6. SUPPLEMENTAL CUMULATIVE IMPACTS ANALYSIS

6.1 Introduction to the Supplemental Cumulative Impacts

To ensure consideration and understanding of the full range of potential cumulative impacts associated with the Water Forum Proposal (WFP) and in response to comments on the Draft Environmental Impact Report (Draft EIR), additional modeling has been performed to assess the cumulative effects under an alternative scenario for the WFP cumulative condition. As explained in the WFP Draft EIR, the cumulative impacts analysis considers the combined effects of the proposed project, other past and present projects, and "reasonably foreseeable probable future projects" (State CEQA Guidelines §15130). In the case of the WFP Draft EIR this involved attempting to foresee related projects occurring over the long-term. The Water Forum Proposal would be implemented over the next three decades. During this same time period, it is expected that many other actions will be implemented that will affect the environmental conditions of the project's direct and indirect study areas.

The WFP Draft EIR noted that a large degree of speculation and uncertainty exists when attempting to characterize the study area 30 years into the future, particularly recognizing the dynamic nature of decisions about water supply and resource protection in the Sacramento and San Joaquin River system. Therefore, it is difficult to define any one scenario as the reasonably foreseeable probable future. Nonetheless, to fulfill the requirements of State CEQA Guidelines §15130, to address future cumulative conditions, the programmatic analysis for the WFP used one scenario as a good faith effort to assess future cumulative potential effects. The scenario was developed after a year of extensive discussions between the Water Forum technical consultants and the U.S. Bureau of Reclamation (USBR) and U.S. Fish and Wildlife Service (USFWS). The WFP Draft EIR defined the cumulative condition as the WFP and three other reasonably foreseeable probable future actions or sets of actions that could be quantified, including:

Increased Trinity River Flows. For modeling and analysis purposes, the WFP Draft EIR assumed that Trinity River flows will be increased from existing levels to 390,000 acre-feet per year in drier years to 750,000 acre-feet per year in wetter years, thereby reducing exports to the Sacramento River.

East Bay Municipal Utility District (EBMUD) Supplemental Water Supply Project. For modeling and analysis purposes, diversions of up to 112,000 acre-feet per year of American River water subject to deficiencies imposed by the Central Valley Project (CVP).

Increased Water Demands. For modeling and analysis purposes, the WFP Draft EIR assumed that increased water demands by State Water Project (SWP) contractors, CVP contractors, and other Sacramento Valley water users would occur. Increased demand volumes are based on projections by USBR and the California Department of Water Resources (DWR).

In light of the uncertainty concerning probable future conditions in the Sacramento and San Joaquin River systems and in response to comments on the WFP Draft EIR, an alternative cumulative condition has been prepared and analyzed to provide the reader with additional information regarding the potential cumulative effects of the WFP. While it is impossible to predict whether either set of cumulative conditions will be realized in 2030, the cumulative condition presented in the WFP Draft EIR and the alternative cumulative condition analyzed below both reflect reasonable projections of probable future conditions.

The analysis was conducted with the intent to illustrate the potential impacts collectively associated with the differences between the alternative cumulative condition and the baseline conditions and also to identify differences between the cumulative condition presented in the WFP Draft EIR and the alternative cumulative condition. While the supplemental analysis focused on the evaluation of potential impacts to those resources hydrologically affected by the alternative cumulative conditions, several resources were not affected by them. All resources, however, are addressed in this supplemental analysis.

The impacts to all resources identified in this supplemental cumulative analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.1.1 ALTERNATIVE CUMULATIVE CONDITIONS

The alternative future conditions incorporated into the supplemental cumulative analysis included the following:

- a diversion point for East Bay Municipal Utility District (EBMUD) at the Folsom South Canal, instead of the joint project location near the mouth of the Lower American River;
- the application of revised Reclamation allocation guidelines for the CVP; and
- other updates and refinements.

EBMUD DIVERSION

The WFP Draft EIR included a projected 2030 diversion by EBMUD of 112,000 AFA located near the mouth of the Lower American River. This assumption was consistent with the proposed joint project included in the East Bay Municipal Utility District - Supplemental Water Supply Project, Volume 1, Draft Environmental Impact Report/ Environmental Impact Statement (October 1997). At the time, the joint project, so named since it was being developed jointly by EBMUD, Sacramento County, and the City of Sacramento was recognized as an alternative diversion and pumpback option that would permit diversions from the Lower American River near the mouth and conveyance of water to the Fairbairn Water Treatment Plant and to the Folsom South Canal. While reasonable to include as a modeling assumption at the time, it was recognized in the WFP Draft EIR that a number of outstanding issues precluded its certainty.

In response to comments on the WFP Draft EIR and to account for the possibility that a diversion would occur at the Folsom South Canal rather than near the mouth of the American River, an alternative EBMUD diversion was analyzed. For the supplemental cumulative impacts analysis, the alternative diversion point analyzed for EBMUD was the Folsom South Canal. Such diversions by EBMUD would be conditioned upon specified minimum flow criteria, which constrains EBMUD's diversions from the Lower American River based on the 1990 decision of presiding Judge Richard Hodge in the Environmental Defense Fund et al., v. EBMUD (E.D. Cal Case No. 425,955) decision (known as the "Hodge" criteria). The "Hodge" criteria were applied in the simulation modeling as set forth in the decision:

October 15th through February: 2,000 cfs
March through June: 3,000 cfs
July through October 15th: 1,750 cfg

The Hodge Decision limits use of EBMUD's diversion to meeting demands for the District's customers within the district. To simulate this limitation on the diversion, a rule curve representing EBMUD's monthly operation of its Mokelumne River facilities was developed from simulation results provided in the October 1997 EBMUD Draft EIR/EIS. Implementing a rule curve for Total System Storage (TSS) provides a means of estimating EBMUD's American River diversion solely for use within the District's boundary based on simulated Mokelumne River operations without an American River diversion.

