APPENDIX S

WATER SUPPLY EFFECTS ANALYSIS

TECHNICAL MEMORANDUM

WATER SUPPLY EFFECTS ANALYSIS IN SUPPORT OF THE AMORUSO RANCH SPECIFIC PLAN EIR

Prepared for:

Brookfield Residential Properties

ROBERTSON - BRYAN, INC.
Solutions for Progress

November 2015

TECHNICAL MEMORANDUM

WATER SUPPLY EFFECTS ANALYSIS IN SUPPORT OF THE AMORUSO RANCH SPECIFIC PLAN EIR

Prepared for:

Brookfield Residential Properties

2271 Lava Ridge Court, Suite 220
Roseville, CA 95661

ROBERTSON - BRYAN, INC.
Solutions for Progress

9888 Kent Street • Elk Grove CA 95624
Phone: (916) 714-1801 • Fax: (916) 714-1804

November 2015

TABLE OF CONTENTS

section page

TABLE OF FIGURES

ACRONYMS AND ABBREVIATIONS

AFY	acre-feet per year
ARG	American River Group
ARSP	Amoruso Ranch Specific Plan
ASR	Aquifer Storage and Recovery
BDCP	Bay Delta Conservation Plan
BO	Biological Opinion
DWR	California Department of Water Resources
CEQA	California Environmental Quality Act
City	City of Roseville
CVP	Central Valley Project
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
FMS	Lower American River Flow Management Standard
LAR	Lower American River
M&I	municipal and industrial
NA ELT	No Action – Early Long Term
PCWA	Placer County Water Agency
RPA	Reasonable and Prudent Alternative
SWP	State Water Project
TCD	Temperature Control Device
TM	Technical Memorandum
USBR	U.S. Bureau of Reclamation
USFWS	U.S. Fish and Wildlife Service
WOMT	Water Operations Management Team
WSA	Water Supply Assessment

1 INTRODUCTION

1.1 PURPOSE OF THE TECHNICAL MEMORANDUM

The Amoruso Ranch Specific Plan (ARSP) is a planned development project located in an unincorporated area of Placer County proposed for annexation within the City of Roseville (City). The proposed municipal water supply for the ARSP is surface water originating from the Placer County Water Agency (PCWA) and its water storage and conveyance systems in the American River basin, and potentially supplemental groundwater sources when the deliveries of surface water supplies are curtailed as a result of drought-related shortages. Once annexed by the City, the City would have oversight of ARSP water system operations. Senate Bills adopted by the California legislature in January 2002 (SB610/SB221), and the related provisions of California Water Code Sections 10910–10915, require information affirming the availability of water supplies be provided to decision-makers prior to approval of large development projects. Accordingly, the City has prepared a Water Supply Assessment (WSA) for the ARSP pursuant to SB610 that evaluates the availability and reliability of the proposed water supply system to serve the ARSP (City of Roseville 2015).

The City and PCWA are signatories to the Water Forum Agreement, which provides a framework for development and future use of American River basin surface water and groundwater resources through the year 2030. The Water Forum Proposal (Water Forum) EIR was prepared and certified in 1999 and provided a comprehensive evaluation of the potential direct and cumulative environmental effects of using surface water and groundwater supplies to meet the projected 2030 level of water demands of the majority of American River basin water purveyors. However, changes in Central Valley Project (CVP) and State Water Project (SWP) water supply operations, environmental regulations, environmental resource conditions, and resource conservation efforts have occurred since preparation of the Water Forum EIR.

The purpose of this technical memorandum (TM) is to support the assessment of water supply impacts in the Environmental Impact Report (EIR) being prepared for the ARSP, and accordingly provide an evaluation of the potential environmental effects of developing and operating the municipal water supply facilities to support the full buildout of the ARSP in compliance with the California Environmental Quality Act (CEQA). Accordingly, this TM evaluates the potential changes in the water supply-related environmental impacts addressed in the Water Forum EIR, in light of changed circumstances and new information, as a means of assessing the environmental effects of providing water to meet the ARSP demands.

1.2 ARSP WATER DEMANDS AND WATER SUPPLY

The ARSP property is approximately 694 acres is currently used for open grazing land as a cattle ranch, which includes a small ranch house and out buildings. As described in the WSA, the proposed land uses for the fully developed ARSP would result in municipal water demands totaling 1,503 acre-feet per year (AFY). These water demands would consist of potable demand (1,069 AFY), and landscape irrigation demands using recycled water (220 AFY) and treated water (214 AFY). The ARSP water demands are based on the use of water conservation best management practices included in the Specific Plan. The WSA indicates that the ARSP water

demands together with the City's existing identified municipal demands at buildout of the current General Plan (63,235 AFY), would total 64,738 AFY. The projected ARSP water demands, City's available water supplies, and water balance between demand and supply is shown in Table 1.

The City's existing water contract entitlements for surface water from the American River total 66,000 AFY, however, the diversions are limited by the Water Forum Agreement to 58,900 AFY in wet/average years[1]. The wet/average year supply consists of 54,900 AFY of City contract water plus 4,000 AFY of San Juan Water District water from PCWA's Middle Fork Project that is reallocated to the City. With projected increased use of recycled water supplies, including the additional use for ARSP, totaling 4,739 AFY (i.e., recycled water would be obtained from the Pleasant Grove and Dry Creek wastewater treatment plants), the City's available water supply to meet potable and recycled water demands is 64,738 AFY. Consequently, the City's current normal year water supply is insufficient to fully meet the projected ARSP demands by an estimated 99 AFY.

Table 1. ARSP and City of Roseville Water Demands and Water Supply.

Parameter	Potable Water (AFY)	Recycled Water (AFY)	Total Demand (AFY)
Water Demands			
ARSP	1,283 [1]	220	1,503
City – Existing (2013)	34,138	2,863	37,001
City – Buildout (2035)	58,716	4,519	63,235
Total – City with ARSP (Buildout)	59,999	4,739	64,738
Water Supply			
City – Buildout (2035)	58,900	4,739	63,369
Water Balance (Supply – Demand)	-99	0	-99
Notes [1] ARSP demand comprised of 1,069 AFY for potable use and 214 AFY for irrigation use.			

In the driest years[2], the City's maximum diversion from the American River is limited under the Water Forum Agreement to 39,800 AFY with a requirement for an additional 20,000 AFY of

[1] Wet/Average Years is defined in the Water Forum Agreement as years when the projected March through November Unimpaired Inflow to Folsom Reservoir is greater than 950,000 acre-feet (Sacramento City-County Office of Metropolitan Water Planning 2000).

[2] Driest Years (i.e. Conference Years) is defined in the Water Forum Agreement as years when the projected March through November Unimpaired Inflow to Folsom Reservoir is less than 400,000 acre-feet. Conference years are those years which require diverters and others to meet and confer on how best to meet demands and protect the American River (Sacramento City-County Office of Metropolitan Water Planning 2000).

water to be made available for release by PCWA through re-operation of its Middle Fork project. The objective of the re-operation water releases is to support environmental needs in the lower American River (LAR) with additional streamflow in years with low natural background flow. In drier years[3] (pursuant to the Water Forum Agreement), the City may divert between 58,900 and 39,800 AFY of American River water depending on the amount of unimpaired flow into Folsom Reservoir (with similar re-operation release requirements from PCWA). During drier year-type conditions and severe droughts, the Roseville Municipal Code provides for the City to use groundwater to supplement shortfalls in surface water supplies. Additionally, the Roseville Municipal Code identifies five stages of mandatory drought water conservation measures with varying degrees of use reduction (10% to 50%). The WSA identifies that groundwater use by the City (including ARSP) at future buildout demands would only be needed infrequently, given that the Roseville Municipal Code limits groundwater use to periods when Stage 3, or more restrictive, drought water reduction requirements are in effect. Under the Water Forum Agreement, the City is required to limit groundwater extraction to less than 6,600 AFY during the drier and driest year types. The estimated sustainable yield of the Placer County groundwater basin was evaluated in 2013 and found to range between 99,000 to 106,000 AFY. The City also has developed an aquifer storage and recovery (ASR) program to inject and store treated surface water (potable water) in the aquifer for use when it is needed (e.g., peak summer demand months or during a drought). The City currently has six ASR wells with extraction capacity of approximately 15,000 AFY, and plans for ten more wells as components of the City's long-term water supply reliability program.

For development of the ARSP property, the acquisition of additional water supply from the PCWA as the preferred and most likely option for providing sufficient water supplies to support the water demands of the ARSP. The WSA summarizes water supplies and demands for the PCWA systems, indicating that at full buildout of anticipated development in its service area (i.e., sometime beyond 2040), demands would be approximately 257,000 AFY. PCWA's projected normal water year supplies total approximately 268,000 AFY, resulting in an excess of about 11,000 AFY, which is sufficient to accommodate the ARSP potable water demand of 1,283 AFY. The WSA indicates that during single dry years at full buildout of PCWA's service area, the demands would exceed the available surface water supplies, thus requiring reliance on groundwater pumping to meet demands. During multiple dry years, the WSA indicates that the PCWA would have sufficient supplies to meet full buildout water demands, which is a result of mandatory staged water conservation and voluntary reductions in water use that occurs during multiple dry year and drought conditions.

2 METHODS OF ASSESSMENT

The Water Forum Agreement purveyors in the American River basin collectively implement surface water diversions and groundwater extraction to meet the regional water demands in the basin in accordance to the Water Forum Agreement. Therefore, the PCWA/City water supply

[3] Drier Years is defined in the Water Forum Agreement as years when the projected March through November Unimpaired Inflow to Folsom Reservoir is less than 950,000 acre-feet (Sacramento City-County Office of Metropolitan Water Planning 2000).

operations contribute proportionally to the regional environmental effects of implementing the Water Forum Agreement such as changes in reservoir storage levels, American River flows, and groundwater extraction. Likewise, the use of municipal water supplies to meet ARSP water demands will create an incremental contribution to the environmental effects of PCWA/City water supply operations. Therefore, the assessment of ARSP's water supply-related environmental effects can be reasonably estimated based on the project's contribution to the effects associated with overall Water Forum Agreement operations. Accordingly, this TM provides an evaluation of the effects of Water Forum Agreement water supply operations based on the environmental effects identified in the Water Forum EIR. The focus of this TM is the potential changes in effects that ARSP water supply operations will have on fisheries resources and water quality.

It should be noted that multiple environmental resources can be affected by the effects of water supply changes in the American River basin that were evaluated in the Water Forum EIR and incorporated by reference herein. Environmental analyses presented in the Water Forum EIR identified the significant and unavoidable impacts for the following effects that are relevant to potential changes that might be associated with the additional water demand of ARSP development:

- Reduced rafting and boating opportunities on the Lower American River
- Reduced Folsom Reservoir boating opportunities
- Reduced availability of Folsom Reservoir swimming beaches
- Cultural resource impacts in Folsom Reservoir from varying water levels

Additionally, implementation of the Water Forum Agreement would result in contributing considerably to the following significant cumulative impacts:

- Reduced CVP hydropower capacity and generation
- Recreation opportunities in the Lower American River and Folsom Reservoir
- Cultural resource impacts in Folsom Reservoir

The potentially significant impacts to recreational, cultural, and energy resources are not addressed further in this assessment because the types and severity of these effects are not anticipated to substantially change in the future with Water Forum implementation and consideration of any changed circumstances in the physical or regulatory environment. The potential effects of increased municipal and agricultural water supply use, and associated reduced river flows and reservoir storage levels, primarily affect these resources under the extremes and adverse conditions that arise during dry year types. Within the normal and routine operating range of the CVP and local water agency facilities, these resources are not anticipated to measurably change with any potential future changed circumstances. Under these extreme conditions, the effects identified in the Water Forum EIR would occur and would not be substantially subject to other quantifiable changes such as the type of effect, intensity, or

duration. For example, adverse effects to exposure of cultural resources or reduced recreational boating at low water levels, once they begin to occur, continue to exist and do not change until improved conditions of sufficient river flow or reservoir refill and inundation returns with winter rains. Since the effects of drought year conditions to these resources already have been demonstrated as having potential to occur directly as a result of Water Forum implementation, or as a contribution to a cumulative effect, the effects would not be anticipated to be substantially more severe or numerous in the future with changed circumstances.

