insignificant.
- *Lower American River Flows at Nimbus Dam:* effects on American River flows are insignificant.
- *Other CVP Reservoir Storage:* effects on other CVP reservoir storages are insignificant.
- *Lower Sacramento River Flow at Freeport:* effects on Sacramento River flows at Freeport are insignificant.
- *Delta Inflow:* effects on Delta Inflow are insignificant.

### 3.2.6 Trinity River Flow Requirements

The Trinity River flows are somewhat lower in the WFP EIR modeling than in recent studies. With higher flow requirements in more recent studies, the availability for cross basin export to the Sacramento River is diminished, creating a potential for increased Shasta reservoir releases. This results in less water available for CVP project purposes. Because of the hierarchy of water user contracts, this would be expected to increase the frequency of export Ag water shortages. The effect on M&I water users is much less pronounced, although some additional shortages would be expected.

- *Folsom Reservoir Storage:* effects on Folsom Reservoir storage are insignificant.

- *Other CVP Reservoir Storage:* effects on other CVP reservoir storage are common but within the range of elevations identified in the WFP EIR.
- *Lower American River Flows at Nimbus Dam:* effects on American River Flows are insignificant.
- *Lower Sacramento River Flow at Freeport:* effects on Sacramento River flows at Freeport are common but within the range of flows identified in the WFP EIR.
- *Delta Inflow:* effects on Delta inflow are common but within the range of inflows identified in the WFP EIR.

### 3.2.7 Clear Creek Flow Requirements

In the WFP EIR, the USFWS Anadromous Fisheries Restoration Program (AFRP) Clear Creek flows were supported by CVPIA 3406(b)(2) water. These flows were subsequently made more permanent by CVPIA policy and USFWS Biological Opinions. The magnitude of any changes in Clear Creek flow requirements between studies, with respect to Sacramento River operations, is too small to influence overall CVP/SWP operations.

- *Folsom Reservoir Storage:* effects on Folsom Reservoir storage are insignificant.
- *Lower American River Flows at Nimbus Dam:* effects on American River flows are insignificant.
- *Other CVP Reservoir Storage:* effects on other CVP Reservoir storage are insignificant.
- *Lower Sacramento River Flow at Freeport:* effects on Sacramento River flow at Freeport are insignificant.
- *Delta Inflow:* effects on Delta inflows is insignificant.

### 3.2.8 Sacramento River Flow Requirements

The Sacramento River flow requirements are those necessary to meet a minimum level of flow and temperature performance. Frequently, flows exceed the minimums as a result of flood control, navigation, Delta water quality, or Delta export requirements. Although changes are to be expected in some months, the difference in CVP/SWP operations between the WFP EIR and more recent modeling caused by this assumption change is small.

- *Folsom Reservoir Storage:* effects on Folsom Reservoir storage are insignificant.
- *Lower American River Flows at Nimbus Dam:* effects on American River flows are insignificant.
- *Other CVP Reservoir Storage:* effects on other CVP reservoir storages are small, and within the range of elevations identified in the WFP EIR.
- *Lower Sacramento River Flow at Freeport:* effects on Sacramento River flow at Freeport are small, and within the range of flows identified in the WFP EIR.
- *Delta Inflow:* effects on Sacramento River flow are small, and within the range of inflow identified in the WFP EIR.

### 3.2.9 Yuba River Flow Requirements

The Yuba Accord combines increased instream fisheries flows with increased supplemental water supplies for export in the Delta. Because the Yuba River Accord was not in existence at

the time of the WFP EIR modeling it was not included. Effects of the accord are focused on the Yuba River, lower Sacramento River and Delta exports.

- *Folsom Reservoir Storage:* the Yuba Accord does not affect Folsom Reservoir operations.
- *Lower American River Flows at Nimbus Dam:* the Yuba Accord does not affect American River flows at Nimbus.
- *Other CVP Reservoir Storage:* the Yuba Accord effects on storage in other CVP reservoirs are occasional, but within the range identified in the WFP EIR.
- *Lower Sacramento River Flow at Freeport:* The Yuba Accord results in higher Sacramento River flows at Freeport.
- *Delta Inflow:* The Yuba Accord results in higher Delta inflow.

### 3.2.10 American River Flow Requirements

American River minimum flow requirements in the WFP EIR are quite different from current flows. Since the WFP EIR was certified, the Water Forum in conjunction with Reclamation and federal and state resource agencies developed a lower American River Flow Management Standard (FMS). Reclamation has voluntarily operated to the minimum instream flow component[2] of the FMS for the last two years and has represented in its modeling of American River operations for existing conditions, its intention to continue doing so. The FMS has two underlying co-equal objectives, providing a safe and reliable water supply for the region, and preserving the fishery, wildlife, recreational and aesthetic values of the lower American River. While different in magnitude from those flows contemplated in the WFP EIR, present FMS flows provide a level of compliance with the co-equal objectives equivalent to the WFP EIR.

It also is important to note, that just as is the case for Sacramento River flows, frequently meeting other CVP purposes causes flows in excess of the minimums. On the American River this is particularly evident in months outside of the fall (October through December period).

- *Folsom Reservoir Storage*: effects on Folsom storage are occasional, in most years lower storage is restored by reservoir inflow in the spring, and within the range of elevations identified in the WFP EIR.
- *Lower American River Flows at Nimbus Dam:* effects on American River flows are occasional, but within the range of flows identified in the WFP EIR.
- *Other CVP Reservoir Storage:* effects of on Other CVP storages are occasional, but within the range of elevations identified in the WFP EIR.
- *Lower Sacramento River Flow at Freeport:* effects on Sacramento River flows at Freeport are occasional, but within the range of flows identified in the WFP EIR.
- *Delta Inflow:* effects on Delta inflow are occasional, but within the range of flows identified in the WFP EIR.