The maximum monthly TSS for the simulated period of record was obtained from each of these simulations. These 12 monthly values defined the monthly rule curve. Utilizing the Mokelumne River simulation results for future conditions without an EBMUD diversion as a basis, when water was available for diversion from the American River was limited by the difference between the simulated TSS and the rule curve.

The EBMUD diversion, consistent with its CVP contract for up to 150,000 AFA, was subject to the "Hodge" criteria, CVP M&I allocation guidelines (as discussed below) and EBMUD's available system storage (difference between a total system storage [TSS] Rule Curve and EBMUD's actual total system storage as simulated without an American River diversion). The modeling of this diversion point showed that in about 25% of the years, EBMUD would receive approximately 25,000 AF. In about 40% of the years, EBMUD would not receive any water from the Folsom South Canal. While EBMUD could receive a maximum of about 100,000 AF, on an average annual basis they would receive about 17,000 AF. This alternative diversion point for EBMUD was included in response to comments received on the WFP Draft EIR. It represents a possible EBMUD future diversion from the American River, but is no more certain than the diversion location modeled in the WFP Draft EIR (i.e., near the mouth of the Lower American River). Details of the supplemental cumulative impacts analysis modeling are provided in Appendix N to the Final EIR.

CVP ALLOCATION GUIDELINES

The WFP Draft EIR included USBR CVP allocation guidelines determined through extensive consultation with USBR staff during 1998. The applied CVP allocation guidelines were mutually agreed upon by USBR's Division of Planning and the Water Forum. The CVP allocation guidelines reflect USBR's planning policy regarding USBR's rules for designating deliveries to CVP customers (e.g., agricultural, M&I, and refuges) defined as decreasing percentages from full delivery allotments. At the time that the WFP Draft EIR was being completed and readied for release, use of the available CVP allocation guidelines represented a reasonable assumption of USBR allocation policy.

Since the release of the WFP Draft EIR, USBR has revised its CVP allocation guidelines. In fact, the Supplemental Programmatic Environmental Impact Statement for the CVPIA (released in the summer of 1999) included the revised CVP allocation guidelines as part of its hydrologic modeling. Given that these CVP allocation guidelines represent the latest USBR "policy" regarding anticipated allocations, they were used in the supplemental cumulative impacts analysis.

Key differences between the two versions of the CVP allocation guidelines lie in the magnitude and frequency with which deficiencies are imposed to the deliveries to either CVP agricultural or M&I customers or refuges. In all cases, allocations to refuges are greater under the revised guidelines than those under the previous guidelines. Conversely, allocations to agricultural and M&I customers are lower and at certain delivery levels, allocations to agricultural customers are reduced to zero.

OTHER UPDATES AND REFINEMENTS

In addition to the alternative cumulative conditions noted above, the Water Forum has taken the opportunity provided through the supplemental cumulative impacts analysis, to update and refine certain hydrologic modeling assumptions as well as the model itself (i.e., PROSIM). This update and refinement of the modeling assumptions, relative to that used in the WFP Draft EIR included: 1) revision to estimated future demands of Contra Costa Water District (i.e., from 145,000 AFA to 195,000 AFA plus their water rights in the Delta which vary depending on consumptive use); 2) a correction to a misprint in the Department of Interior's Final Administrative Proposal for the Management of Section 3406 (b)(2) Water, dated November 20, 1997 regarding the flow release-storage relationship for Folsom Reservoir; and 3) updating the PROSIM tool itself, from PROSIM 99 which represented a pre-release version of PROSIM 99.0, to the use of PROSIM 99.0. Specific details associated with the PROSIM inputs in the revised cumulative condition model run are provided in Appendix N of the Final EIR.

6.1.2 CONSISTENT HYDROLOGIC MODELING ASSUMPTIONS

Two potential policy changes that could affect future conditions were identified in comments received for the WFP Draft EIR and were thoroughly reviewed before determining whether they should be included in the supplemental cumulative impacts analysis. They are:

- revised minimum instream flows for the Trinity River; and
- CVPIA section 3406 (b)(2) actions both upstream and in the Delta.

The Trinity River Flow Evaluation, Final Report, released by the USFWS in July, 1999 recommended a variable release pattern of 369,000 AFA to 815,000 AFA. However, the flow pattern of 390,000 AFA to 750,000 AFA, at this point, remains the operative future flow pattern of USBR for the Trinity River as recently confirmed in its Supplemental Programmatic Environmental Impact Statement for the CVPIA (released in June 1999) and in the Programmatic Environmental Impact Statement/Environmental Impact Report for CALFED's Bay-Delta Program (released in June 1999). The supplemental cumulative analysis, therefore, retains the variable 390,000 AFA to 750,000 AFA future flow pattern for the Trinity River consistent with that used in the WFP Draft EIR.

The final decision on the future minimum instream flows for the Trinity River ultimately rests with the Department of the Interior. Accordingly, the use of the 390,000 AFA to 750,000 AFA minimum instream flow for the Trinity River in this Final EIR should not imply that the Water Forum takes a position on this issue; rather, it denotes that a reasonably foreseeable flow standard was applied based on the above documents.