There are three components to the assessment approach in this TM to update the analysis of Water Forum Agreement-related effects in light of changed operations, regulatory, and environmental conditions that have occurred since the Water Forum EIR was prepared in 1999, as follows:

1. Identification and evaluation of changes in American River basin hydrologic conditions and water supply system operations anticipated to occur with full Water Forum Agreement demands at the 2030 level of development. These future conditions are compared to the existing conditions, and the estimated changes to the underlying system hydrology and water supply operations are compared to the predicted equivalent changes presented in the Water Forum EIR.

2. Evaluation, on a qualitative basis, of how changes in system hydrologic conditions, given the changed circumstances, change the fisheries resources and water quality impacts that were previously identified in the Water Forum EIR (based on the CEQA thresholds of significance used for Water Forum EIR). This analysis is focused on evaluating whether there would be substantial changes in the severity of previously disclosed significant impacts, identifying any new significant impacts, and determining whether changes to mitigation measures, or new mitigation measures, are warranted to reduce the impacts.

3. Evaluation, on a qualitative basis, of the significant cumulative fisheries resources and water quality impacts that may be affected by Water Forum Agreement-related water supply operations. The analysis is focused on identifying whether the changed circumstances would result in substantially more severe (or additional) cumulative impacts, or substantial changes in the contribution of water supply operations to cumulative impacts, compared to effects identified in the Water Forum EIR.

The first component of the assessment consists of evaluating hydrologic conditions in the American River basin with full Water Forum Agreement demands based primarily on modeling information provided in the U.S. Bureau of Reclamation (USBR) and California Department of Water Resources (DWR) Bay Delta Conservation Plan (BDCP)/California WaterFix Partially Recirculated Draft Environmental Impact Report/Supplemental Draft Environmental Impact Statement (WaterFix RDEIR/SDEIS) that was recently published for public review on July 10, 2015 (USBR and DWR 2015). Other sources of information reviewed for this TM, which are incorporated herein by reference, are:

- Water Forum Final EIR (Sacramento City-County Office of Metropolitan Water Planning 1999)

- Western Placer County Groundwater Management Plan (Montgomery Watson Harza 2007)
- Western Placer County Sustainable Yield (GEI Consultants 2013)
- American River Basin Integrated Regional Water Management Plan 2013 Update (Regional Water Authority 2013)

3 CHANGED CIRCUMSTANCES OF THE AFFECTED ENVIRONMENT

3.1 CHANGES IN CIRCUMSTANCES FOR WATER FORUM AGREEMENT WATER SUPPLY OPERATIONS

More than 15 years have passed since the Water Forum EIR was prepared in 1999. This period has been a particularly dynamic period in the history of water supply operations in the Central Valley and Sacramento-San Joaquin Delta (Delta) involving changes in facilities, regulations, and environmental conditions. The following list identifies the major relevant actions and regulatory changes affecting water supply operations in the American River basin.

- 1999 San Joaquin River Agreement (restored flows and exports) and 2012 San Joaquin River Restoration Program FEIS/EIR and Record of Decision (ROD)
- Department of Interior: 1999 Final Decision Accounting of Central Valley Improvement Project (CVPIA) 3406 (b)(2) and 2001 ROD (allocation of additional water for environmental purposes)
- State Water Resources Control Board (SWRCB): 2000 Revised Water Right Decision 1641 (revised CVP/SWP requirements to protect Delta water quality)
- USBR and DWR: 2000 CALFED Program ROD (long-term plan for the Delta)
- USBR: 2000 Trinity River Mainstem Fishery Restoration ROD (revised minimum flow regime)
- National Oceanic and Atmospheric Administration National Marine Fisheries Service (NOAA Fisheries): 2001 Biological Opinion for Spring-Run Chinook Salmon and Steelhead
- PCWA: 2002 American River Pump Station Project FEIR/EIS
- Freeport Regional Water Authority: 2003 Final EIR/EIS for the Freeport Regional Water Project
- U.S. Fish and Wildlife Service (USFWS): 2008 Formal Endangered Species Act Consultation on the Proposed Coordinated Operations of the Central Valley Project (CVP) and State Water Project (SWP) (i.e., herein referred to as the USFWS BO)
- NOAA Fisheries: 2009 Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project (i.e., herein referred to as the NOAA Fisheries BO)
- Water Forum: Lower American River Flow Management Standard (FMS) (ongoing)

This list of actions reflects many changes to the existing baseline conditions affecting CVP/SWP water supply operations that were not previously considered in the Water Forum EIR. Additionally, water supply operations modeling for the Water Forum EIR was conducted with now-obsolete models (i.e., USBR's PROSIM model and the DWRSIM hydrodynamic Delta model), whereas current USBR and DWR water supply modeling is conducted with the CALSIM II model, the DSM2 hydrodynamic Delta model, and USBR river temperature and salmon mortality models. Also, the Water Forum EIR modeling assessed the potential 2030 Water Forum Agreement demands compared to a baseline Existing Conditions scenario representing the 1995 level of development and demands.

Because of the many changes in the underlying water supply operations, modeling tools, facilities, and hydrologic inputs/assumptions of the Water Forum EIR, the current CALSIM II modeling information cannot simply be compared to the previous PROSIM and supporting model output conducted for the Water Forum EIR. However, the CALSIM II modeling (and supporting model) results for the WaterFix RDEIR/SDEIS reflect the most up-to-date simulation of Existing Conditions for water supply operations that incorporate the facility and regulatory changes listed above. The Existing Conditions scenario in the WaterFix RDEIR/SDEIS reflects the existing CVP/SWP facilities operated to meet 2005 demands with current regulatory requirements (i.e., limited to adopted water contract amounts, water year availability, and other operational constraints).

The WaterFix RDEIR/SDEIS also provides the best available information to evaluate the effects of Water Forum Agreement-related demands for the future 2030 buildout conditions. The WaterFix RDEIR/SDEIS includes water supply operations modeling for a No Action (NA) Early Long Term (ELT) alternative scenario that simulates the projected 2030 level of development and demands, and with all of the same major regulatory requirements considered for the Existing Conditions scenario. Under the NA ELT scenario, the CVP/SWP facilities and operations are similar to the Existing Conditions scenario with the following key changes:

- Increased north-of-Delta water demands of about 443,000 AFY associated with water rights and CVP contracts, primarily for urban municipal and industrial (M&I) uses in the American River basin of the Water Forum Agreement purveyors.

- Increased south-of-Delta water demands associated with SWP contracts, up to full contract amounts, representing a potential 25% increase in the existing variable range of demands of 3.0 to 4.1 million acre feet per year due to assumed additional development and population growth.

- New urban intakes and Delta diversions: City of Stockton Delta Water Supply Project (33,000 AFY); Freeport Regional Water Project with additional East Bay Municipal Utility District (EBMUD) average demand of about 24,000 AFY and increased demand in dry years; and Contra Costa Water District Alternative Intake and 55,000 AFY increased demand.

- Increased supplies for wildlife refuges (8,000 AFY) and shift in refuge demands with 24,000 AFY reduction in south-of-Delta, and 32,000 AFY increase in north-of-Delta, refuge deliveries.

- Implementation of the increased Fall X2[4] flow requirements of the USFWS BO requires additional Delta outflow for maintenance of X2 at specific locations in wet and above normal years.

- Assumptions for hydrologic changes associated with climate change and sea level rise estimated to occur by 2025.

The modeling results for the NA ELT scenario of the WaterFix RDEIR/SDEIS, and comparison to Existing Conditions, provides a reasonably equivalent assessment of Water Forum Agreement-related effects as was presented in the Water Forum EIR. In particular, the NA ELT scenario and the Water Forum EIR both were evaluated with similar water supply modeling methods and underlying assumptions of existing and future hydrologic inputs, facilities, and regulatory requirements, and thus are equivalent in that respect. Moreover, the primary modeled change in the WaterFix RDEIR/SDEIS for the northern Sacramento Valley region in the NA ELT scenario is the increased annual water deliveries in the American River basin of about 181,000 AFY, which comprises a large proportion of additional total system deliveries under the NA ELT scenario (i.e., along with increased in-Delta deliveries to water rights holders listed above). However, the consideration of climate change is a substantial difference between the NA ELT scenario and the Water Forum EIR assumptions. Under the NA ELT scenario, compared to Existing Conditions, the average annual north-of-Delta total CVP/SWP reservoir storage would be lower by 850,000 AFY, and Delta outflow would increase by 625,000 AFY, primarily in response to increased fall X2 requirements, and other Delta flow and water quality compliance requirements that would necessitate additional Delta inflow to counter the effects of future climate change and sea level rise. Under the NA ELT scenario, despite the future increased SWP and CVP demands, the annual average south-of-Delta deliveries would decrease by about 385,000 AFY, and CVP north-of-Delta agricultural, refuge, and settlement contractor deliveries would decrease by 73,000 AFY compared to Existing Conditions in response to the future need for additional Delta outflow.

Because the NA ELT scenario includes effects of climate change such as the relatively large seasonal increases in Delta outflow for the fall X2 requirements, the increased American River basin deliveries for Water Forum purveyor demands contribute to only a portion of the overall system changes observed in the modeling data. Consequently, the hydrologic changes in the NA ELT scenario compared to the Existing Conditions in the WaterFix RDEIR/SDEIS reflect an overestimate of the contribution of Water Forum purveyor-related water supply operations (and thus overestimate the incremental effects of ARSP water demands) to fisheries resources and water quality effects. Additional information is provided below to describe the effects of the USFWS BO, NOAA Fisheries BO, and climate change to the underlying conditions under which CVP water supply operations occur compared to the conditions that existed at the time the Water Forum EIR was prepared.

---

[4] X2 is the location where the daily average Delta channel water salinity equals 2 parts per thousand (one meter off the channel bottom), as measured in kilometers upstream from the Golden Gate Bridge.

3.2 REGULATORY REQUIREMENTS OF THE USFWS BO AND NOAA FISHERIES BO

The USFWS BO and NOAA Fisheries BO issued for the coordinated operations of the CVP and SWP water supply systems according to the 2004 Operations Criteria and Plan (OCAP) specify new regulatory requirements for CVP/SWP operations adopted since the preparation of the Water Forum Agreement and Water Forum EIR. USBR and DWR are currently operating according to the Reasonable and Prudent Alternative (RPA) conditions stipulated in each of these BOs, and the large majority of the RPA conditions are included in the Existing Conditions and NA ELT scenario assumptions for modeling of the WaterFix RDEIR/SDEIS. The BOs and RPAs address resource conditions for special-status fisheries in the Delta and Central Valley including delta smelt, green sturgeon, and salmonid species (i.e., Chinook salmon and steelhead). The RPAs stipulate numerous CVP/SWP operational requirements including reservoir management, river flows and temperatures, and specific facility operations in the Central Valley and Delta.

The RPA Actions (1, 2, and 3) in the USFWS BO impose limitations on reverse Old River and Middle River (OMR) flows to prevent entrainment of delta smelt. Action 4 requires additional Delta outflow in the fall months, as determined by the X2[5] standard, for habitat improvement. The RPA (Action 6) also requires restoration of tidal habitat for delta smelt. The fall X2 outflow requirement (Actions 4) is not included in the Existing Conditions scenario, but is included in the NA ELT scenario modeling for the WaterFix RDEIR/SDEIS.