[2] The flow component of the FMS was included in the 2009 NOAA Fisheries OCAP Biological Opinion RPA and is, therefore, a directive of the ESA process. Further acknowledgement of the FMS may be forthcoming in actions before the SWRCB, although this effort has not yet been initiated.

### 3.2.11 Delta Water Quality Requirements

The December 1994 Bay-Delta Accord, formally known as the "Principles for Agreement on Bay-Delta Standards Between the State and Federal Governments," brought together urban, agricultural, and environmental interests around a consensus on setting new Bay-Delta water quality standards (including flow requirements for the Sacramento and San Joaquin Rivers). This facilitated coordinating the operations in the SWP and the CVP to help achieve those standards, and developing new long-term approaches to address a variety of fish and wildlife, water supply, and water quality issues involving the Bay-Delta. Among other things, the Bay-Delta Accord was intended to reduce uncertainties in how the ESA would be applied going forward as a tool for managing Bay-Delta water resources.

The accord provided for an integrated ecosystem approach to management of the Bay- Delta that would allow for protection of species without impairing seasonal water supply allocations. In May 1995, the California State Water Resources Control Board (State Water Board) adopted a final Water Quality Control Plan for the Bay-Delta (1995 Bay-Delta Plan). The 1995 Bay-Delta Plan incorporated the basic standards and strategies laid out in the 1994 Bay-Delta Accord. In addition, the State Water Board initiated one of the longest and most complicated water rights proceeding in state history to modify previously issued permits (principally held by the CVP and the SWP) for the long-term appropriation of water from the Delta and to manage that resource in a reliable and environmentally sensitive way. The State Board's water rights proceeding resulted in the adoption of Water Rights Decision 1641 (D-641) on Dec. 29, 1999 (revised on March 15, 2000).

For modeling purposes, D-1641 can be assumed as codifying the Bay-Delta Accord principles. Thus, there is no recognizable change in the modeling.

- *Folsom Reservoir Storage:* effects on Folsom Reservoir storage are insignificant
- *Lower American River Flows at Nimbus Dam:* effects on American River flows are insignificant
- *Other CVP Reservoir Storage:* effects on other CVP Reservoir storage are insignificant
- *Lower Sacramento River Flow at Freeport:* effects on Sacramento River flow at Freeport are insignificant
- *Delta Inflow:* effects on Delta inflows is insignificant

### 3.2.12 Wanger Decision

The CVP/SWP operational changes required by the Wanger Decision addressing the 2004 OCAP USFWS OCAP Biological Opinion for delta smelt was not in effect at the time of the WFP EIR. Had it been so, the resultant effect in CVP/SWP operations would have been a reduction in CVP/SWP Delta exports associated with not exceeding maximum prescribed net upstream flow in Old and Middle Rivers. This reduction in exports would have affected CVP and SWP delivery allocations and potentially and/or resulted in additional releases from upstream reservoirs.

- *Folsom Reservoir Storage:* effects of the Wanger Decision on Folsom Reservoir storage would likely be occasionally lower storage, in most years restored by reservoir inflow in the spring, but within the range of elevations identified in the WFP EIR.

- *Lower American River Flows at Nimbus Dam:* effects on American River flows at Nimbus would be occasional (+/-), but within the range of flows identified in the WFP EIR.
- *Other CVP Reservoir Storage:* effects of the Wanger Decision on Other CVP reservoir storages would likely be occasionally lower storage, but within the range of elevations identified in the WFP EIR.
- *Lower Sacramento River Flow at Freeport:* effects on Sacramento River flows at Freeport would be occasional (+/-), but within the range of flows identified in the WFP EIR.
- *Delta Inflow:* effects on Delta inflow would be occasional (+/-), but within the range of inflows identified in the WFP EIR.

### 3.2.13 USFWS 2008 OCAP Biological Opinion for Delta Smelt

The USFWS Biological Opinion is not presently included in current modeling at any level of development. Modelers are in the process of incorporating the Reasonable and Prudent Alternative (RPA) for this Biological Opinion into CALSIMII so that its effects may be quantified. Extrapolating from the text of the RPA there are several Actions (1, 2, and 3) that will affect Delta exports by virtue of limitations on Old and Middle River ("OMR") flows, and Action 4 requiring additional X2 flows in the fall months that will affect reservoir releases. RPA Actions 1 through 4 address the following measures:

- RPA Action 1: limits exports at the Project pumps so that the average daily OMR flow is no more negative than -2,000 cfs for a total duration of 14 days, with a 5-day running average no more negative than -2,500 cfs (within 25 percent). This action would occur at some time within the December – March window.
- RPA Action 2: requires that the range of net daily OMR flows will be no more negative than -1,250 to -5,000 cfs. This action would occur immediately following Action 1.
- RPA Action 3: requires that net daily OMR flow will be no more negative than -1,250 to -5,000 cfs based on a 14-day running average with a simultaneous 5-day running average within 25 percent of the applicable requirement for OMR. This action would occur at the onset of spawning and extending to as late as June 30.
- RPA Action 4: improves fall estuarine habitat for delta smelt by managing of X2 through increasing Delta outflow during fall when the preceding water year was wetter than normal. This action would occur on September 1 through November 30.