Comments on the WFP Draft EIR also suggest that future conditions may change as a result of recent federal court decisions. The United States District Court issued a preliminary injunction in San Luis & Delta Mendota Water Authority v. United States of America E.D.Cal. (March 19, 1999) CV-F-97-6140, CV-F-98-5261, blocking implementation of the *Department of Interior's Final Administrative Proposal for the Management of Section 3406 (b)(2) Water*, on the basis that the accounting procedures used by USBR in calculating the dedicated 800,000 AFA of CVP yield for section 3406 (b)(2) purposes were inadequate. The court decision does not directly address the appropriateness of either upstream or Delta actions, but rather the manner with which the dedicated 800,000 AFA of CVP yield is accounted. While the decision requires USBR to re-calculate the allocation of CVP yield, it is reasonable to assume both upstream and downstream actions identified in section 3406 (b)(2) in the future. USBR has directed on numerous occasions the inclusion of section 3406 (b)(2) Delta actions in future cumulative condition modeling and it is the best available information that USBR still voluntarily attempts to

meet the requirements of the Delta actions. The supplemental cumulative impacts analysis, therefore, retains both the section 3406 (b)(2) upstream and Delta actions, consistent with that used in the WFP Draft EIR.

6.1.3 SCOPE OF SUPPLEMENTAL CUMULATIVE ANALYSIS

The supplemental cumulative analysis involved modeling of the alternative cumulative conditions in the year 2030. Accordingly, the cumulative condition model run (i.e., 2030 with WFP) was refined based on updated information (see Section 6.1.2, Alternative Cumulative Conditions). The supplemental analysis involved a comparison of the alternative cumulative conditions model run and the existing Base Condition from the WFP Draft EIR. The Base Condition did not change. The thresholds of significance used for the supplemental cumulative analysis are the same as those used for the cumulative impacts analysis in the WFP Draft EIR. Also, mitigation measures addressed in the cumulative impacts analysis in the WFP Draft EIR are fully applicable to impacts identified in this supplemental analysis.

It is important to note that the Water Forum Final EIR does not serve as the environmental document for the noted future conditions. The possible impacts associated with each of these actions would be evaluated in project-specific environmental documentation and, where appropriate, alternatives and mitigation measures recommended to reduce significant effects would be identified. Also, as mentioned previously, the supplemental cumulative impacts analysis does not replace the original cumulative analysis in the WFP Draft EIR; rather, it illustrates the potential cumulative impacts under another set of reasonable probable future conditions.

6.1.4 SUPPLEMENTAL CUMULATIVE ANALYSIS OF RESOURCES

The analysis presented in this supplemental cumulative evaluation is based on the best available up-to-date information and a reasonable set of assumptions as to how the system would be operated under these alternative cumulative conditions. Similar to the original cumulative impacts analysis in the WFP Draft EIR, it assumes that no additional water supply would be developed. The impacts to all resources identified in this supplemental cumulative analysis either do not differ at all or do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.2 CUMULATIVE GROUNDWATER IMPACTS

This section provides a discussion of the cumulative impacts to groundwater resources that could occur in the future under an alternative future cumulative scenario. It is assumed under this supplemental cumulative impacts analysis that the WFP would be in place as well as other reasonably foreseeable future actions. Because groundwater pumping within Sacramento County does not change between the two comparative future conditions, the impacts identified in this supplemental analysis do not differ at all from the impacts identified in the cumulative impact analysis in the WFP Draft EIR. In the future, it is expected that groundwater use would continue throughout Sacramento County as defined for the Sacramento North, South Sacramento, and Galt Areas. While groundwater levels are expected to continue to decline, ultimate stabilization of the water table is projected under the sustainable yield recommendations of the WFP. Groundwater management throughout Sacramento County would be facilitated through maintaining basin-specific sustainable yields and through implementation of conjunctive use programs or similar efforts designed to maximize the efficient use of available surface water and groundwater supplies.

While the alternative future cumulative scenario, as modeled through PROSIM, could result in changes to groundwater accretions and depletions, no changes were made to this PROSIM parameter in the supplemental analysis. The accretions and depletions input parameters used in the cumulative impacts analysis in the WFP Draft EIR were maintained for the supplemental analysis because any changes under this alternative condition would be immeasurable, relative to the cumulative impacts evaluation in the WFP Draft EIR. The impacts to groundwater resources identified in this supplemental analysis do not differ at all from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.2-1**

Groundwater Quality. *Because groundwater pumping within Sacramento County does not change between the two comparative future conditions, the impacts to groundwater quality identified under this alternative future cumulative condition, would represent* ***a less-than-significant impact.*** *The impacts to groundwater quality identified in this supplemental analysis do not differ at all from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Lowering of groundwater levels in the South Sacramento and Galt areas is associated with the up-rising of poorer quality water from the lower aquifer zone which then mixes with the water of the shallow aquifer zone. For the Sacramento North Area, no direct relationship between groundwater level decline and groundwater quality was observed from the available data. Thus, additional water level declines are not likely to significantly affect regional groundwater quality in the Sacramento North Area. In the South Sacramento and Galt areas, both manganese and arsenic have recently shown significant increases in average concentrations corresponding to a decline of 80 feet or more from pre-development conditions. It is anticipated that elevated levels of manganese and iron may occur in groundwater but at levels that would constitute an aesthetic, rather than health-related effect. Arsenic levels are not expected to exceed current Title 22 standards. No standards for radon have yet been established. The impacts to groundwater quality identified in this supplemental analysis do not differ at all from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.2-2**

Movement of Groundwater Contaminants. *Under this alternative future cumulative condition, movement of groundwater contaminants would not increase beyond that described for the WFP. This would be a* ***less-than-significant cumulative effect****. The impacts to groundwater quality identified in this supplemental analysis do not differ at all from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