The RPA actions in the NOAA Fisheries BO restrict Delta pumping operations, impose Shasta Reservoir storage targets to achieve water temperature requirements in the Sacramento River below Keswick Dam, impose flow standards for the LAR, require modified Delta Cross Channel operations, limit reverse OMR flows, and include multiple actions applied to various CVP-influenced watersheds. For the American River basin, the RPA includes the development and implementation of the FMS for the LAR by the Water Forum and resource agencies (Action II.1), LAR Temperature Management Plan (Action II.2), and "Minimize Flow Fluctuation Effects" (Action II.4). The objectives of these RPA actions are to provide minimum flows for all stages of steelhead and to maintain suitable temperatures to support over-summer rearing of juvenile steelhead. The Temperature Management Plan is prepared in May of each year for NOAA Fisheries and considers actions under USBR's authority using iterative modeling (i.e. Coldwater Pool Management model). Implementation of the FMS flow criteria began in 2009 and is intended to improve habitat conditions for fall-run Chinook salmon and steelhead by enhancing minimum flows and water temperatures, establishing a formal management process, and facilitating coordinated monitoring, and evaluation and reporting. Water temperature control operations in the LAR are affected by many factors and ideal temperature targets are sometimes infeasible (particularly with multiple years of below normal, dry conditions). Temperature is affected by the amount of available coldwater pool, Nimbus Dam release schedules, annual

[5] 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.

hydrology/snow pack, management of the shutters on the Folsom Dam power penstock and the Temperature Control Device (TCD) on the urban water supply intake, power generation, and Nimbus Fish Hatchery operations and maintenance. Desired downstream temperatures can be controlled with the penstock shutters and TCD by selecting the elevation where the water is withdrawn from the reservoir.

CVP/SWP operations are substantially guided by the RPA implementation requirements of the USFWS BO and NOAA Fisheries BO, which limit many aspects of reservoir storage, river release, and contractor diversions. Because there is a finite water supply, and environmental protections are not discretionary, compliance with the BOs may necessitate the imposition of reduced contractor diversions under some conditions. When water supplies are limited, CVP contract priorities govern the water allocation restrictions based on a contractor's geographical location and type of water use (i.e., M&I, agricultural). The majority of the delivery reduction effects will occur to the export contractors south of the Delta who are subject to more frequent and larger magnitude cuts in the allocation restrictions, when imposed.

3.3 FUTURE CLIMATE CHANGE CONSIDERATIONS

The NA ELT scenario in the WaterFix RDEIR/SDEIS considers the anticipated future climate changes with adjustments to the underlying system hydrology estimated to occur by the year 2025. The modeling includes adjustments to seasonal and annual rainfall patterns in the CALSIM II model, increased sea level rise in the DSM2 hydrodynamic model of the Delta, and increased water temperatures for the USBR temperature models. In the future, changes in climate are assumed to increase the amount of rainfall and decrease the amount of snow that would occur in the upper alpine watersheds of the Central Valley. Therefore, peak runoff would be more likely in the late winter and early spring, and runoff during the late spring and summer would be reduced under future climate conditions as compared to current climate conditions. Lower amounts of winter snowpack and snowmelt would subsequently result in reduced storage volumes in Central Valley reservoirs, and reduced reservoir releases during later periods of the year for downstream uses. With climate change, ambient air temperatures also are expected to increase causing warmer average water temperatures within reservoirs, rivers, and the Delta as well making it more difficult to meet temperature requirements for cold-water fish species. Sea level rise is primarily a concern for its potential to increase tidal exchange of high-salinity seawater in the western and central Delta, and increased water surface elevations leading to greater risks of flooding- and seismic-related damage to Delta levee failures.

The anticipated changes to system hydrologic conditions and sea level rise will affect CVP/SWP water supply operations in several ways, particularly during drier year types. Shifts in precipitation and lower reservoir storage and runoff in the dry season can lower the water supply year-type indices, and thus affect the allocation of water supplies to agricultural, M&I, and environmental uses, and may result in reduced water available for all uses. Reduced Delta inflows could reduce the amount of water available for CVP/SWP Delta exports, in particular exports from the south Delta at the Jones and Banks pumping plants. Reduced San Joaquin River streamflow also could result in more frequent reverse OMR flows, and thus could reduce the opportunities for exports at Jones and Banks pumping plants to maintain compliance with OMR requirements. With sea level rise, additional CVP/SWP reservoir releases during late

summer and fall months also would likely be needed to provide sufficient Delta outflow for compliance with Delta water quality standards, thus reducing CVP/SWP water supplies for other uses.

The consideration of a future, reasonably foreseeable effect that is not associated with the proposed project, such as climate change, would typically be considered in the cumulative impact analysis of a CEQA assessment process as a contributing factor along with other past, present, and foreseeable influences on environmental resource conditions. However, climate change effects to the underlying watershed hydrology and temperature conditions are integral to water supply operations and water use in the American River basin (i.e., City/PCWA and other Water Forum purveyors) and elsewhere in the Central Valley. Moreover, because water supply operations will need to comply with flow and water quality requirements in the future, it is appropriate to consider the combined effects of climate change and water supply operations in determining the CEQA significance of an impact. Consequently, this assessment considers the quantitative modeling information of the combined effects of water supply operations and climate change for the assessment of effects to fisheries and water quality. Where climate change has a substantial or dominant influence on a significant resource impact, it is appropriate to consider whether there are any potentially feasible mitigation measures that may reduce the specific effects of each influencing factor (i.e., project effects vs. climate change effects), and appropriately assign responsibility for implementation if any such measures are determined to be feasible and necessary.

3.4 WATER FORUM - LOWER AMERICAN RIVER FLOW MANAGEMENT STANDARD (FMS)

The Water Forum, USBR, NOAA Fisheries, California Department of Fish and Wildlife (CDFW), USFWS, Sacramento Area Flood Control Agency (SAFCA), and other resource agencies are currently in progress of developing refinements to the FMS for LAR temperature and flow management for protection of steelhead and fall-run Chinook salmon. An initial FMS was developed in 1997 based on the "Improved Pattern of Fishery Flow Releases" and modifications from the Anadromous Fish Restoration Program, and ultimately adopted for the Water Forum Agreement. Since that time, the FMS has been modified and improved, with the current version of the FMS being developed in 2006. This 2006 version also is stipulated as an RPA action in the NOAA Fisheries 2009 BO. USBR oversees the American River Group (ARG) of Water Forum and resource agency representatives, which operates each year to review basin hydrologic and fisheries resource conditions and make recommendations for management actions within the constraints of the FMS. The ARG provides a consultative role for the operational decisions of USBR, along with monitoring and evaluation information, to ascertain the biological and ecological status of the river, and provide input into the river management process to budget the use of available coldwater resources focused on juvenile steelhead rearing in the summer, and fall-run Chinook salmon spawning in the fall.

The proposed FMS Update will provide the framework for managing reservoir storage, LAR flows, and LAR temperatures in response to anticipated hydrologic and water storage conditions in the American River watershed through 2030. Refinements to the current FMS are proposed based on improved understanding of fish and habitat management objectives developed in the

Fish and Instream Habitat Plan (FISH Plan) for the River Corridor Management Plan by Water Forum/SAFCA. Assumptions for modified flow/temperature criteria to the FMS specified in the NOAA Fisheries BO are included in the modeling of Existing Conditions and the NA ELT scenario of the WaterFix RDEIR/SDEIS. Therefore, quantitative modeling results reasonably reflect the anticipated future conditions with modified FMS requirements.

4 ENVIRONMENTAL EFFECTS ASSESSMENT

4.1 WATER SUPPLY-RELATED EFFECTS TO FISHERIES RESOURCES

The Water Forum EIR, Chapter 4.5, "Fisheries Resources and Aquatic Habitat," addressed a total of seventeen individual numbered impacts. This section provides a qualitative assessment for each numbered impact of the potential effects to fisheries resources from the total Water Forum Agreement-related water demands (which include the ARSP demands), in light of the changed circumstances described in Section 3 above.

4.1.1 Folsom Reservoir and Lake Natoma

Impacts to Folsom Reservoir Coldwater and Warmwater Species (Water Forum EIR Impacts 4.5-1 and 4.5-2). The Water Forum 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 resources was identified in the Water Forum EIR. However, it was determined that due to uncertainty regarding future conditions, the impact would remain significant and unavoidable following mitigation.

The Water Forum EIR fisheries assessment determined that Water Forum Agreement-related water supply operations would result in more frequent reductions in Folsom Reservoir storage, and thus reductions in the availability of littoral (nearshore) habitat containing vegetation, during the critical spawning and rearing period of warmwater fish species (i.e., March through September). 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.

Based on the modeling results for the WaterFix RDEIR/SDEIS, the distribution of Folsom Reservoir storage levels in May for the NA ELT scenario (reflecting future water demands in the American River basin and climate change) would generally be lower compared to Existing Conditions (see **Figure 1**), and thus indicating Water Forum Agreement-related effects that would be generally consistent with the findings presented in the Water Forum EIR. Additionally, Folsom Reservoir would be full in May slightly less frequently, and the lowest end-of-September storage levels, or "carryover" storage, also would occur slightly more frequently under the NA ELT scenario compared to Existing Conditions (see **Figure 2**).

The modeling for the NA ELT scenario for the WaterFix RDEIR/SDEIS indicates that Water Forum Agreement demands (in combination with climate change) would result in greater seasonal variability in Folsom Reservoir storage levels throughout the spring, summer, and fall months compared to Existing Conditions, and thus be similar to the previously modeled effects

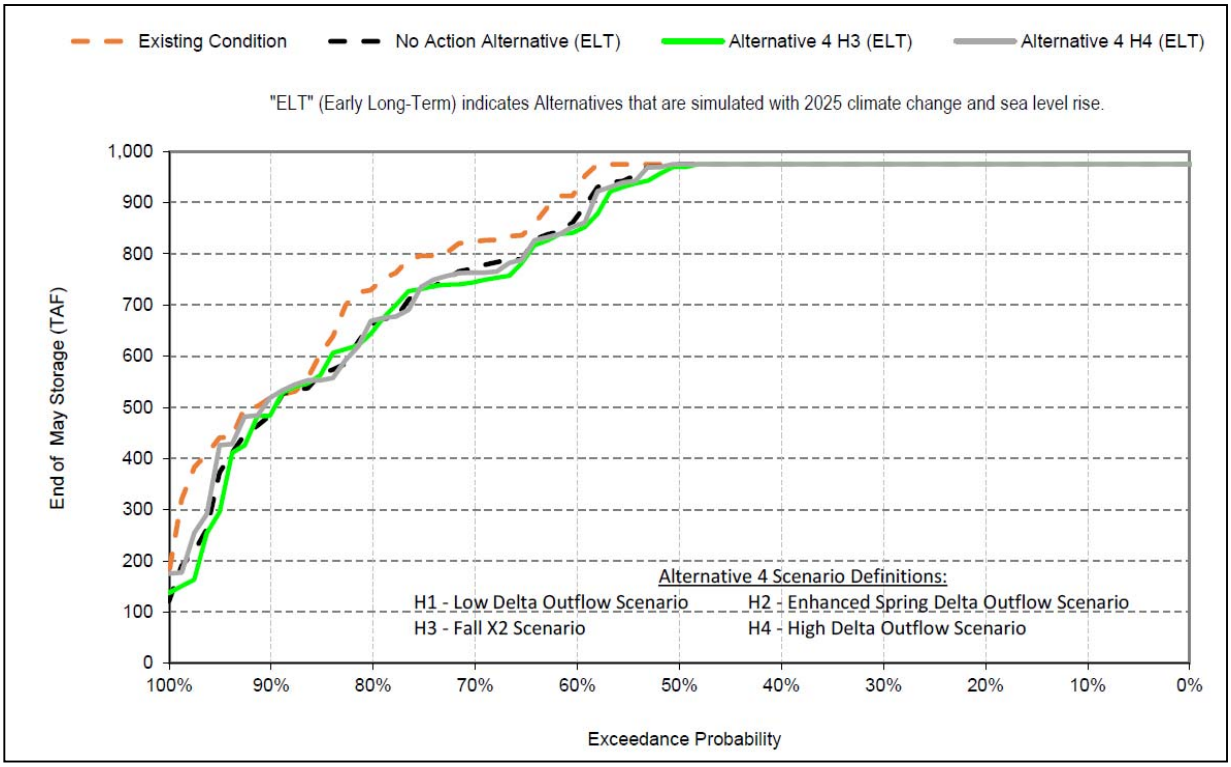

Figure 1. Folsom Reservoir End-of-May Storage.