Folsom reservoir storage will likely be lower in the fall as a result of these RPAs; however, in most years the storage would recover by spring.

- *Folsom Reservoir Storage:* Folsom Reservoir storage will likely be frequently lower in the fall as a result of the RPAs; however, in most years the storage would recover by spring, and be within the range of elevations identified in the WFP EIR.
- *Lower American River Flows at Nimbus Dam:* effects on American River flows at Nimbus particularly in the fall months could be frequent (+/-), but within the range of flows identified in the WFP EIR.

- *Other CVP Reservoir Storage:* other CVP reservoir storage will likely be frequently lower in the fall as a result of the RPAs; however, it should remain within the range of elevations identified in the WFP EIR .
- *Lower Sacramento River Flow at Freeport:* effects on Sacramento River flows at Freeport, particularly in the fall months, could be frequently higher, but within the range of flows identified in the WFP EIR.
- *Delta Inflow:* effects on Delta inflow, particularly in the fall months could be frequently higher, but within the range of flows identified in the WFP EIR.

### 3.2.14 NOAA Fisheries 2009 OCAP Biological Opinion

The NOAA Fisheries Biological Opinion is also not presently included in current modeling at any level of development. As with the USFWS Opinion, modelers are in the process of incorporating the Reasonable and Prudent Alternative (RPA) for this Opinion into CALSIMII so that its effects may be quantified. Extrapolating from the text of the RPA there are multiple Actions applied to various CVP-influenced watersheds.

RPA Action I is specific to the Sacramento River, primarily affecting Shasta reservoir storage operations necessary to achieve water temperature requirements in the Sacramento River below Keswick Dam. RPA Action II applies to the American River and is quite similar with respect to flows, to the Flow Management Standard used in recent modeling. RPA Action III applies to the San Joaquin River operations. RPA Action IV applies to Delta operations and includes requirements for Delta Cross Channel Gate operations and OMR flows. Included within the RPA actions are other components dealing with fish passage and physical feature changes. Actions I and IV are those which will have the most effects on CVP operations with respect to reservoir storage and CVP water deliveries.

- *Folsom Reservoir Storage:* Folsom reservoir storage will be lower in the fall as a result of the RPAs; however, it is likely in most years the storage would recover by spring, and be within the range of elevations identified in the WFP EIR.
- *Lower American River Flows at Nimbus Dam:* effects on American River flows at Nimbus particularly in the fall months could be frequently (+/-), but within the range of flows identified in the WFP EIR.
- *Other CVP Reservoir Storage:* other CVP reservoir storage, particularly Shasta, will be frequently higher as a result of the RPAs; however, it is likely in most years the storage would be within the range of elevations identified in the WFP EIR.
- *Lower Sacramento River Flow at Freeport:* effects on Sacramento River flows at Freeport, could frequently be (+/-), but within the range of flows identified in the WFP EIR.
- *Delta Inflow:* effects on Delta inflow, could frequently be (+/-), but within the range of flows identified in the WFP EIR.

### 3.2.15 Summary of Changes in System Hydrology at Existing Conditions

**Table 3-3** shows a summary matrix of the anticipated changes in system hydrology and changes in key storage and flow parameters of importance to the assessment of fisheries resources and

water quality impacts in the WFP EIR. These changes reflect a qualitative assessment of effects promulgated by the identified changed conditions. It may be seen in the table that a given change in condition does not always indicate a "negative" effect on a key parameter, but frequency of effects are variable. In some cases the lack of effect is a function of operational flexibility within the CVP/SWP, while in other cases there are temporal effects that occur but without any overall annual effect.

While the table is indicative of individual parameter effects, it is necessary for the assessment of environmental impacts to combine the individual effects and determine the net effect. Therefore, Table 3-3 includes a final row that provides the estimated net change in the key storage and flow parameters, based on all changed conditions identified and discussed herein.

Overall, the effects of the multiple analytical, regulatory, and hydrologic changes of the past ten years have not radically changed the performance of CVP facilities with respect to American River operations identified in the WFP EIR. Folsom Reservoir levels remain within the WFP EIR limits, as do minimum and typical lower American River flows.

There are many similarities between the operations identified in the WFP EIR and those that presently exist. There are identified increases in water demands by contractors, but these have taken place coincident with regulatory actions intended to maintain or improve conditions for the environment. Consequently, the environmental protections envisioned by the WFP EIR remain.

Today, the operation of the CVP/SWP is significantly guided by the USFWS and NOAA Fisheries OCAP Biological Opinions. The Biological Opinions limit many aspects of CVP/SWP reservoir storage, river release, and contractor diversions. Because there is a finite water supply, and environmental protections are not discretionary, ultimately, these limitations manifest themselves in reduced contractor diversions in some conditions. By virtue of the CVP contract priorities based on a contractor's geographical location and intended use for the water, diversion reductions are applied when water supplies are limited. The majority of the delivery reduction effects will occur to the export contractors south of the Delta who will experience much more frequent reductions and greater cuts to deliveries.