IGSM results showed that the rate of groundwater movement at each of the groundwater contamination sites increases with the additional groundwater level declines for the sites in the South Sacramento Area. The highest groundwater migration rate with the implementation of the recommended sustainable yields under the WFP, 662 feet/yr, is projected to occur at the Army Depot site located in the South Sacramento Area. This, however, would represent an increase in the rate of migration resulting from the WFP of 86 feet/yr. This increase in migration rate would not be instantaneous and would occur after groundwater levels have declined and stabilized. As such, the increase in migration rate that may occur each year over 20 to 30 years would be less than 5 feet/year for the Union Pacific site. As a result, no substantial increase in the rate of groundwater contaminant movement is expected, relative to the Base Condition. The impacts to groundwater contaminants identified in this supplemental analysis do not differ at all from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.2-3** ***Land Subsidence.*** *Under this alternative future cumulative condition, land subsidence would not occur beyond that described for the WFP. This would be a* ***less-than-significant impact.*** *The impacts to land subsidence identified in this supplemental analysis do not differ at all from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Throughout Sacramento County, the hydrogeologic substrata is not conducive to significant land subsidence. This has been supported by historic data relating observed land subsidence to past groundwater declines. While the WFP is anticipated to result in estimated land subsidence of generally less than one-half foot, the cumulative effect of all withdrawals from the existing groundwater aquifer on projected land subsidence will not differ measurably, relative to the Base Condition. Overall, the small magnitude of estimated land subsidence coupled with the fact that such estimates are projected over several decades, supports the conclusion that as a potential cumulative impact, land subsidence would be less than significant. The impacts to land subsidence identified in this supplemental analysis do not differ at all from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.2-4** ***Efficiency of Wells.*** *Under this alternative future cumulative condition, efficiency of wells would not change beyond that described for the WFP. This would be a* ***less-than-significant impact****. The impacts to well efficiency identified in this supplemental analysis do not differ at all from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Under this alternative future cumulative condition, anticipated lowering of groundwater levels, relative to the Base Condition, may result in reduced efficiency of existing groundwater wells. Groundwater levels are anticipated to continue to decline and ultimately stabilize under the sustainable yield recommendations of the WFP. This would include the need to: 1) deepen many existing wells, and 2) increase pumping at the deepened wells. Recognized as an economic rather than environmental impact, where the economic effects would exist as increased costs to well users, well efficiency from a cumulative environmental perspective would be a less-than-significant impact. The impacts to well efficiency identified in this supplemental analysis do not differ at all from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.3 CUMULATIVE WATER SUPPLY IMPACTS

The supplemental cumulative analysis is based on a set of alternative cumulative future conditions throughout the CVP/SWP, as described in Section 6.1.2, Alternative Cumulative Conditions. As an alternative future cumulative scenario, the supplemental analysis still includes implementation of the WFP and other reasonably foreseeable future actions. The analysis does not assume any development of additional Sacramento River supplies because no specific proposals are available. Under this set of alternative conditions, the analysis indicates that annual deliveries to CVP and SWP customers could be reduced in the future, relative to current conditions. Annual delivery shortfalls could be more frequent in the future as a result of the increase in competing demands on the system (i.e., consumptive uses and increasing environmental instream requirements). Accurate predictions at this time are not feasible, owing to the uncertainty of future operations. Current commitments, however, made by USBR and various public trust resource agencies in reconsidering and re-assessing the coordinated operations of the CVP as well as its implications on current and future ESA requirements, will dictate how the system will be ultimately allocated for future competing resource uses. The impacts to water supply identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

SWP contract demands associated with future 2030 development will be higher than current demands by approximately 600,000 AF on an average annual basis. Consequently, one would expect to see, on average, greater SWP deliveries under alternative cumulative conditions than the Base Condition. Future level cumulative condition hydrologic modeling conducted under the supplemental analysis indicates that reductions of SWP diversions are likely to occur in the driest years.

CVP contract demands associated with future development will also be higher than current demands, with average annual CVP delivery also higher, relative to today's condition. However, due to the increased overall demands on the system, it is likely that lower deliveries to all categories of CVP contractors could occur in the future, and be most significant in the dry and driest years. This would be particularly pronounced on agricultural contractors who, in the future, and depending on USBR's ultimate decision regarding their deficiency criterion, may experience significant shortfalls in deliveries, relative to current conditions.

Impact **6.3-1**

Decrease in Deliveries to SWP Customers. *Implementation of this future cumulative condition could result in increased deliveries to SWP customers of ranging between 20,000 and 1,245,000 acre-feet in 48 years; and, decreased water deliveries to SWP customers in 21 years of the 70-year record, ranging between 45,000 and 1,210,000 acre-feet. Average annual SWP deliveries would increase by about 375,000 acre-feet. The delivery reduction in 21 years would represent a* ***significant impact.*** *The impacts to water supply identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

SWP customers receive deliveries from the Feather River and the Delta. The Feather River service area customers received full deliveries (no deficiencies) in all years under the future cumulative and Base Condition simulations. Therefore, there are no impacts to SWP customers in this service area.