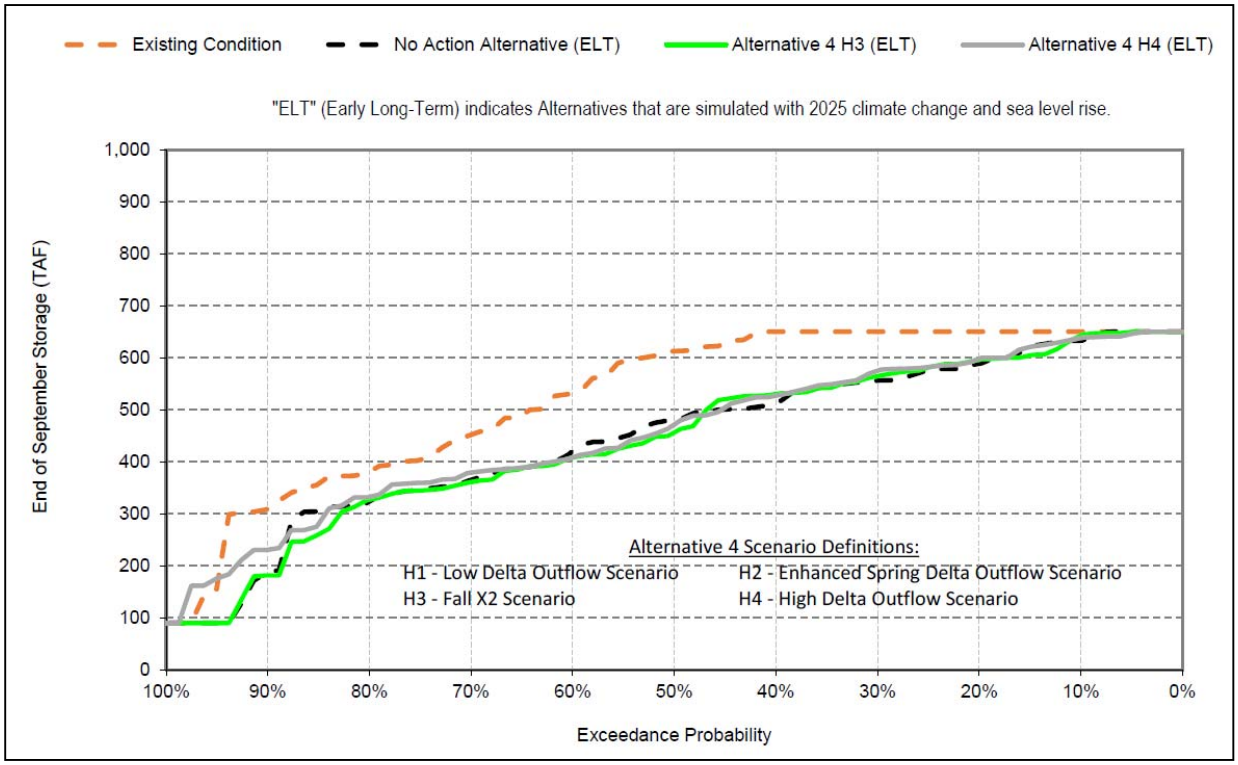

Figure 2. Folsom Reservoir End-of-September Storage.

in the Water Forum EIR. Accordingly, the effects to seasonal Folsom Reservoir storage levels, in light of the changed circumstances and Water Forum Agreement demands, would not change the impact determination for Folsom Reservoir coldwater fisheries, compared to the conclusion made in the Water Forum EIR.

Likewise, the effects to reservoir storage levels would result in similar reductions to littoral habitat for warmwater species as previously determined in the Water Forum EIR. Also, the changes in seasonal reservoir storage levels would not be expected to cause new or substantially more severe impacts to Folsom Reservoir warmwater fisheries, compared to what was determined in the Water Forum EIR. Therefore, the effects of the Water Forum demands (including those of ARSP) to reservoir warmwater fish species is a potentially significant impact as originally characterized in the Water Forum EIR, and there are no changes to the mitigation measures and impact determination identified in the Water Forum 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 Water Forum 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.

As a regulating after bay for power production at Folsom Dam, Lake Natoma storage and surface elevation fluctuations would be expected to remain similar to Existing Conditions, and any changes in Lake Natoma operations as a result of Water Forum Agreement demands would be negligible, as previously determined in the Water Forum EIR. The Water Forum EIR found that water temperature patterns within Lake Natoma would be cooler during the June through September period as a result of the proposed TCD for the urban water intake (construction completed in 2003) and optimal coldwater pool management.

Based on the modeling results for the WaterFix RDEIR/SDEIS (i.e., Appendix B, Table B.7-65), which includes the effects of the TCD and optimal coldwater pool management, the monthly average Nimbus Dam release temperatures would increase under the NA ELT scenario compared to Existing Conditions during the June through September period. Steelhead production in the Nimbus Hatchery remains relatively unaffected when hatchery temperatures remain below 60°F. However, increased disease and mortality of hatchery-reared fish can occur as temperatures exceed 60°F, and losses can become a problem when hatchery water temperatures exceed 65°F for extended periods. Water temperatures exceeding 68°F for even short periods (e.g., days) may result in unacceptably high mortality to hatchery fish held at high densities.

The temperature modeling for the WaterFix RDEIR/SDEIS indicates the range of average monthly temperatures would be 66–67°F under Existing Conditions and 67–70°F under the NA ELT scenario during the June through September period, with higher average temperatures during drier year types. Consequently, the modeling results indicate potentially adverse temperature conditions for the Nimbus Hatchery operations under both Existing Conditions and NA ELT scenarios. In fact, the Nimbus Fish Hatchery has conducted early releases and transfers of hatchery fish (steelhead and trout) in 2014 and 2015 due to excessive water temperature conditions during the most recent severe drought conditions occurring in California. The modeling for the NA ELT scenario for the WaterFix RDEIR/SDEIS indicates that Water Forum

Agreement demands (in combination with the effects of climate change) would result in generally higher water temperatures compared to Existing Conditions. Consequently, underlying changes to CVP/SWP system operations to meet new USFWS BO and NOAA Fisheries BO regulatory requirements appear to be the primary contributing factor to higher temperatures under Existing Conditions, and the effects of climate change appear to be the dominant factor contributing to higher temperatures under the NA ELT scenario.

Based on the anticipated minimal changes to Lake Natoma storage, surface elevation fluctuations, and temperatures, the effects of Water Forum Agreement demands in light of changed circumstances would result in a less-than-significant impact to Lake Natoma's warmwater and coldwater fish populations. However, steelhead rearing operations in the Nimbus Fish Hatchery may be exposed to water temperatures near or exceeding adverse effect levels under both Existing Conditions and the NA ELT scenario. Consequently, the effects to seasonal water temperatures, in light of the changed circumstances and Water Forum Agreement demands, may result in additional adverse effects to coldwater fish species production that were not known and considered at the time of the Water Forum EIR preparation. Therefore, the potential for increased temperatures during June through September, and associated potential for adverse effects to Nimbus Fish Hatchery operations for steelhead, would be considered a new **potentially significant Water Forum Agreement-related impact** not previously identified in the Water Forum EIR.

However, the ongoing management of LAR resource conditions by USBR/Water Forum organization operations is expected to minimize the potential additional adverse effects to Nimbus Hatchery steelhead production operations. The ARG process, as stipulated under the NOAA Fisheries BO, involves annually evaluating hydrologic and fisheries resource conditions in the American River basin, and developing the Annual Operations Forecast by May 1 each year to define the forecasted American River operations and implementation of the Minimum Flow Requirements and Water Temperature Objectives of the FMS. An Annual Water Temperature Management Plan (Temperature Plan) also is developed by May 1 each year to define the actions to meet the Water Temperature Objectives of the FMS. The FMS Water Temperature Objectives are designed for budgeting of available cold water resources to support juvenile steelhead rearing in the summer. Potential avoidance and minimization measures to reduce the adverse temperature effects to hatchery steelhead production, particularly during extreme drought conditions, also may require earlier seasonal releases of juvenile fish and/or relocation of fish to alternative hatcheries with suitable water temperatures, as implemented in the past two years.

City/PCWA (and ARSP) Specific Contribution to Impact: The Water Forum and USBR will continue to provide oversight for implementing the FMS-related annual planning and management actions for coldwater pool management to reduce the potential adverse temperature effects to Nimbus Hatchery operations. The incremental effect of the water demand for ARSP to the potentially increased water temperatures released to the Nimbus Hatchery would be exceedingly small, if even measurable. In addition, in receiving municipal water service from the City, ARSP's use of surface water from the American River, like all of the City's other surface water uses, will be subject to CVP allocation cutbacks and City-imposed mandatory water conservation measures when such measures are imposed. Consequently, given the existing annual water temperature planning and management actions by the Water Forum and USBR, the

effect of ARSP water demands on potentially increased water temperatures released to the Nimbus Hatchery is a **less-than-significant ARSP-related impact.**

4.1.2 Lower American River

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

Based on the CALSIM II modeling results for the WaterFix RDEIR/SDEIS (i.e., Appendix B, Table B.7-19) for the NA ELT scenario, monthly average Nimbus Dam release flows would generally be similar, or slightly lower, compared to Existing Conditions during the October through December period of peak fall-run Chinook salmon spawning activity. CVP water supply operations would continue to implement the FMS, as specified in the NOAA Fisheries BO, until such time as the Water Forum develops a revised FMS. Therefore, the effects to Nimbus Dam release flows, in light of the changed circumstances and Water Forum Agreement demands, would be similar to the effects previously identified in the Water Forum EIR. Reduced LAR flows in October through December period, as previously determined in the Water Forum EIR, may reduce available spawning habitat and lead to redd superimposition and reduced salmon production.

Temperature modeling results presented in the Water Forum EIR indicated a general reduction in average monthly water temperatures during the months of fall-run Chinook salmon spawning. However, based on the temperature modeling results for the WaterFix RDEIR/SDEIS (i.e., Appendix B, Table B.7-65) for the NA ELT scenario, the monthly average Nimbus Dam release temperatures would increase compared to Existing Conditions in October (i.e., 59°F to 63°F) and November (i.e., 57°F to 59°F). As described in the Water Forum EIR, spawning activity of fall-run Chinook salmon is strongly influenced by water temperature, generally starting when daily average water temperatures approach and fall below approximately 60°F, with peak spawning activity occurring during mid- to late-November. Survival of fertilized eggs that are buried in the streambed gravels, and the intragravel residence period (typically mid-October through March) of incubating eggs and yolk-sac fry, also are highly dependent upon water temperature. Egg incubation survival is highest at water temperatures at or below 56°F. Consequently, the modeling results indicate that the effects of the NA ELT scenario (including Water Forum Agreement demands and climate change) may result in increased average monthly LAR temperatures during the fall months at levels above the optimal threshold values for spawning and egg incubation, which may contribute to potential delays in spawning and increased thermally induced egg losses.