**Table 3-3. Summary of Changes and Key CALSIMII Modeling Outputs.**

| Changed Condition | Key Parameters for Impact Assessment | | | | |
|---|---|---|---|---|---|
| | Folsom Reservoir Storage | Lower American River Flows | Other CVP Reservoir Storage | Lower Sacramento River Flow | Delta Inflow |
| PROSIM to CALSIMII | + | o/- | o | o | o |
| Period of Simulation | o | o | o | o | o |
| CVP Demands: (North of Delta/South of Delta) | o/- | o/- | o/- | o/+ | o/+ |
| SWP Demands | o | o | o | o | o |
| CVP Water Allocations | o | o | o | o | o |
| Trinity River Flow Requirements | o | o | +/- | +/- | +/- |
| Clear Ck Flow Requirements | o | o | o | o | o |
| Sacramento River Flow Requirements | o | o | +/- | +/- | +/- |
| Yuba River Flow Requirements | None | None | +/- | + | + |
| American River Flow Requirements | +/- | **+/–** | +/- | +/- | +/- |
| Delta Water Quality Requirements | o | o | o | o | o |
| Wanger Decision | **–** | +/- | - | +/- | +/- |
| USFWS 2008 OCAP Biological Opinion | **–** | **+/–** | **–** | **+** | **+** |
| NOAA Fisheries 2009 OCAP Biological Opinion | **–** | **+/–** | **+** | **+/–** | **+/–** |
| *Overall Net Effects* | +/- | +/- | +/- | **+/–** | **+/–** |

Notes:
None = The changed condition does not affect the parameter.
o = No appreciable change.
-, +, and +/- = Overall occasional decreases (-), increases (+), or both (+/-) relative to WFP EIR.
**–**, **+**, and **+/–** = Overall frequent decreases (**–**), increases (**+**), or both (**+/–**) relative to WFP EIR.

# 4 Evaluation of Fisheries and Water Quality Impacts Identified in the Water Forum EIR in light of Anticipated CVP/SWP System Hydrologic Changes

This section provides an assessment to determine whether the fisheries and water quality impact determinations disclosed in the WFP EIR would differ today, due to changes in current baseline conditions as a result of changed CVP/SWP operations and system hydrological conditions described in Section 3, that were not present when the WFP EIR was prepared. As indicated in Section 3, the potential changes in CVP operations and system hydrological conditions have not been assessed quantitatively through revised CALSIMII modeling. Likewise, related modeling with Reclamation's reservoir and river temperature models, or early life-stage salmon mortality, has not been conducted. A key reason for this is because the resource agencies, including Reclamation and DWR, have not yet determined how CVP/SWP operations are to be modified to adequately address the USFWS and NOAA Fisheries Biological Opinions on OCAP discussed above, nor has Reclamation or any other party codified the "Reasonable and Prudent Alternatives" of the 2008 and 2009 Biological Opinions into CALSIMII. In other words, CALSIMII, the standard tool used to model the effects of a project on CVP/SWP system operations and resulting system-wide hydrologic conditions has not been updated to account for implementation by the agencies of the USFWS and NOAA Fisheries Biological Opinions on OCAP. Therefore, this evaluation, by necessity, was performed in a qualitative manner by leading experts.

Based on the anticipated changes to system operations and hydrology, the key factors upon which the WFP EIR impact determinations were based were reevaluated to determine whether there would be any new previously undisclosed significant impacts requiring mitigation, or whether the impacts would be substantially more severe than previously disclosed. Lastly, the assessment considered whether any new significant impacts rise to the level that would warrant new quantitative analyses with the CALSIMII model (or Reclamation's related models) to provide and adequate impact assessment for the purposes of assessing the effects of the SVSP Project's 3,612 AFY water supply, which is part of the City's overall American River water supply previously assessed under the WFP EIR.

## *4.1 Fisheries Impacts*

The WFP EIR, Chapter 4.5, "Fisheries Resources and Aquatic Habitat," addressed a total of seventeen individual numbered impacts. This section provides a qualitative assessment of each numbered impact based on the present understanding of CVP/SWP operations and resulting system hydrology upon which WFA demands, including the City of Roseville's American River demands, would be imposed. The impact discussions are organized by the general location where the primary effects would occur, which are Folsom Reservoir and Lake Natoma, Lower American River, Upper CVP Reservoirs, Sacramento River, and the Delta.

### 4.1.1 Folsom Reservoir and Lake Natoma

*Impacts to Folsom Reservoir Coldwater and Warmwater Species (WFP EIR Impacts 4.5-1 and 4.5-2).* The WFP EIR found the impacts in Folsom Reservoir to coldwater fisheries to be less than significant, and impacts to warmwater species to be potentially significant due to reduced availability of littoral habitat. Mitigation for the impact to warmwater fisheries was identified in the WFP EIR. However, it was determined that due to uncertainty regarding future conditions, the impact would remain significant and unavoidable following mitigation.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, the seasonal reductions in Folsom Reservoir storage levels would be more frequent and occasionally of greater magnitude, relative to conditions modeled in the WFP EIR. Minimum storage levels in late fall, and storage levels in the spring following reservoir refilling during the winter, are expected to change minimally. Under current conditions and system operations, WFA demands would be anticipated to result in a similar pattern of seasonal reductions in Folsom Reservoir storage as previously determined in the WFP EIR.

Anticipated changes in seasonal storage levels within the reservoir's normal operational range would not cause substantial adverse effects on habitat quality or quantity or prey availability for coldwater species. Thus, the anticipated incremental changes to Folsom Reservoir storage, due to changed conditions and WFA demands, would not change the impact determination for Folsom Reservoir coldwater fisheries, relative to that made in the WFP EIR. Likewise, the anticipated seasonal changes to reservoir storage and surface elevations would result in similar reductions to littoral habitat for warmwater species as previously determined in the WFP EIR. Therefore, the reduced reservoir storage and elevations would not be expected to cause new or substantially more severe impacts to Folsom Reservoir warmwater fisheries, relative to that determined in the WFP EIR, and thus this impact would remain potentially significant under current conditions as originally characterized in the WFP EIR.