SWP customers dependent on water supplies from the Delta would, however, be subject to delivery reductions resulting from CVP/SWP operations under this alternative future cumulative condition. Although the PROSIM modeling does not substitute deliveries to WFP purveyors from the SWP, the change in surplus Delta inflow caused by future cumulative conditions would result in water availability differences to SWP contractors. Deliveries to SWP contractors are not distinguished by contract type in PROSIM, therefore, impacts reported are aggregate reductions in deliveries. Modeling results for the supplemental cumulative impacts analysis suggest that deliveries to the SWP will be significantly reduced during 21 years in the future when compared on a year to year basis with the Base Condition. This comparison, however, masks the fact that the SWP's increased delivery in one year can directly affect the SWP's ability to meet its demands in a succeeding year. Overall (annual average of 69-year record) the SWP would deliver about 375,000 acre-feet more water under this future cumulative condition when compared with the Base Condition. The significance criteria which identifies any yearly decrease as an impact does, nevertheless, identify a significant impact to SWP water users. The impacts to water supply identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.3-2**

Decrease in Deliveries to CVP Customers. *Implementation of this future cumulative condition could result in CVP water delivery increases ranging up to 610,000 acre-feet in 40 years of the 70-year record; and, decreases between 25,000 and 525,000 acre-feet in 29 years of the 70-year record. Average annual CVP deliveries would increase by about 35,000 acre-feet. The delivery reduction in 29 years would represent a* ***significant impact****. The impacts to water supply identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Discussions of the effects of this alternative future cumulative condition on CVP deliveries focuses only on the overall delivery changes to the CVP as a whole. The inability of USBR to meet all of its obligations in this future cumulative condition, evidenced by an annual Sacramento River water supply deficit of about 55,000 acre-feet during the critical dry period, obscures identification of impacts to individual contractors. It is only appropriate to disclose that there would be less water delivered to CVP contractors, compared to the Base Condition, in 42% of the years despite the fact that CVP demands would increase in the future. In the 58% of years that deliveries increase, the change is largely caused by the growth in water demands. Reductions in deliveries would be a significant impact. The impacts to water supply identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.4 CUMULATIVE WATER QUALITY IMPACTS

Under an alternative future cumulative condition, which includes the WFP and other reasonably foreseeable future system-wide actions (e.g., 2030 out-of-basin CVP/SWP demands, increased Sacramento Valley demands, and increased Trinity River flows), changes in water quality could occur in waterbodies of both the direct and indirect effect study areas. Seasonal impacts to water quality could occur as a result of increased surface water diversions and modified CVP operations that would result in lower reservoir storage and river flows. Lower volumes of water in both Folsom Reservoir and the Lower American and Sacramento rivers would provide less dilution for future levels of nutrient, pathogen, TDS, TOC, and priority pollutant loadings, which are anticipated to increase relative to existing levels due to planned urban growth within the region. Reduced Delta inflows could affect various water quality parameters within portions of the Delta.

A review of specific hydrologic modeling output (lower Sacramento River flows at Freeport) from the supplemental cumulative impacts analysis confirms that hydrologically, the change in river flows, relative to the Base Condition, would be minimal (generally less than a 3% reduction in 70-year average monthly flows). The impacts to water quality identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

This section provides a discussion of the potential water quality impacts that could occur in Folsom Reservoir, Lake Natoma, the Lower American River, the Sacramento River and the Delta under an alternative future cumulative condition, relative to existing conditions.

Impact **6.4-1**

Lower American River and Folsom Reservoir Water Quality. *Under this alternative future cumulative condition, which includes the WFP and other reasonably foreseeable future system-wide actions (e.g., 2030 out-of-basin CVP/SWP demands, increased Sacramento Valley demands, and increased Trinity River flows), Folsom Reservoir storage and Lower American River flows would be reduced more frequently and/or by greater magnitudes compared to that which would occur due to the WFP alone. Constituent loading to these waterbodies also would be expected to increase somewhat in the future, relative to existing conditions, but such increases will be minimized by project-level urban runoff and stormwater discharge mitigation measures that will be required for planned growth to occur. With the exception of water temperature (see Section 6.5.3), program-level assessment indicated that any impacts to water quality from reduced dilution and increased constituent loading would be minor, and would not be expected to cause State or federal water quality standards, objectives or criteria to be more frequently exceeded, relative to existing conditions. This would be a* ***less-than-significant cumulative impact.*** *The impacts to Lower American River and Folsom Reservoir water quality identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

The primary water quality parameter anticipated to be affected in Folsom Reservoir, Lake Natoma, and the Lower American River under this alternative future cumulative condition is water temperature. For a detailed discussion of cumulative temperature-related impacts in these waterbodies under this alternative future condition, see Section 6.5, Fisheries Resources and Aquatic Habitat.

Levels or concentrations for other water quality parameters of interest such as nutrients, pathogens, TDS, TOC, turbidity, and priority pollutants (e.g., metals, organics) would not be expected to be altered substantially, if at all, by reductions in Folsom Reservoir storage or Lower American River flows (i.e., dilution capacity), relative to existing conditions. The changes in reservoir storage and river flows under this alternative future cumulative condition would not differ substantially from that due to the additional diversions under the WFP alone. This alternative future cumulative condition would have little effect on seasonal volumes of water maintained in Lake Natoma.

Additional loading of constituents could potentially degrade water quality. Future increases in constituent loading will be minimized by project-level urban runoff and stormwater discharge mitigation measures that will be required for planned growth to occur. In addition, these waterbodies do not directly receive municipal wastewater discharges; hence, loading from this source would not change in the future. Hence, this alternative

future cumulative condition would not be expected to regularly cause substantial degradation of existing water quality in these waterbodies, nor would it be expected to cause State or federal water quality standards, objectives or criteria to be more frequently exceeded, relative to existing conditions.