The minor changes in LAR flows would not be expected to result in new flow-related impacts to fall-run Chinook salmon, compared to the impacts disclosed in the Water Forum EIR. However, the assessment demonstrates that with the effects of climate change, the potential environmental stressors to the fall-run Chinook salmon population in the American River basin will continue, and likely be more severe during drier year types than anticipated at the time the Water Forum

EIR was developed. Therefore, the effects of the Water Forum demands (including those of ARSP) to the flow- and temperature-related effects to fall-run Chinook salmon is a potentially significant impact as originally characterized in the Water Forum EIR, and there are no changes to the mitigation measures and impact determination identified in the Water Forum EIR.

As described above, the ongoing actions of the ARG for implementation of the FMS, and Water Forum organization's ongoing implementation of management actions and development of the refined FMS for the LAR, would be expected to avoid and minimize the potential adverse effects to fall-run Chinook salmon, as originally envisioned in Water Forum EIR and defined mitigation measure identified for this impact (i.e., *Flow-Related Impacts to Lower American Chinook Salmon, Mitigation Measure for Impact 4.5-5*).

Impact to Steelhead (Water Forum EIR Impacts 4.5-6). The Water Forum EIR found the flow and temperature-related effects to steelhead life stages in the LAR to be less than significant.

Based on the modeling results for the WaterFix RDEIR/SDEIS (i.e., Appendix B, Table B.7-21), for the NA ELT scenario, monthly average LAR flows at the confluence with the Sacramento River would generally be similar, or slightly higher, compared to Existing Conditions during the months of December through April. Average monthly LAR flows would be similar or slightly lower during May and June compared to Existing Conditions. Consequently, the seasonal LAR flows would be similar to those assessed in the Water Forum EIR and would not substantially change or adversely affect the flow conditions during the steelhead spawning, rearing, or emigration periods. Therefore, the effects of the Water Forum demands (including those of ARSP) to changes in LAR flows is a less than significant impact to steelhead as originally characterized in the Water Forum EIR.

The temperature modeling of the NA ELT scenario for the WaterFix RDEIR/SDEIS (i.e., Appendix B, Table B.7-65, as described above for Water Forum EIR Impacts 4.5-3 and 4.5-4) indicates that average monthly water temperatures of Nimbus Dam release flows would generally be higher compared to Existing Conditions during the steelhead emigration and summer rearing months of March through September. As described in the Water Forum EIR, temperatures up to 65°F are considered suitable for steelhead rearing, with each degree increase between 65°F and the upper lethal limit of 75°F being increasingly less suitable and thermally more stressful. The modeled average monthly temperature would be near or above the 70°F rearing threshold under Existing Conditions (70°F) when averaged for critical dry year-types, and above 70°F under the NA ELT scenario in August and for critical dry year-types in June through September (i.e., up to 74°F). In contrast, the average LAR temperature model results for the Water Forum EIR indicated lower monthly average Nimbus Dam release temperatures of about 68°F in July through September, with reductions compared to the Existing Baseline conditions.

Additionally, the LAR temperature effects modeled under the Existing Conditions and NA ELT scenarios for the 2015 WaterFix RDEIR/SDEIS indicate that average LAR water temperatures would be higher than those assessed in the Water Forum EIR. The increased average LAR temperatures potentially would result in additional adverse effects to steelhead rearing as a result

of Water Forum Agreement-related demands compared to the assessment presented in the Water Forum EIR.

Therefore, the potential for increased temperatures during June through September, and associated potential for adverse effects to steelhead, would be considered a new **potentially significant Water Forum Agreement-related impact** not previously identified in the Water Forum EIR. However, as explained above in the discussion of Impact 4.5-4, the annual planning and management process of the ARG, and oversight of Folsom Reservoir and LAR operations, will serve to minimize the potential adverse flow- and temperature-related effects to steelhead. Moreover, in receiving municipal water service from the City when developed, water uses for ARSP will be subject to CVP allocation cutbacks and City-imposed mandatory water conservation measures when such measures are imposed. Consequently, given the existing annual water temperature planning and management actions by the Water Forum and USBR, the effect of ARSP water demands is a **less-than-significant ARSP-related impact.**

Flow- and Temperature-Related Impacts to Splittail (Impact 4.5-7). The Water Forum 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 Water Forum EIR. However, it was determined that due to uncertainty regarding future conditions, the impact would remain significant and unavoidable following mitigation.

Based on the modeling results for the WaterFix RDEIR/SDEIS (i.e., Appendix B, Table B.7-21), for the NA ELT scenario, monthly average LAR flows at the confluence with the Sacramento River would be slightly higher during the months of February through April, and slightly lower during May, compared to Existing Conditions. The NA ELT modeling results also indicate the potential for reduced flow during February through May in drier year types compared to Existing Conditions. Consequently, the year-type variability and lower average flow in May would be similar to the assessment of effects presented in the Water Forum EIR. The potential for reductions in LAR flows during the February through May period may reduce available spawning habitat for splittail. Consequently, the Water Forum Agreement demands (including climate change) would result in a similar (or somewhat lesser) potential for seasonal reduction in splittail spawning habitat previously determined in the Water Forum EIR. The effects of Water Forum Agreement demands would not be expected to substantially change the severity of the effects or cause any new significant impacts to splittail compared to the effects disclosed in the Water Forum EIR. Therefore, the effects of the Water Forum demands (including those of ARSP) to flow- and temperature-related effects to splittail is a potentially significant impact as originally characterized in the Water Forum EIR, and there are no changes to the mitigation measures and impact determination identified in the Water Forum EIR.

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

Based on the modeling results for the WaterFix RDEIR/SDEIS (i.e., Appendix B, Table B.7-21), for the NA ELT scenario, monthly average LAR flows at the confluence with the Sacramento River would be slightly higher during the months of May and June, compared to Existing

Conditions. Consequently, the Water Forum Agreement demands (including climate change) would result in similar 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 Water Forum 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. Additionally, the effects of Water Forum Agreement demands would not be expected to substantially change the severity of the effects or cause any new significant impacts to American shad or striped bass. Therefore, the effects of the Water Forum demands (including those of ARSP) to shad and striped bass is a less than significant impact as originally characterized in the Water Forum EIR.

4.1.3 Other CVP Reservoir Storage

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

The Water Forum EIR fisheries assessment determined that Water Forum Agreement-related water supply operations would result in more frequent reductions in Shasta Reservoir and Trinity Reservoir storage levels. However, the reductions would not be of sufficient magnitude to substantially reduce the availability of littoral (nearshore) habitat containing vegetation. Anticipated changes in seasonal storage levels within the normal operational range of the reservoirs also would not cause substantial adverse effects on habitat quality or quantity or prey availability for coldwater species.

Based on the modeling results for the WaterFix RDEIR/SDEIS, the distribution of Shasta Reservoir storage levels in May for the NA ELT scenario (reflecting future water demands and climate change) would be slightly lower compared to Existing Conditions (see **Figure 3**). The distribution of end-of-September carryover storage for Shasta Reservoir also would be lower under NA ELT conditions compared to Existing Conditions (see **Figure 4**). Overall, the minimum storage levels in the spring following reservoir refilling during the winter, and minimum carryover storage levels, are expected to be similar in upper CVP reservoirs to conditions described in the Water Forum 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.

Under the NA ELT scenario, as previously assessed in the Water Forum EIR, the seasonal reductions in Shasta Reservoir and Trinity Reservoir storage levels would not be expected to adversely affect the habitat or prey for coldwater species. Likewise, the seasonal changes would not substantially reduce near-shore habitat availability in the March through September period, or spring nest-building activity, of warmwater species. Moreover, the observed changes in these reservoirs are affected by other system demands and fall X2 requirement included in the NA ELT scenario, in addition to Water Forum Agreement demands, and thus overestimate the effects of Water Forum Agreement related demands.

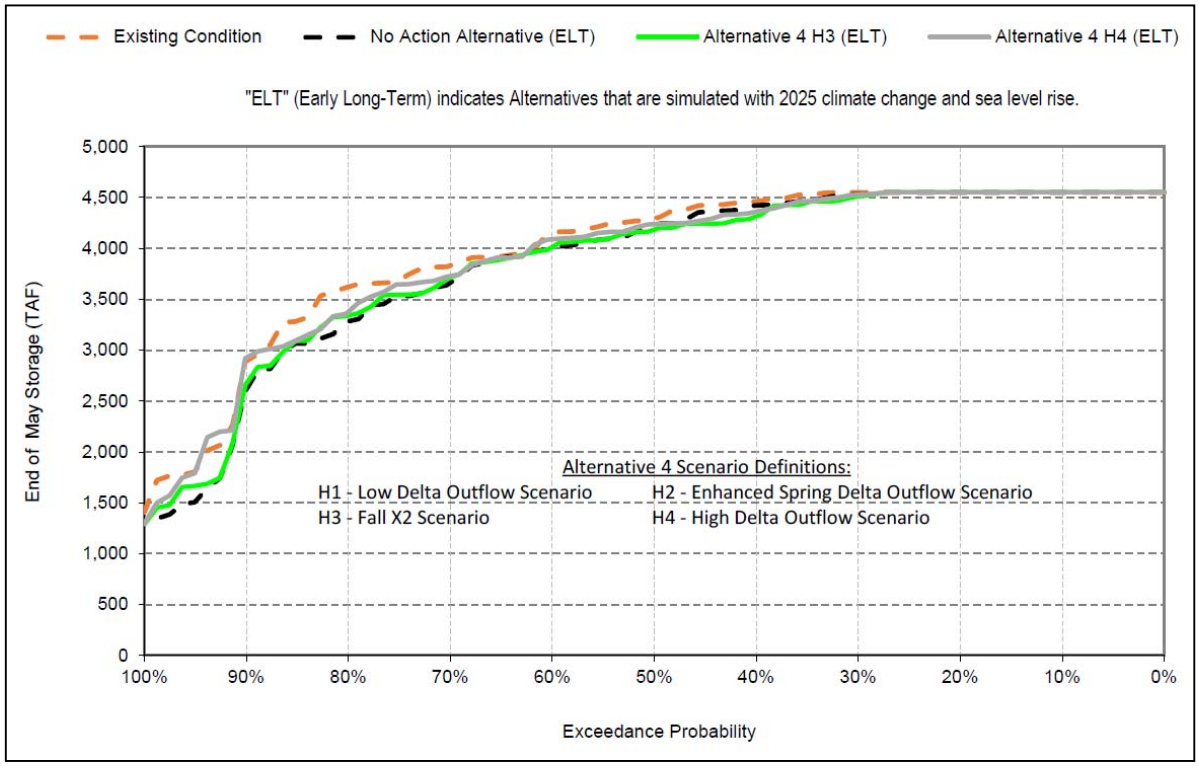

Figure 3. Shasta Reservoir End-of-May Storage.