*Impact to Coldwater and Warmwater Species in Lake Natoma (Impact 4.5-3) and Temperature Impacts to Nimbus Fish Hatchery Operations and Fish Production (Impact 4.5-4).* The WFP EIR found the impacts to coldwater and warmwater fish populations in Lake Natoma to be less than significant. The impacts to operations and fish production of the Nimbus Fish Hatchery also were less than significant.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, the seasonal reservoir storage, elevations, and flows through Lake Natoma would not change appreciably from those defined in the WFP EIR. As a regulating after bay for power production at Folsom Dam, Lake Natoma storage and surface elevation fluctuations would remain similar under current conditions and operations, and any changes in Lake Natoma operations as a result of WFA demands would be negligible, as previously determined in the WFP EIR. The WFP EIR found that water temperature patterns within Lake Natoma would be somewhat cooler during the June through September period as a result of a new temperature control device (TCD) for the Folsom Dam urban water intake structure and optimal coldwater pool management. The TCD was installed in 2003 and thus represents a new baseline for thermal conditions within the lake.

Based on the anticipated minimal changes to Lake Natoma storage, surface elevation fluctuations, and temperatures that may occur, due to changed conditions and system operations, WFA demands imposed on the changed conditions and system operations would not be expected to cause any new significant impacts to Lake Natoma's coldwater and warmwater fish populations or Nimbus Fish Hatchery operations and fish production, relative to those determined in the WFP EIR. Therefore, these impacts would remain less than significant under current conditions and operations as originally characterized in the WFP EIR.

### 4.1.2 Lower American River

*Impact to Fall-run Chinook Salmon (WFP EIR Impact 4.5-5).* The WFP EIR found the impacts to fall-run chinook salmon to be potentially significant, primarily as a result of frequent reductions in lower American River (LAR) flows during October through December. Mitigation for the impact was identified in the WFP EIR. However, it was determined that due to uncertainty regarding future conditions, the impact would remain significant and unavoidable following mitigation.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, seasonal LAR flows would be occasionally different (either higher or lower) relative to conditions modeled in the WFP EIR. CVP's implementation of the LAR Flow Management Standard (FMS) and the NOAA Fisheries 2009 OCAP Biological Opinion are specifically for the purpose of modifying operations to benefit LAR coldwater fish resources. Under current conditions and system operations, WFA demands would be anticipated to result in a similar pattern of seasonal reductions in LAR flows as previously determined in the WFP EIR. Therefore, the seasonal LAR flows would be expected to be similar to that assessed in the WFP EIR and there may be some flow improvement related to meeting the life-cycle needs of the fall-run chinook salmon resulting from the FMS and NOAA Fisheries 2009 OCAP Biological Opinion.

When imposed on the changed conditions, WFA demands are anticipated to result in reduced LAR flows in October through December period, as previously determined in the WFP EIR, which may reduce available spawning habitat and lead to redd superimposition and reduced size of the initial year-class. The anticipated incremental changes to LAR flows, due to changed conditions and WFA demands, would be expected to result in similar, or possibly lesser, seasonal reductions in spawning habitat availability. The changes in LAR flows would not be expected to result in new or substantially more severe impacts to fall-run chinook salmon, relative to those determined in the WFP EIR. Therefore, this impact would remain potentially significant under current conditions and operations as originally characterized in the WFP EIR.

*Impact to Steelhead (WFP EIR Impacts 4.5-6).* The WFP EIR found the impact to steelhead to be less than significant.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, the seasonal LAR flows would occasionally be both higher and lower, relative to conditions modeled in the WFP EIR. As noted for the discussion of fall-run chinook salmon, the seasonal LAR flows would be similar to those

assessed in the WFP EIR and there may be some flow improvement related to meet the life-cycle needs (including thermal needs) of the steelhead population as a result of CVP's implementation of requirements in the NOAA Fisheries 2009 OCAP Biological Opinion and/or the FMS. The WFA demands would be anticipated to result in similar seasonal reductions in LAR flows and increases in LAR water temperatures as previously determined in the WFP EIR.

The WFP EIR found that the TCD and optimal coldwater pool management would reduce temperatures in the juvenile steelhead rearing period of June through September and offset potential flow-related effects (e.g., reduced juvenile rearing habitat). Based on the anticipated occasional changes to LAR flows, due to changed conditions and system operations, and implementation of the TCD at Folsom Dam and optimal coldwater pool management, WFA demands would not be expected to cause any new significant impacts to steelhead. Therefore, these impacts would remain less than significant under current conditions and operations as originally characterized in the WFP EIR.

*Flow- and Temperature-Related Impacts to Splittail (Impact 4.5-7).* The WFP EIR found flow-related impacts to splittail to be potentially significant as a result of reductions in inundated riparian spawning habitat in the LAR during the February through May period. Mitigation for the significant impact was identified in the WFP EIR. However, it was determined that due to uncertainty regarding future conditions, the impact would remain significant and unavoidable following mitigation.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, the seasonal LAR flows would occasionally be both higher and lower relative to conditions modeled in the WFP EIR. As noted above, the seasonal LAR flows would be similar to those assessed in the WFP EIR and the WFA demands would be anticipated to result in similar seasonal reductions in LAR flows, particularly during the February through May period, which is a period of flood-control operations.