Impact **6.4-2**

Sacramento River Water Quality. *Under this alternative future cumulative condition, which includes the WFP and other reasonably foreseeable future system-wide actions (e.g., 2030 out-of-basin CVP/SWP demands, increased Sacramento Valley demands, and increased Trinity River flows), Sacramento River flows would be reduced more frequently and/or by greater magnitudes compared to that which would occur due to the additional diversions under the WFP alone. Constituent loading to the Sacramento River also would be expected to increase in the future, relative to existing condition. Future project-level water quality mitigation that will be implemented as urban growth occurs (i.e., mitigation measures to minimize additional loading from urban runoff and stormwater and effluent discharges) and ongoing water quality management plans and programs are expected to prevent State and federal water quality standards, objectives and criteria from being exceeded on a more frequent basis than currently occurs. However, substantial uncertainty exists with regard to seasonal changes in Sacramento River flow, constituent loading, and the extent and effectiveness of project-level water quality mitigation and management measures in the future, all of which are beyond the Water Forum's control. Because the potential for degradation of water quality in the future depends on uncertain future policy decisions and actions, this would be a* ***potentially significant impact.*** *The impacts to Sacramento River water quality identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Seasonal reductions in Sacramento River flows are anticipated to occur as a result of the additional surface water diversions under the WFP along with other reasonably foreseeable future system-wide actions (e.g., 2030 out-of-basin CVP/SWP demands, increased Sacramento Valley demands, and increased Trinity River flows). Such flow reductions, relative to existing conditions, could cause additional warming in various reaches of the Sacramento River, relative to higher flow conditions, when ambient air temperatures are high (i.e., during the summer and fall months). Conversely, measurable temperature changes would generally not be expected to occur in the Delta. For a detailed discussion of cumulative temperature-related impacts in the Sacramento River under this alternative future condition, see Section 6.5.3, Fisheries Resources and Aquatic Habitat.

The flow reductions expected to occur in the Sacramento River under this alternative future cumulative condition would reduce the dilution capacity of the river which, in turn, could result in elevated levels of certain constituents such as nutrients, pathogens, TDS, TOC, turbidity, and priority pollutants (e.g., metals, organics). However, river flow reductions of sufficient magnitude to cause measurable increases in various water quality constituents for a given rate of loading would be expected to occur infrequently. Higher rates of effluent discharge, urban runoff, and urban stormwater discharges to the Sacramento River would be expected to result from the planned development in the future that would be facilitated, in part, by the increased water supply made available by the WFP. However, increases in constituent loading are anticipated to be minimized by project-level urban runoff and stormwater and effluent discharge mitigation measures that will be required for planned growth to occur. Moreover, a number of regional plans and programs to address large-scale cumulative water quality impacts are in place or have recently been completed. Such plans/programs include, but are not limited to, the following:

- CALFED
- Sacramento River Coordinated Monitoring Program
- Sacramento River Watershed Program
- Sacramento County Stormwater Management Plan
- Triennial Review and Update of the Central Valley RWQCB Basin Plan
- NPDES Permitting Program
- CVRWQCB Ambient Monitoring Studies
- CVRWQCB Sacramento River Watershed Management Initiative
- Interagency Ecological Program Monitoring
- U.S. EPA Regional Environmental Monitoring and Assessment Program
- USGS Sacramento River Trace Metals Transport Studies
- USGS Sacramento River Basin National Water Quality Assessment Program
- SCRSD and EPA's Sacramento River Mercury Control Planning Project
- SWRCB Toxic Substances Monitoring Program
- USBR Upper Sacramento River Water Quality Monitoring Program
- DWR Municipal Water Quality Investigations Monitoring Program
- Cal EPA Department of Pesticide Regulation's Rice Pesticides Program
- 1995 Bay/Delta Water Quality Control Plan
- San Francisco Estuary Institute's Regional Monitoring Program for Trace Substances
- miscellaneous other watershed management plans and monitoring programs

Future actions implemented under the plans and programs identified above are anticipated to prevent significant cumulative impacts to Sacramento River and Delta water quality. However, substantial uncertainty exists with regard to seasonal changes in future Sacramento River flow and constituent loading, the extent and effectiveness of ongoing and future water quality management plans/programs and their actions, and the effectiveness of future project-level water quality mitigation measures associated with planned growth. Because of this extensive uncertainty, a definitive cumulative water quality impact determination cannot be made for the Sacramento River or Delta, based on available information. Although the actions anticipated to result from the numerous water quality monitoring and management plans/programs, coupled with project-specific mitigation measures that will be implemented as growth occurs, are anticipated to keep Sacramento River and Delta water quality changes to a minimum, the potential for water quality degradation in these waterbodies does exist. The realization of such impacts thus depends on uncertain future policy decisions and actions beyond the Water Forum's control. The impacts to Sacramento River water quality identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.5 CUMULATIVE FISHERIES RESOURCES AND AQUATIC HABITAT IMPACTS

This supplemental cumulative impacts analysis is based on a set of alternative future cumulative conditions throughout the CVP/SWP, as described in Section 6.1.2, Alternative Cumulative Conditions. As an alternative future cumulative scenario, the supplemental analysis still includes implementation of the WFP and other future, system-wide diversion projects. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Regarding the use of modeling output, it should be noted that the comparisons made under each numbered impact in this section are comparisons between the supplemental future cumulative condition (also referred to as the "2030 w/WFP" within this section) and existing conditions (also referred to as the "Base Condition"). For the purposes of this assessment, USBR's proposed temperature control device (TCD) for the urban water intake at Folsom Dam was included in the "2030 w/WFP" simulation, but not in the Base Condition simulation. This was done because the TCD is a reasonably foreseeable action that is expected to be in-place before Water Forum diversions increase to the levels modeled under the 2030 w/WFP, and because it does not physically exist today (i.e., is not a part of the Base Condition) or at the time of issuance of the NOP. All modeling output supporting the analysis contained in this section are provided in Appendix N.