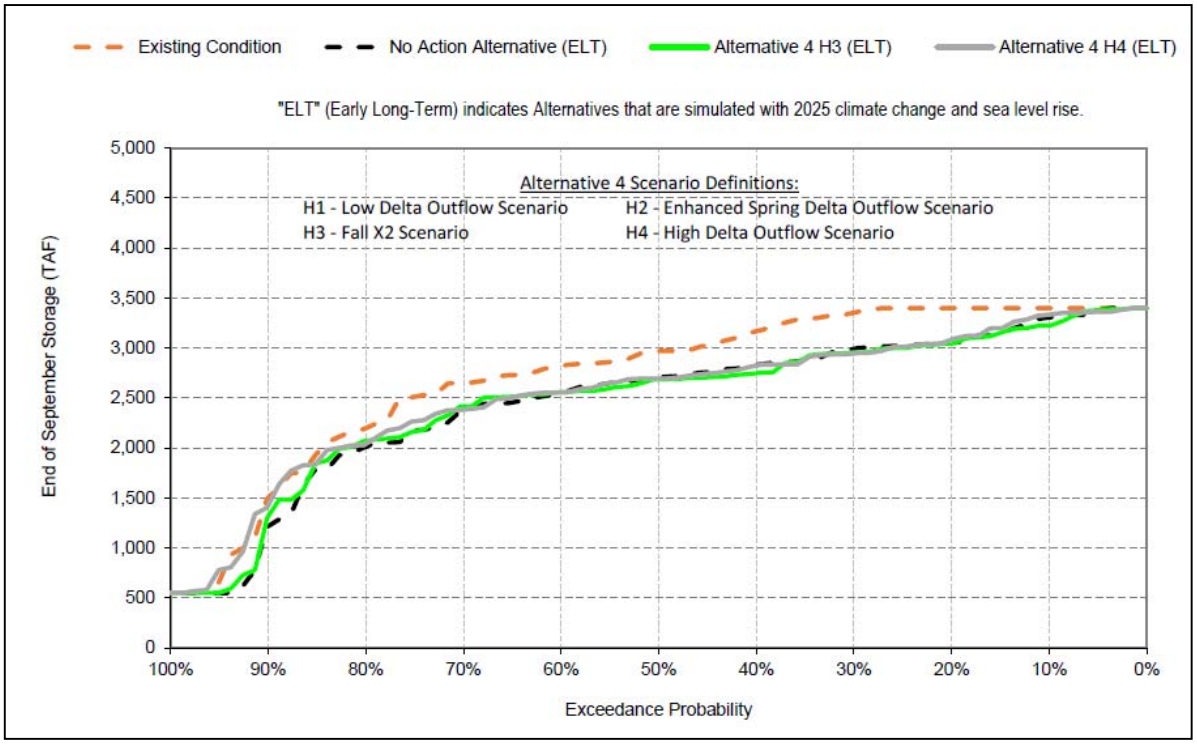

Figure 4. Shasta Reservoir End-of-September Storage.

Accordingly, the effects to seasonal storage levels of these CVP reservoirs, in light of the changed circumstances and Water Forum Agreement demands, would not change the impact determination for effects to coldwater or warmwater fisheries, compared to the conclusion in the Water Forum EIR. Therefore, the effects of the Water Forum demands (including those of ARSP) to upper CVP reservoirs fisheries resources is a less-than-significant impact as originally characterized in the Water Forum EIR.

4.1.4 Sacramento River

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

Based on the modeling results for the WaterFix RDEIR/SDEIS for the NA ELT scenario, monthly average upper Sacramento River flows at Keswick (i.e., Appendix B, Table B.7-1) and lower Sacramento River flows at Verona (i.e., Appendix B, Table B.7-7) would frequently be both higher and lower compared to Existing Conditions, compared to the equivalent modeling values presented in the Water Forum EIR. The effects of Water Forum Agreement demands, as determined in the Water Forum EIR, resulted in generally small and infrequent reductions in flow in the Sacramento River. The greater variability, range, and magnitude of differences in Sacramento River flows under the NA ELT scenario are affected by other system demands and fall X2 requirement included in the NA ELT scenario, in addition to Water Forum Agreement demands, and thus overestimate the effects of Water Forum Agreement related demands.

As previously determined in the Water Forum EIR, the effects of Water Forum Agreement demands in the American River basin would not result in upper Sacramento River being reduced below levels for protection of winter-run Chinook salmon rearing and downstream passage in the October through March period. The effects of Water Forum Agreement demands would contribute to the seasonal flow changes in the Sacramento River, which would not be expected to result in 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, Water Forum Agreement demands would not be expected to cause any new significant impacts to Sacramento River fisheries resources. Therefore, the effects of the Water Forum demands (including those of ARSP) to changes in Sacramento River flows is a less than significant impact to fisheries resources as originally characterized in the Water Forum EIR.

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

Based on the modeling results for the WaterFix RDEIR/SDEIS for the NA ELT scenario, monthly average temperatures in the upper Sacramento River at Bend Bridge (i.e., Appendix B, Table B.7-41) would generally be similar to Existing Conditions, and thus similar to modeling values presented in the Water Forum EIR. As previously determined in the Water Forum EIR, there would be no substantial changes to average temperature for any month of the year during the April through September period. Based on the minor changes in anticipated monthly

Sacramento River temperature values, in light of the changed circumstances and Water Forum Agreement demands, the effects of Water Forum Agreement demands would not be expected to cause any new significant temperature-related impacts to fish resources of the Sacramento River. Therefore, the effects of the Water Forum demands (including those of ARSP) to changes in lower Sacramento River temperature conditions is a less than significant impact to fisheries resources as originally characterized in the Water Forum EIR.

4.1.5 Delta

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

Based on the modeling results for the WaterFix RDEIR/SDEIS for the NA ELT scenario, monthly average Delta outflow (i.e., Appendix B, Table B.7-31) would be substantially higher in the fall months (September through November) compared to Existing Conditions, compared to the equivalent modeling values presented in the Water Forum EIR, as a result of CVP/SWP operations of releasing more water from upper reservoir storage for compliance with new fall X2 outflow requirements of the USFWS BO. The effects of Water Forum Agreement demands, as determined in the Water Forum EIR, resulted in generally small contributions to overall reductions in Delta inflows. In light of the changed circumstances with climate change and additional USFWS BO and NOAA Fisheries BO requirements for the Delta, the greater variability, range, and magnitude of differences in Delta inflow and outflow under the NA ELT scenario overestimate the effects of Water Forum Agreement related demands. Rather, the effects of Water Forum Agreement water supply operations would likely result in less contribution to effects previously assessed in the Water Forum EIR because all CVP/SWP operations would experience more frequent restrictions in water allocations to facilitate compliance with the Delta flow requirements.

Based on the anticipated occasional changes to Delta inflows, due to changed conditions and system operations, the effects of Water Forum Agreement demands would not be expected to cause any new significant habitat-related impacts to fish resources in the Delta. Therefore, the effects of the Water Forum demands (including those of ARSP) to changes in Delta channel flows is a less than significant impact to fisheries resources as originally characterized in the Water Forum EIR.

4.2 WATER SUPPLY-RELATED EFFECTS TO WATER QUALITY

The Water Forum EIR, Chapter 4.4, "Water Quality," addressed 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 in light of the changed circumstances described in Section 3 above.

Lower American River and Folsom Reservoir Water Quality (Water Forum EIR Impact 4.4-1). The Water Forum EIR found the Water Forum Agreement-related impacts to water quality in Folsom Reservoir and the LAR to be less than significant.

Based on the modeling results for the WaterFix RDEIR/SDEIS, the distribution of Folsom Reservoir storage levels (as described above for Impact 4.5-1 and Impact 4.5-2 of the Water Forum EIR) for the NA ELT scenario would generally be lower compared to Existing Conditions based on end-of-May and carryover storage diagrams (see **Figure 1** and **Figure 2**), and thus indicating Water Forum Agreement-related effects that would be generally consistent with the findings presented in the Water Forum EIR.

As previously determined in the Water Forum 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 in the reservoir. Accordingly, the effects to seasonal Folsom Reservoir storage levels and LAR flows, in light of the changed circumstances and Water Forum Agreement demands, 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 Water Forum EIR. Therefore, the effects of the Water Forum demands (including those of ARSP) to changes in Folsom Reservoir hydrology and LAR flows would result in a less than significant water quality impact as originally characterized in the Water Forum EIR.

Lower Sacramento River and Delta Water Quality (Water Forum EIR Impact 4.4-2). The Water Forum 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 Regional Wastewater Treatment Plant (SRWTP) associated with the development and growth supported by increased Water Forum Agreement deliveries. Mitigation for the impact was identified in the Water Forum 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 changed circumstances associated with underlying American River basin hydrologic conditions as affected by future climate change, new regulatory requirements, and changes in CVP/SWP operations, the lower Sacramento River flows and Delta inflows would frequently be both higher and lower, compared to conditions modeled in the Water Forum EIR. Based on the modeling results for the WaterFix RDEIR/SDEIS for the NA ELT scenario, monthly average lower Sacramento River flows at Verona (i.e., Appendix B, Table B.7-7) would frequently be both higher and lower compared to Existing Conditions, and as compared to the equivalent modeling values presented in the Water Forum EIR. The effects of Water Forum Agreement demands, as determined in the Water Forum EIR, resulted in generally small and infrequent reductions in lower Sacramento River flows and Delta inflow. The greater variability, range, and magnitude of differences in flows under the NA ELT scenario are affected by other system demands and fall X2 requirement included in the NA ELT scenario, in addition to Water Forum Agreement demands, and thus overestimate the effects of Water Forum Agreement related demands. Rather, the effects of Water Forum Agreement water supply operations would likely result in less contribution to effects previously assessed in the Water Forum EIR because all CVP/SWP operations would experience more frequent restrictions in water allocations to facilitate compliance with the Delta flow requirements.

As previously determined in the Water Forum EIR, increased urbanization in the area served by Water Forum Agreement purveyors would indirectly result in substantial increases in the amount of urban runoff and treated effluent discharged from the SRWTP into the lower Sacramento River. 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. However, the SRWTP is currently underway with planned construction of treatment process improvements that will substantially reduce the volume and concentrations of potential contaminants discharged to the Sacramento River. The effects of Water Forum Agreement demands in light of the changed circumstances would be expected to result in similar indirect water quality effects as those disclosed under the Water Forum EIR, particularly with overall urban population growth and increased wastewater and urban runoff discharges to the LAR and lower Sacramento River. Consequently, the direct and indirect effects of Water Forum Agreement demands, in light of changed circumstances, would not be expected to result in new or substantially more severe water quality impacts, compared to the conclusion in the Water Forum EIR. Therefore, the effects of the Water Forum demands (including those of ARSP) to changes in lower Sacramento River flows and Delta hydrology is a potentially significant impact as originally characterized in the Water Forum EIR and there are no changes to the mitigation measures and impact determination identified in the Water Forum EIR.

5 ASSESSMENT OF WATER SUPPLY-RELATED CONTRIBUTION TO CUMULATIVE FISHERIES RESOURCES AND WATER QUALITY IMPACTS

This section provides an assessment of the cumulative fisheries resources and water quality impacts identified in the Water Forum EIR, and specifically evaluates whether the cumulative impacts have substantially changed in light of changed circumstances that have transpired in the 15 years since the Water Forum EIR was prepared. Specifically, the analysis is intended to evaluate whether cumulative impacts are substantially more severe than previously assessed and whether there are new significant cumulative fisheries resources or water quality impacts identified. Based on the analysis of cumulative impacts, this assessment further considers the CEQA significance of the incremental contribution of Water Forum Agreement water supply operations to the cumulative impacts (and thus the contributing effect of City/PCWA and ARSP demands).

Cumulative impacts consist of the effects of all past, present, and reasonably foreseeable future projects that affect a specific environmental resource. This analysis is based on using best available information to describe the future cumulative fisheries resources and water quality conditions for the affected environment that could be affected by the City/PCWA water supply operations to provide water supply to the ARSP area. The future cumulative effects are assessed for the 2030 planning timeframe for general consistency with current planning activities relevant to ARSP including the WSA, current Urban Water Management Plans and General Plans for the City/PCWA, and the water supply operations modeling for the WaterFix RDEIR/SDEIS. Pursuant to the State CEQA Guidelines, future cumulative conditions are defined for this analysis using both a “list” approach to identify specific projects/actions anticipated to occur, and

a "plan" approach to predict the future fisheries resources and water quality resource conditions that will occur within the 2030 planning timeframe.