WFA demands would be anticipated to result in reduced LAR flows in the February through May period, as previously determined in the WFP EIR, which may reduce available spawning habitat for splittail. The anticipated incremental reduction in spawning habitat availability for splittail is not expected to change substantially under current conditions and operations, relative to that identified under the WFP EIR. Consequently, WFA demands imposed on the changed conditions and system operations would not be expected to result in new or substantially more severe impacts to splittail, relative to those determined in the WFP EIR. Therefore, this impact would remain potentially significant under current conditions as originally characterized in the WFP EIR.

*Flow- and Temperature-Related Impacts to American Shad (Impact 4.5-8) and Striped Bass (Impact 4.5-9).* The WFP EIR found the impacts to shad and striped bass to be less than significant.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, the seasonal LAR flows would occasionally be both higher and lower, relative to conditions modeled in the WFP EIR. As noted above, the

May and June LAR flows are not expected to be substantially reduced, relative to those identified in the WFP EIR, due to changed conditions and system operations. The WFA demands would be anticipated to result in similar seasonal reductions in LAR flows.

When imposed on the changed conditions, WFA demands would be anticipated to result in only minimal reductions in the suitable range of LAR flows in the May and June period for attraction and spawning of American shad, as previously determined in the WFP EIR. Likewise, the minimal changes in LAR flows in May and June would not substantially reduce striped bass spawning and rearing activity within the LAR. Based on the anticipated occasional changes to LAR flows, due to changed conditions and system operations, WFA demands imposed on the changed conditions and system operations would not be expected to cause any new significant impacts to American shad or striped bass. Therefore, these impacts would remain less than significant under current conditions and operations as originally characterized in the WFP EIR.

### 4.1.3 Other CVP Reservoir Storage

*Impacts to Coldwater and Warmwater Species in Shasta Reservoir (WFP EIR Impacts 4.5-10 and 4.5-11), Trinity Reservoir (WFP EIR Impacts 4.5-12 and 4.5-13), and Keswick Reservoir (WFP EIR Impacts 4.5-14).* The WFP EIR found the impacts to coldwater and warmwater fisheries in Shasta Reservoir, Trinity Reservoir, and Keswick Reservoir to be less than significant.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, the seasonal reductions in storage levels at Trinity Reservoir would be more frequent and generally of greater magnitude, relative to conditions modeled in the WFP EIR. Likewise, CVP operations in response to some changed conditions may result in more frequent seasonal reductions in storage levels at Shasta Reservoir. However, as a result of the NOAA Fisheries 2009 OCAP Biological Opinion, seasonal Shasta Reservoir storage may be maintained at higher levels relative to conditions assessed in the WFP EIR. Overall, the minimum storage levels in late fall and storage levels in the spring following reservoir refilling during the winter are often expected to be similar in upper CVP reservoirs relative to that identified in the WFP EIR. No measurable changes would be expected to occur in Keswick Reservoir storage or elevation because, as a regulating afterbay of Shasta Reservoir, its operations would not change notably. Additionally, under current conditions and system operations, WFA demands would be anticipated to result in a similar pattern of generally small and infrequent reductions in seasonal Shasta Reservoir and Trinity Reservoir storage levels, as previously determined in the WFP EIR.

Anticipated minimal WFA-related changes in seasonal storage levels within the normal operational range of Shasta Reservoir and Trinity Reservoir would not adversely affect the habitat or prey for coldwater species. Likewise, the incremental effects of WFA demands would not substantially reduce seasonal near-shore habitat availability in the March through September period, or spring nest-building activity, of warmwater species. Thus, the anticipated incremental changes to upper CVP reservoir storage, due to changed conditions and WFA demands, would not change the impact determination for coldwater or warmwater fisheries in upper Shasta Reservoir and Trinity Reservoir, relative to that made in the WFP EIR. As disclosed in the WFP EIR, potential flow and temperature effects in Keswick Reservoir would not be expected to

occur because its operations as a regulating reservoir would not change. Therefore, the potential impacts to upper CVP reservoirs would remain less than significant under current conditions and operations as originally characterized in the WFP EIR.

### 4.1.4 Sacramento River

*Flow-Related Impacts to Sacramento River Fisheries (WFP EIR Impacts 4.5-15).* The WFP EIR found the flow-related impacts to fisheries resources in the upper and lower Sacramento River to be less than significant.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, the seasonal flows in the upper and lower Sacramento River would frequently be both higher and lower, relative to conditions modeled in the WFP EIR. In particular, flows may frequently be higher in the fall months as a result of CVP's implementation of requirements in the USFWS 2008 OCAP Biological Opinion, which requires additional Delta inflows for improved habitat quality as reflected by the "X2" location objectives. The WFA demands would be anticipated to result in generally small and infrequent reductions in seasonal Sacramento River flows as previously determined in the WFP EIR.

As previously determined in the WFP EIR, flows in the upper Sacramento River would not be expected to be reduced below levels for protection of winter-run chinook salmon rearing and downstream passage in the October through March period as a result of WFA demands. WFA demands would be anticipated to result in only minimal and occasional flow reductions in the lower Sacramento River, such that there would be no substantial reductions in physical habitat availability, or reduced immigration of adult or emigration of juvenile anadromous fishes. Based on the anticipated occasional changes to Sacramento River flows, due to changed conditions and system operations, WFA demands imposed on the changed conditions and system operations would not be expected to cause any new significant impacts to Sacramento River fisheries resources. Therefore, this impact would remain less than significant under current conditions and operations as originally characterized in the WFP EIR.