FOLSOM RESERVOIR

COLDWATER FISHERY

Impact **6.5-1**

Impacts to Folsom Reservoir's Coldwater Fisheries. *This supplemental cumulative analysis is based on a set of assumptions about future cumulative conditions and does not assume any development of additional Sacramento River water supplies. Under this set of assumptions, the analysis indicates that Folsom Reservoir storage would be reduced by 10% or more, relative to the Base Condition, occasionally during some months of the April through November period. However, anticipated reductions in reservoir storage would not be expected to adversely affect the reservoir's coldwater fisheries because: 1) coldwater habitat would remain available within the reservoir during all months of all years; 2) physical habitat availability is not believed to be among the primary factors limiting coldwater fish populations; and 3) anticipated seasonal reductions in storage would not be expected to adversely affect the primary prey species utilized by coldwater fishes. This would be a* ***less-than-significant future cumulative impact.*** *The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Additional diversions from Folsom Reservoir under the 2030 w/WFP would result in seasonal changes in end-of-month storage during most years. Seasonal changes in storage could result in corresponding changes in physical habitat availability for the reservoir's coldwater fish species. Lower reservoir storage could reduce, to some degree, the amount of space available for coldwater species to use during the April through November period, when strong thermal stratification occurs within the reservoir. Conversely, higher storage could increase the availability of coldwater fish habitat in the reservoir.

During the April through November period of the year, under 2030 w/WFP, reductions in the 70-year average end-of-month storage would range from approximately 4 to 7%, relative to mean monthly storage levels under the Base Condition (Appendix N). Reductions in reservoir storage of 10% or more during individual years, relative to the Base Condition, would occur occasionally during the period April through June and frequently during the period July through November (Appendix N). However, storage reductions of the magnitudes anticipated from limited water availability and increased demands by 2030 would not result in significant

adverse effects to coldwater fisheries because the availability of physical habitat is not a primary limiting factor for these fishes. Food availability is a key factor affecting coldwater fish populations in the reservoir. However, the seasonal changes in reservoir storage expected to occur under the 2030 w/WFP would not be expected to have substantial, if any, effects on the population dynamics of threadfin shad or wakasagi, which are the primary prey species for the reservoir's coldwater fish populations. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

WARMWATER FISHERY

Impact **6.5-2**

Impacts to Folsom Reservoir's Warmwater Fisheries. *Under the set of assumptions used for this supplemental cumulative analysis, Folsom Reservoir storage (and thus water levels) could frequently be reduced during the critical warmwater fish spawning and rearing period (i.e., March through September), which could reduce the availability of littoral (nearshore) habitat containing vegetation. Modeling output indicates that long-term average reductions in littoral habitat availability of up to approximately 50% could occur in September. Reductions in littoral habitat availability of this magnitude could result in increased predation on young-of-the-year warmwater fishes, thereby reducing long-term initial year-class strength of warmwater fishes. Unless willows and other nearshore vegetation become established at lower reservoir elevations in the future in response to seasonal reductions in water levels, long-term year class production of warmwater fishes would be reduced. Reduced littoral habitat availability would be a* ***potentially significant future cumulative impact*** *to Folsom Reservoir warmwater fisheries. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Changes in the Seasonal Availability of Littoral Habitat

Additional diversions from Folsom Reservoir under the 2030 w/WFP would result in seasonal changes in end-of-month water surface elevation during most years, with the 70-year average monthly elevation being reduced, relative to that under the Base Condition, from approximately 2 to 3 feet during the March through September warmwater fish spawning and rearing period (Appendix N).

Changes in water surface elevation during the March through September period would result in corresponding changes in the availability of reservoir littoral habitat containing inundated terrestrial vegetation (e.g., willows). The 70-year average amount of littoral habitat potentially available to warmwater fishes for spawning and/or rearing in Folsom Reservoir would decrease during all months of the March through September period. Seventy-year average reductions in the availability of littoral habitat were estimated to range from approximately 5 to 50% during the March through September period (Appendix N). The average loss of approximately one-half of the reservoir's available littoral habitat containing vegetative structure during this period would be expected to reduce long-term year-class strength of warmwater fishes through resultant increases in predation losses of young-of-the-year fishes.

Changes in the Monthly Rates of Water Surface Elevation Fluctuation

Changes in Folsom Reservoir operations under the 2030 w/WFP would generally alter the rates at which reservoir surface elevations change during each month of the primary warmwater fish spawning period of the year (i.e., March through July). However, under the 2030 w/WFP, the potential for nest dewatering would change little, if at all, during all months of the March through July warmwater fish spawning period. (Appendix N). Changes in the potential for significant nest dewatering events to occur during the March through July period would not be expected to have substantial adverse effects on annual year-classes of warmwater fishes in Folsom Reservoir. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

LAKE NATOMA

Impact **6.5-3**

Impacts to The Warmwater and Coldwater Fisheries of Lake Natoma. *Under the specific set of cumulative assumptions, this supplemental analysis indicates that operations of Folsom Dam and Reservoir would have minimal, if any, impact to Lake Natoma's seasonal storage, rates of elevation fluctuation, or temperature. Any changes to these lake parameters that could occur under the future cumulative condition would not adversely affect the lake's warmwater or coldwater fisheries. This would be a less-than-significant future cumulative impact. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Because Lake Natoma serves as a regulating afterbay of Folsom Reservoir, it commonly experiences daily/weekly fluctuations in water surface elevations of approximately 4 to 7 feet. Hydrologic changes associated with the 2030 w/ WFP would not cause substantial changes in seasonal lake storage or water surface elevation fluctuations. Therefore, changes in use of surface and groundwater defined in the WFP would not directly affect the fisheries resources of Lake Natoma.