This assessment draws substantially from information presented in the WaterFix RDEIR/SDEIS recently prepared by USBR and DWR. Similar to the rationale described above (Section 2, Methods of Assessment), the WaterFix RDEIR/SDEIS represents the best available quantitative and qualitative information for describing the future cumulative fisheries resources and water quality conditions in the American River basin, Central Valley, and Delta. The modeling of the WaterFix action alternatives in the WaterFix RDEIR/SDEIS is conducted for the ELT (2030) timeframe assumptions and includes the known and planned future actions that will comprise the future conditions affecting CVP/SWP water supply operations. Consequently, comparing the modeling results for the WaterFix action alternatives to the Existing Conditions baseline is considered to provide generally equivalent information as the method used in the Water Forum EIR for assessing the potential cumulative impacts, and contribution of Water Forum water demands to those effects (i.e., and in-turn the incremental contribution of ARSP water demands to the cumulative conditions).

5.1 CHANGES IN CIRCUMSTANCES FOR DEFINING CUMULATIVE CONDITIONS

Determining the future cumulative fisheries resources and water quality conditions entails identifying the list of projects/activities that can affect these resources. Although the effects of ARSP water supply operations (i.e., City/PCWA operations) will occur in a relatively localized area of the American River basin, any hydrologic effects of CVP water supply operations are interrelated with other CVP/SWP operations throughout the Central Valley, and in particular the operations of CVP's upper watershed reservoirs (i.e., Shasta Reservoir and Trinity Reservoir primarily), Sacramento River, and coordinated CVP/SWP operations in the Delta. The WaterFix RDEIR/SDEIS identifies the known suite of existing and planned activities in the Central Valley that will be implemented within the ELT timeframe. The water supply operations modeling for the action alternatives considered in the WaterFix RDEIR/SDEIS includes most of the same major facilities, water demands, regulatory requirements, and assumptions for climate change and underlying hydrologic inputs that were considered under the NA ELT scenario.

The preferred WaterFix alternative (Alternative 4A) is designed to: (a) construct new water conveyance facilities to improve south-of-Delta water exports from the CVP (Jones) and SWP (Banks) pumping plants; (b) restore and enhance the ability of CVP/SWP exports to maximize deliveries of available water; (c) operate CVP/SWP water supply operations in a manner that is compliant with regulatory ESA-related and water quality requirements; and, (d) achieve the coequal goals in the California Water Plan of improving water supply reliability and protecting, restoring, and enhancing the Delta ecosystem. The Alternative 4A conveyance system will consist of three new screened water diversion intakes located on the east bank of the Sacramento River between Clarksburg and Courtland with capacity to divert up to 9,000 cubic feet per second (cfs). The Sacramento River water will then be conveyed through a new tunnel to the Clifton Court Forebay in the south Delta for export via the Jones and Banks pumping plants. The new Sacramento River diversion system and existing Delta facilities (i.e., Delta Cross Channel, temporary barriers, south Delta diversions to Jones and Banks pumping plants) will be operated by CVP/SWP according to four new sets of operational flow criteria for compliance

with fisheries protection and water quality requirements (i.e., Scenarios H1, H2, H3, or H4) that will depend on the seasonal hydrologic conditions.

The following focused list of future planned activities are not considered in the water supply operations modeling for the WaterFix RDEIR/SDEIS, and are described herein due to their potential influence on cumulative fisheries resources and water quality conditions that may be affected by the ARSP water supply operations.

- **Flood Control Operations for new Folsom Dam Auxiliary Spillway.** An auxiliary spillway is under construction at Folsom Dam (anticipated 2017 completion). The U.S. Army Corps of Engineers will update the flood control manual to implement use of the new spillway to reduce flooding risks in Sacramento, which potentially may increase the ability to capture water supplies within the runoff period for use by CVP operations.
- **Temperature Control Device (TCD).** El Dorado Irrigation District (EID) proposes to construct a TCD facility on the bank of Folsom Reservoir for its existing urban water intakes. The TCD would facilitate diversion of warmer water from the lake while preserving the coldwater pool at the bottom of the lake.
- **PCWA Water Rights Extension Project.** PCWA is in the process of seeking extension of existing water rights permits for North Fork American River. The project will include PCWA's Water Forum Agreement-related commitment to additional environmental water releases of up to 47,000 AFY to the LAR in drier years through lowering of the normal operational reservoir carryover storage targets in those years, with accompanying long-term water transfer downstream of the American River/Sacramento River confluence.
- **El Dorado Water & Power Authority (EDWPA) Supplemental Water Rights Project.** The proposed project is to establish permitted water rights allowing diversion of water from the American River basin to meet planned future water demands in the EID and GDPUD service areas and other areas located within El Dorado County that are outside of these service areas and allowing for anticipated withdrawal of up to 40,000 AFY.
- **Sacramento River Water Reliability Project (SRWRP).** Roseville and PCWA, along with the Sacramento Suburban Water District and City of Sacramento, are investigating the viability of a joint water supply diversion to meet the water demands of future urban development. The SRWRP, which is in the planning stages [?], will identify a package of water supply infrastructure components that may include a new Sacramento, Feather, or American river diversion of up to about 88,000 AFY, new/expanded water treatment and pumping facilities, storage tanks, and major transmission and distribution pipelines.
- **Other Major Water Supply Infrastructure Projects.** A number of water supply storage and infrastructure projects were identified as components of the CALFED program intended to provide multiple water supply storage, reliability, and environmental restoration benefits, as follows:
    - Shasta Dam Raise. An increase to Shasta Dam storage is being planned for between 6.5 to 18.5 feet above current elevation, which would result in additional storage capacity of 256,000 to 634,000 AF. The increased capacity would

improve water supply reliability and increase the cold water pool, which would improve water temperature management for fish in the Sacramento River.

- North-of-the-Delta Offstream Storage Project (i.e., Sites dam and reservoir). An offstream storage reservoir is being planned for the northern Sacramento Valley. Feasibility studies have been developed for the "Sites" location, which would provide improved water supply and water supply reliability, water quality, and enhanced survival of special-status fish.
- Upper San Joaquin River Basin Storage Investigation (i.e., Temperance Flats reservoir). A new reservoir is in the planning stages for the upper San Joaquin River. The Temperance Flats location, upstream of Millerton Reservoir, has been evaluated for the opportunities to enhance the San Joaquin River restoration project, and improve water supply reliability and environmental uses in the Friant Division, the San Joaquin Valley, and other regions of the state
- In-Delta Water Storage Project. DWR is considering the construction of an in-Delta water storage facility, which has been proposed since the 1990's (formerly as the Delta Wetlands project). The project would provide storage capacity on two existing subsided Delta islands (Webb Tract and Bacon Island) for about 217,000 AFY to capture wet weather flows for water supply, water quality, and ecosystem benefits. The project would include two habitat islands (Holland Tract and Bouldin Island).

- **California EcoRestore.** California EcoRestore consists of numerous Delta and regional ecosystem protection and habitat restoration projects, initiatives, and activities, including specific elements of the RPAs for the USFWS BO and NOAA Fisheries BO. EcoRestore consists of the activities that were previously included in the Bay Delta Conservation Plan, have now been separated from the WaterFix activities, and will be led by the Delta Conservancy as the lead state agency. Regarding water-related activities, EcoRestore will implement approximately 30,000 acres of habitat restoration actions prescribed in the 2014 California Water Action Plan within the 2020 planning timeframe including about 3,500 acres of managed wetlands, 9,000 acres of tidal and sub-tidal habitat, 17,500 acres of restored floodplain areas, and 1,000 acres of aquatic, riparian and upland habitat. Multiple fish passage improvement projects also will be included in the Yolo Bypass and other key locations.

These additional projects may incrementally affect CVP/SWP water supply operations in the American River basin, and WaterFix implementation would specifically alter CVP/SWP operations throughout the Central Valley. Additionally, future climate change effects on Central Valley hydrology and sea level rise in the Delta are anticipated to result in changes to reservoir storage and watershed runoff conditions. Consequently, the future cumulative regional water supply operations will be different with additional project implementation than assessed at the time the Water Forum EIR was prepared.

5.2 ASSESSMENT OF CUMULATIVE FISHERIES RESOURCES AND WATER QUALITY IMPACTS

5.2.1 Previous Cumulative Impacts Analysis of the Water Forum EIR

The Water Forum EIR identified and concluded that implementing water diversions under the Water Forum Agreement had the potential for cumulative fisheries resources and water quality impacts as follows:

Fishery Resources and Aquatic Habitat

- Folsom Reservoir warm water fisheries
- Fall-run Chinook salmon
- Flow and temperature related impacts to splittail (February–May)
- Shasta Reservoir and Trinity Reservoir warmwater fisheries
- Temperature related impacts to Sacramento River fishery resources.
- Delta fish populations

Water Quality

- Sacramento River and Delta Water Quality

The Water Forum EIR identified that the project-specific mitigation measures developed to reduce impacts to warmwater fisheries in Folsom Reservoir and fall-run Chinook salmon and splittail in the lower American River would serve to lessen or mitigate for the contribution to future cumulative impacts. However, unless additional water supplies are developed, diversions are reduced, or measures are implemented to reduce the impacts of water supply operations, the Water Forum EIR concluded that there would still be remaining significant cumulative impacts to regional fisheries resources and water quality, and thus these cumulative impacts would remain significant and unavoidable. The primary responsibility to address the regional fisheries conditions lies with the USBR and DWR for CVP/SWP operations, and other federal and state agencies with jurisdiction over the affected resources including the USFWS, NOAA Fisheries, and CDFW. The Water Forum EIR identified that the number and range of potential policy decisions and actions to reduce adverse impacts to fisheries resources were considerable, and it was not feasible to predict which measures could and should be implemented.

5.2.2 Current Cumulative Impacts Analysis

This section analyzes new information that has become available since the certification of the Water Forum EIR and considers whether there are any substantial changes in the severity of the cumulative fisheries resources and water quality impacts identified in the Water Forum EIR or new cumulative impacts, in light of any changed circumstances. A degree of speculation and uncertainty exists when attempting to characterize future cumulative conditions and, therefore,

the cumulative impact analysis only requires a level of detail that is reasonable given available information and knowledge. Moreover, the ability to accurately estimate environmental conditions in the project area many years into the future is limited, particularly recognizing the interrelated and dynamic effects of land uses and population growth, surface water and groundwater management, natural and anthropogenic water quality influences, and biological resources.

Cumulative Fisheries Resources Conditions

The current status of fisheries resources in the American River, Sacramento River, and the Delta, described below, indicates that there are numerous stressors with the potential to adversely influence fisheries and aquatic resources including altered flows, decreasing habitat quantity and quality, invasive species, and declining water quality (e.g., increased water temperatures and contaminants). The primary fish species of concern are state and federal special-status species, and other native resident and anadromous salmonids. The issuance of the USFWS BO and NOAA BO addressing CVP/SWP coordinated water supply operations, and implementation of the specified RPAs reflect the most prominent regulatory change since the Water Forum EIR was prepared.