*Temperature-Related Impacts to Sacramento River Fisheries (WFP EIR Impacts 4.5-16).* The WFP EIR found the temperature-related impacts to fish resources in the lower Sacramento River to be less than significant.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, the seasonal flows in the Sacramento River would frequently be both higher and lower, relative to conditions modeled in the WFP EIR. In particular, flows may frequently be higher in the fall months as a result of CVP's implementation of X2 requirements in the USFWS 2008 OCAP Biological Opinion. Additionally, there may be some flow- and temperature-related improvements associated with CVP requirements for the winter-run chinook salmon populations in the NOAA Fisheries 2009 OCAP Biological Opinion. The WFA demands would be anticipated to result in generally small and infrequent reductions in seasonal Sacramento River flows, and thus temperatures, as previously determined in the WFP EIR.

As previously determined in the WFP EIR, there would be no substantial changes to average temperature below Keswick Dam for any month of the year, for the number of years exceeding 56°F in the upper Sacramento River during the April through September period. Additionally, there would be no substantial decreases in annual early life stage survival of fall-run, late fall-run, winter-run, or spring-run chinook salmon in any individual year. Based on the anticipated occasional changes to Sacramento River flows, due to changed conditions and system operations, WFA demands imposed on the changed conditions and system operations would not be expected to cause any new significant temperature-related impacts to fish resources of the Sacramento River. Therefore, this impact would remain less than significant under current conditions and operations as originally characterized in the WFP EIR.

### 4.1.5 Delta

*Impacts to Delta Fish Populations (WFP EIR Impacts 4.5-17).* The WFP EIR found the impacts to Delta fish resources to be less than significant.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, the seasonal Delta inflows would frequently be both higher and lower, relative to conditions modeled in the WFP EIR. In particular, Delta inflows may frequently be higher in the fall months as a result of CVP's implementation of X2 requirements in the USFWS 2008 OCAP Biological Opinion. Additionally, there may be some Delta operations-related improvements to meet the life-cycle needs of ESA-listed fish species as a result of CVP's implementation of requirements in the USFWS 2008 OCAP Biological Opinion and NOAA Fisheries 2009 OCAP Biological Opinion. The WFA demands would be anticipated to result in generally small and relatively infrequent reductions in Delta inflows as previously determined in the WFP EIR.

As previously determined in the WFP EIR, there would be no substantial flow-related upstream shifts in the X2 position during the February through June period. Additionally, there would be no anticipated substantial changes in CVP's Delta export-to-inflow ratio. Based on the anticipated occasional changes to Delta inflows, due to changed conditions and system operations, WFA demands imposed on the changed conditions and system operations would not be expected to cause any new significant habitat-related impacts to fish resources in the Delta. Therefore, this impact would remain less than significant under current conditions and operations as originally characterized in the WFP EIR.

## *4.2 Water Quality Impacts*

The WFP EIR, Chapter 4.4, "Water Quality," addressed a total of two individual numbered impacts. This section provides a qualitative assessment of each numbered impact based on the present understanding of CVP/SWP operations and resulting system hydrology upon which WFA demands, including the City of Roseville's American River demands, would be imposed.

### 4.2.1 Lower American River and Folsom Reservoir Water Quality (WFP EIR Impact 4.4-1)

The WFP EIR found the WFA-related impacts to water quality in Folsom Reservoir and the LAR to be less than significant.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, seasonal reductions in Folsom Reservoir storage levels would be more frequent, and seasonal LAR flows would be occasionally different (both higher and lower), relative to conditions modeled in the WFP EIR. Under current conditions and system operations, WFA demands would be anticipated to result in a similar pattern of seasonal reductions in Folsom Reservoir storage and LAR flows as previously determined in the WFP EIR.

As previously determined in the WFP EIR, reduced reservoir storage and LAR flows would be expected to result in minor increases in concentrations of contaminants (e.g., nutrients, pathogens, turbidity, or priority trace metal and organic compounds) due to reduced dilution capacity. Based on the anticipated reductions to Folsom Reservoir storage and LAR flows, due to changed conditions and system operations, WFA demands imposed on the changed conditions and system operations would not be expected to cause any new significant impacts to water quality. Therefore, this impact would remain less than significant under current conditions and operations as originally characterized in the WFP EIR.

### 4.2.2 Lower Sacramento River and Delta Water Quality (WFP EIR Impact 4.4-2)

The WFP EIR found the indirect water quality impacts to the lower Sacramento River to be potentially significant, primarily as a result of increased urban runoff and domestic wastewater discharge from the Sacramento Regional County Sanitation District's Sacramento Region Wastewater Treatment Plant (SRWTP) associated with the development and growth supported by increased WFA deliveries. Mitigation for the impact was identified in the WFP EIR. However, it was determined that due to uncertainty regarding future conditions, namely uncertainty in level of treatment of the additional urban runoff and municipal wastewater flows, the impact would remain significant and unavoidable following mitigation.

Based on the assessment of changes to CVP/SWP operations and anticipated resultant changes to hydrologic conditions identified in Table 3.3 above, the lower Sacramento River flows and Delta inflows would frequently be both higher and lower, relative to conditions modeled in the WFP EIR. Flows would be frequently higher in the fall months as a result of CVP's implementation of X2 requirements in the USFWS 2008 OCAP Biological Opinion. The WFA demands imposed on the changed conditions would be anticipated to result in generally small and occasional reductions in lower Sacramento River flows and Delta inflows as previously determined in the WFP EIR.