5.2.3 American River Basin.

Based on modeling results presented in the WaterFix RDEIR/SDEIS, the distribution of future cumulative Folsom Reservoir storage levels with WaterFix implementation under the influence of climate change and sea level rise, as shown for the Alternative 4A ELT scenarios in Figure 1 (end-of-May) and Figure 2 (carryover storage), would be similar to the effects described for the NA ELT, i.e., generally lower than under Existing Conditions. Similarly, climate change will result in a general increase in seasonal LAR temperature conditions, and shifts in LAR flow patterns will occur as a result of climate change and ongoing management for LAR FMS requirements. Other activities underway or planned in the American River basin may improve supply and coldwater pool conditions (e.g., additional PCWA releases in drier years, Folsom Dam auxiliary spillway completion, and new TCD for EID urban intake). Consequently, the potential cumulative impacts to Folsom Reservoir warmwater species, and fall-run Chinook salmon and splittail in the LAR previously assessed for the Water Forum EIR are considered to remain potentially significant cumulative impacts. Additionally, the increased Nimbus Dam release temperatures and potential for adverse effects to Nimbus Hatchery steelhead production and steelhead rearing in the LAR represents a new significant cumulative impact. With the ongoing management, monitoring, and coordination of resource conditions in the basin by the Water Forum, USBR, and interagency oversight of the ARG, these effects are not anticipated to be substantially worse the previously assessed in the Water Forum EIR.

Sacramento River and Delta. In the Delta, attention has been focused on the phenomenon known as Pelagic Organism Decline (POD), which refers to the decline of the open-water (pelagic) fishes (i.e., delta smelt, longfin smelt, juvenile striped bass, and threadfin shad), and some prey species (Baxter et al. 2008). The population levels of delta smelt and longfin smelt have declined substantially since about 2000, despite relatively moderate hydrologic conditions (i.e., both wet and dry year-types). The causes of POD remain uncertain, and likely involve many factors including changes to hydrologic patterns and entrainment losses associated with

water export operations, loss of habitat, prior-year abundance of each species, food and prey relationships, water quality parameters (e.g., turbidity, contaminants), and non-native species predation/competition. Decline in habitat suitability for delta smelt is associated with increasing water clarity (i.e., smelt are most common in turbid water), high water temperatures in summer, and salinity mixing zone intrusion in fall months.

With the climate change and sea level rise, and implementation of the reasonably foreseeable actions including WaterFix, EcoRestore, and implementation of the RPA for the USFWS BO, the future cumulative conditions for delta smelt and other pelagic species in the Delta will continue to be dynamic and difficult to predict. The RPA for the USFWS BO imposes pumping restrictions on CVP/SWP Delta exports and increased fall Delta outflow specifically for the protection of delta smelt. Delta export operations are being managed with input from a Water Operations Management Team (WOMT) of agency representatives that determine how to best implement the RPA actions. The WOMT reviews flow, water quality, and delta smelt data on a routine basis, and as frequently as weekly for the December–May period. It is anticipated that with the combination of new WaterFix facilities and operations, implementation of RPA actions and the WOMT approach to CVP/SWP water supply operations, and future EcoRestore program habitat restoration activities, future cumulative habitat conditions will improve for delta smelt and direct/indirect losses will decline.

In the Delta and Sacramento River watershed, attention also is focused on the ESA-listed salmonid species (i.e., winter-run and spring-run Chinook salmon, and steelhead) and green sturgeon. Sacramento River Chinook salmon escapement levels (i.e., the number of fish returning to natal freshwater habitat to spawn) have declined substantially in both recent wet year-types and dry year-types. The NOAA Fisheries BO identifies factors of reduced habitat availability, poor migration conditions, increased water temperature, increased contaminants, entrainment in diversions, increased predation, reduced food, hatchery effects, altered ocean conditions, and harvest that have acted upon the populations over decades as the main stressors on these species. With implementation of the RPA actions for the NOAA Fisheries BO, and management of CVP/SWP water supply operations for the proposed WaterFix, general improvements are expected over the long-term in terms of reduced entrainment losses in the Delta diversions, and improved temperature conditions in the upper Sacramento River, compared to Existing Conditions. Based on water supply operations modeling results for Alternative 4A ELT presented in the WaterFix RDEIR/SDEIS, the distribution of Shasta Reservoir and Trinity Reservoir storage levels, and mainstem Sacramento River flow and temperature conditions, would be generally similar to the effects described for the NA ELT. Potential future cumulative fisheries conditions are anticipated to not differ substantially in the future compared to Existing Conditions.

Overall, in combination with the modeled hydrologic effects of WaterFix implementation through 2030, including effects of climate change, sea level rise, and other planned future activities identified above, the potential exists for substantial changes to the underlying Central Valley hydrologic conditions. The large geographical extent and magnitude of regional water supply operations, likewise, have potential for ongoing substantive effects to fisheries resources and temperature conditions in the American River, other Central Valley reservoirs and rivers, and the Delta. The fisheries resources conditions in many water bodies and some Delta water

quality conditions, as affected by CVP/SWP water supply operations and other factors, are generally acknowledged to currently experience degraded conditions, and will likely continue to be adversely affected in the future, compared to Existing Conditions. Moreover, there is considerable uncertainty regarding future fisheries resources conditions, given the number of ecosystem stressors that already exist, and effects of extreme drought conditions that are currently being experienced. Therefore, for the purposes of this analysis, it is assumed that the future significant cumulative impacts to fisheries resources identified in the Water Forum EIR will continue to be potentially significant, which is equivalent to the impact determination originally presented in the Water Forum EIR. However, with implementation of RPA actions, including habitat restoration, the cumulative impacts would be expected to be no more adverse than the conditions that were assessed in the Water Forum EIR.

Lower Sacramento River and Delta – Cumulative Water Quality Conditions

The Delta and Suisun Marsh are currently listed under the Clean Water Act Section 303(d) program, in one or more locations, as impaired for salinity, organic enrichment/dissolved oxygen (DO) depletion, mercury/methylmercury, pathogens, legacy organochlorine pesticides, dioxin/furan compounds, polychlorinated biphenyl compounds (PCBs), and unknown toxicity. CVP/SWP water supply operations have the potential to affect many of these constituents either directly, such as salinity which is affected directly by Delta inflow and outflow, or indirectly by general effects on dilution, conveyance, and residence time of water in the Delta. Total Maximum Daily Load (TMDL) programs have been initiated or developed for several of these contaminant categories including for organic enrichment/DO depletion in the Stockton Deep Water Ship Channel and methylmercury in the Delta. No TMDL for any of the salinity impairments in the Delta or Suisun Marsh has been developed at this time. The TMDLs and implementation programs are intended to result in net reductions in contaminant concentrations. However, the effectiveness of the TMDL implementation programs to correct the impairments is uncertain; therefore, it is conservatively assumed that the existing impairments may continue into the future and are considered potentially significant future cumulative water quality conditions, which is equivalent to the impact determination originally presented in the Water Forum EIR.

The water supply operations modeling and cumulative impacts analysis for the WaterFix RDEIR/SDEIS provides an assessment of the best available information regarding the factors affecting Delta water quality conditions, concluding that future cumulative water quality conditions are anticipated to be adverse for salinity parameters (i.e., chloride and EC), mercury, dissolved organic carbon, selenium, and Microcystis algae. The modeling analyses with CALSIM II/DSM2 indicate that salinity conditions are associated primarily with tidal exchange of salt water in the western Delta. Most of the constituents are present in the Delta at adverse levels as a result of defined source loading (e.g., legacy mercury and pesticide) and indirectly by channel flow conditions and seasonal water residence time. Therefore, for the purposes of this analysis, it is assumed that the future significant cumulative Delta water quality impacts will be potentially significant, which is equivalent to the impact determination originally presented in the Water Forum EIR. However, the cumulative water quality impacts would be expected to be no more adverse than the conditions that were assessed in the Water Forum EIR.

5.2.4 Contribution of the Proposed ARSP Water Demands to Cumulative Impacts

The contribution of City/PCWA water supply operations (and thereby incremental contribution of ARSP water demands) to the cumulative fisheries resources and water quality impacts would occur as a result of the physical withdrawal of surface water from the American River for M&I use. However, the incremental ARSP water demand of 1,503 AFY would itself have little, if even measureable, effect to the cumulative fisheries resources and water quality impacts assessed in the Water Forum EIR. The ARSP demands would result in a small contribution to the cumulative effects because the total 2030 demands in the American River basin considered in the Water Forum EIS is approximately 380,000 AFY, thus the ARSP water demand represents a small fraction (i.e., about 0.3%) of these total water demands. Regardless, the City conservatively assumes that the ARSP's incremental contribution to the significant cumulative impacts listed above is cumulatively considerable because it's the effects of all the incremental demands that collectively result in adverse changes to reservoir storage, river flows, temperature, and water quality conditions.

Consistent with the Water Forum EIR, the discussion of potential mitigation actions for cumulative effects is on the Water Forum-related contributions to the cumulative impact, as allowed under the Section 15130(b)(3) of the State CEQA Guidelines. Accordingly, within the American River basin, the USBR and the Water Forum purveyors have been implementing the adopted project-specific mitigation measures from the Water Forum EIR consisting of improved ecosystem monitoring and adaptive management of facilities including Folsom Reservoir coldwater pool management procedures for the power penstock shutters and urban water intake TCD, and conducting annual planning within the American River Group framework for the FMS-related flow and temperature management pursuant to the NOAA Fisheries BO. Therefore, no other new or additional mitigation measures for the Water Forum-related effects are proposed herein to lessen cumulatively significant fisheries or water quality impacts.

Additionally, the USBR and its coordinated CVP/SWP operations will continue to be responsible for implementing actions for compliance with fisheries resources protection requirements of the RPAs issued for the USFWS BO and NOAA Fisheries BO, water quality requirements of the State Water Resources Control Board water rights permit (i.e., D1641 requirements), and ultimately mitigation measures undertaken for the WaterFix and EcoRestore projects. Decision-making about the coordinated CVP/SWP water supply operations and mitigation actions for effects to fisheries resources and water quality conditions is beyond the control of the Water Forum organization, any single Water Forum purveyor, the City/PCWA organizations, or ARSP proponents. Therefore, as identified in the Water Forum EIR, attempting to define other mitigation measures in the ARSP EIR beyond those project-specific actions for the water supply operations and management in the American River basin that are addressed in the Water Forum EIR would be speculative and are unnecessary at this time.

6 REFERENCES

Baxter, R., R. Breuer, L. Brown, M. Chotkowski, F. Feyrer, M. Gingras, B. Herbold, A. Mueller, Solger, M. Nobriga, T. Sommer and K. Souza. 2008. Pelagic Organism Decline Progress Report: 2007 Synthesis of Results. January 15, 2008. 52 pp.

GEI Consultants. 2013. Western Placer County Sustainable Yield. Prepared for the Western Placer County Groundwater Management Plan. (November).

Montgomery Watson Harza. 2007. Western Placer County Groundwater Management Plan. Prepared for the cities of Roseville, Lincoln, PCWA, and California American Water.

City of Roseville. 2015. Water Supply Assessment for the Amoruso Ranch Specific Plan. Prepared by the Municipal Consulting Corp., Citrus Heights, CA.

National Marine Fisheries Service. 2009. Biological Opinion and Conference Opinion on the Long-Term Operations of the Central Valley Project and State Water Project. June 4. Long Beach, CA. Available:<http://swr.nmfs.noaa.gov/ocap/NMFS_Biological_and_Conference_Opinion_on_the_Long-Term_Operations_of_the_CVP_and_SWP.pdf>.

Sacramento City-County Office of Metropolitan Water Planning. 2000. Water Forum Agreement. Sacramento, CA

Sacramento City-County Office of Metropolitan Water Planning. 1999. Final Environmental Impact Report for the Water Forum Proposal (SCH #95082041). Prepared by EDAW. Sacramento, CA

USFWS. 2008. Formal Endangered Species Act Consultation on the Proposed Coordinated Operations of the Central Valley Project (CVP) and State Water Project (SWP). Biological Opinion. December 15. Sacramento, CA. Available:<http://www.fws.gov/sfbaydelta/documents/SWP-CVP_OPs_BO_12-15_final_OCR.pdf>.

USBR and DWR. 2015. Bay Delta Conservation Plan/California WaterFix Recirculated DEIR and Supplemental DEIS.