As previously determined in the WFP EIR, increased urbanization in the area served by WFA purveyors would indirectly result in substantial increases in the amount of treated effluent discharged from the SRWTP into the Sacramento River at Freeport. Coupled with seasonal flows, minor increases in concentrations of contaminants (e.g., nutrients, pathogens, turbidity, or

priority trace metal and organic compounds) could occur due to reduced dilution capacity. The imposing of WFA demands on current conditions and operations would be expected to result in similar water quality effects as those disclosed under the WFP EIR. The changed system conditions and operations would not be expected to result in new or substantially more severe water quality impacts, relative to that determined in the WFP EIR. Therefore, this impact would remain potentially significant under current conditions as originally characterized in the WFP EIR.

# 5 Evaluation of Roseville's Water Supply and Reliability in light of Anticipated CVP/SWP System Operational Changes

In general, with the progression of time and imposition of new and revised regulatory actions affecting CVP/SWP operations, the ability to "flex" project operations to maintain historical performance and hydrologic conditions has been eroded. There is now, virtually no action that does not precipitate some effect on water storage, reservoir releases, and/or water deliveries. Given that most often, storage or releases are requirements for complying with regulatory standards, the "give" in the systems becomes water deliveries.

Even when there was more flexibility in the CVP/SWP systems than exists today, increased demands on project water resources created occasional change in the frequency and/or magnitude of annual water deliveries. The magnitude of annual water diversions on the American River is still increasing. However, CVP operations can still honor senior American River water rights in all years and meet full American River CVP water contractor diversions in many years.

What has changed on the American River is the frequency of water shortages (years with less than full CVP contract deliveries). Compared to those identified in the WFP EIR, modeled future CVP deliveries will be less than full more frequently and shortages in those years may be greater, but the range of annual deliveries can be expected to comport with that shown in the WFP EIR.

In short, the City of Roseville's 58,900 AFY water supply from the American River remains highly reliable under the WFA and anticipated current and future CVP operations. However, the percent of time under dry and critical water year conditions that deliveries from the American River may be reduced below the City's full demand may occur somewhat more often in the future than previously identified, and as identified in the WFP EIR.

Based on over 82 years of historical hydrology (and WFA restrictions), the 58,900 AFY contract surface water supply is assumed to be available to the City in about 83 percent of the years. In about 17 percent of the years, quantities from 58,900 AFY to a minimum of 39,800 AFY of surface water would be available per the WFA. Thus, in drought years, supplemental supplies potentially totaling up to 19,100 AFY (the difference between the average/wet year supply and the dry year supply) are needed to make up for the dry year and critical year deficiencies

To meet water supply demands during dry and critical water years, the City may utilize other supplies like recycled water and groundwater and implement the water conservation strategies outlined in the Roseville Municipal Code (RMC). Recycled water offsets the use of surface

water supplies by reducing the City's reliance on American River supplies by filling irrigation demands that would otherwise use surface water supplies. Groundwater is used to make up any additional water supply shortfall.

Based on the above, the City's water supply reliability for the SVSP Project remains very high.

## 5.1 Water Supply Reliability Under Future Cumulative Conditions

As described in Section 3.1.2, quantifying the effects of future cumulative conditions and related CVP/SWP operations, in consideration of the future implementation of the BDCP, EDWPA Supplemental Water Supply Project, and implementation of the USFWS 2008 OCAP Biological Opinion and the NOAA Fisheries 2009 OCAP Biological Opinion, is not currently possible. The effects of these future projects are not fully understood and, thus, have not been fully integrated into the current versions of DWR's CALSIMII water supply operations model. In addition to the new regulatory requirements and future projects that may arise under the BDCP, climate change also may affect water supply conditions. Future climate change will affect the characteristics of runoff into CVP reservoirs (both in timing and volume) as well as exacerbate water quality conditions in the Delta as a result of sea level rise. Climate change without infrastructure changes will certainly lead to additional reductions in CVP water supplies. Consequently, the future cumulative conditions may have profound effects on CVP/SWP operations and resulting system hydrology, yet these effects remain unclear at this time.

History has shown that the availability of unused surface water supplies suitable for beneficial uses has diminished with time. In the American River basin, the contracted CVP surface water supplies that the City of Roseville depends on have been affected by this reduction in unused surface water. Water supplies that were believed to exist and be available for contractor deliveries when water supply contracts were initially signed, and subsequently renewed, are now insufficient to meet 100% deliveries as frequently as once assumed. Allocation reductions to Delta exports already are more frequent than in the past, and deliveries to these contractors are most tenuous because they are at the furthest extreme of the CVP delivery system, and can receive supplies only after all of the environmental requirements are met upstream of their location. At Roseville's location in the system, deliveries are indirectly affected by Reclamation's reservation of American River (Folsom) water to serve a portion of downstream flow, water quality, and environmental requirements placed on the CVP, but Roseville's diversions are not dependent on the American River meeting all of the downstream needs.

CVP's obligations to ongoing changes in environmental protections, changes to CVP water supply obligations, increased demand for previously unused surface water supplies, and climate change, collectively will affect Roseville's water supply. Compared to historical deliveries, there will be fewer years in the future when the CVP will be able to deliver 100% of Roseville's contract supply. At this moment in time, the environmental actions designed to maintain or restore historical ecological values in the American River will continue (i.e., through the OCAP Biological Opinions), while at the same time viable CVP water supplies will be available to the City of Roseville.