The 69-year average temperature of water released from Nimbus Dam under the 2030 w/WFP would be essentially equivalent to that under the Base Condition from December through May, but would be reduced up to about 1°F during the June through November period (Appendix N). These findings suggest that long-term average conditions in Lake Natoma could be somewhat improved for coldwater fishes during the June through November period, with temperatures being affected little during the remainder of the year. Spatial and temporal changes in water temperatures within Lake Natoma would not be expected to be sufficiently large to adversely affect the lake's warmwater fisheries. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

NIMBUS FISH HATCHERY

Impact **6.5-4**

Temperature Impacts to Nimbus Fish Hatchery Operations and Fish Production. *Under the specific set of cumulative assumptions, this supplemental analysis indicates that operations of Folsom Dam and Reservoir would generally have little effect on May temperatures below Nimbus Dam, but would generally result in equivalent or colder temperatures during the June through September period, relative to the Base Condition. On a long-term basis, the frequent and measurable temperature reductions that would occur during the June through September period (when hatchery temperatures reach seasonal highs annually) would more than offset the infrequent adverse impacts resulting from increased temperature. This would potentially benefit long-term hatchery operations and resultant fish production. Overall, this would be a* ***less-than-significant future cumulative impact.*** *The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Under the 2030 w/WFP, changes in the 69-year average water temperature at Nimbus Dam during the May through September period would range from less than measurable to reductions of about 1°F (Appendix N). Based on probability of exceedance, measurable temperature increases could occur about 17% to 25% of the time during some months of this period. However, measurable temperature decreases would occur at Nimbus Dam approximately 50% to 70% of the time during June through September under the 2030 w/WFP (Appendix N). On a long-term basis, temperature decreases under the 2030 w/WFP more than offset the infrequent temperature increases.

LOWER AMERICAN RIVER

Flow- and temperature-related impacts are discussed separately below by species and lifestage. Organizationally, flow- and temperature-related impacts to fall-run chinook salmon are discussed first (Impact 6.5-5), followed by impact discussions for steelhead (Impact 6.5-6), splittail (Impact 6.5-7), American shad (Impact 6.5-8), and finally striped bass (Impact 6.5-9). Flow- and temperature-related impacts to fall-run chinook salmon and steelhead are discussed together. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.5-5**

Fall-run Chinook Salmon. *The supplemental cumulative impacts analysis is based on a set of assumptions about future cumulative conditions and does not assume any development of additional Sacramento River water supplies. Under this set of assumptions, operations of Folsom Dam and Reservoir would result in periods of reduced flows in the lower American River during the October through December spawning period, when flows under the Base Condition would be 2,500 cfs or less. Further flow reductions occurring at already low flow levels could result in increased redd superimposition and eventual lower year-class strength. Improved water temperatures (resulting from a Folsom Dam urban water intake structure and optimal coldwater pool management) and improved early lifestage survival will benefit chinook salmon spawning success, as well as other lifestages. However, because of the broad, programmatic nature of the WFP, the extent to which these actions (combined with other future actions such as spawning gravel management, revised flow ramping rate criteria, etc.) will interact to*

counterbalance flow reductions is uncertain, as is the manner in which these actions will be implemented, managed and coordinated without a comprehensive Habitat Management Program Plan for the Lower American River. Consequently, the overall effect of 2030 w/ WFP on chinook salmon year-class strength also is uncertain and, therefore, is considered to represent a ***potentially significant impact.*** *The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Impact **6.5-6**

Lower American River Steelhead*. Under the supplemental cumulative analysis set of assumptions, flow reductions anticipated to occur during the April through September period would reduce the amount of juvenile rearing habitat in many years. The analysis also indicates that the 69-year average temperature at Nimbus Dam and Watt Avenue for the June through September period would decrease up to about 1 °F. Although measurable temperature increases could occur in up to 30% of the years during this period, measurable temperature decreases could occur approximately 45% to 70% of the time during the June through September period. Because steelhead in the Lower American River are believed to be more limited by summer rearing temperatures than flows, the frequent and substantial temperature reductions would be expected to offset the flow reductions. Consequently, the combined temperature and flow changes under the 2030 w/ WFP would not be expected to adversely affect the long-term population trends of steelhead in the Lower American River. This would be a* ***less-than-significant future cumulative impact.*** *The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Flow-Related Impacts to Fall-Run Chinook Salmon and Steelhead Adult Immigration (September through March)

Flow-related impacts to chinook salmon adult immigration would primarily be dictated by the volume of flow at the mouth during the September through December period of the year, and for steelhead during the December through March period of the year. Under the 2030 w/WFP, the 70-year average flow at the mouth would decrease during all months of the September through March period (Appendix N). Although the 70-year average flow at the mouth during these months would be reduced under the 2030 w/WFP, relative to flows under the Base Condition, the 70-year average Sacramento River flow at Freeport also would be reduced during this period (Appendix N). Under the 2030 w/WFP, the greatest reduction in the 70-year average proportion of Sacramento River flow immediately downstream of the mouth that would be composed of American River water during the September through March period (the combined primary period of upstream adult immigration for chinook salmon and steelhead) would be less than 5%. Hence, although mean monthly Lower American River flows at the mouth under the 2030 w/WFP would decrease during each month of this period, relative to the Base Condition, these reductions would not be expected to adversely affect the long-term homing ability of immigrating adult fall-run chinook salmon or steelhead.

Temperature-Related Impacts to Fall-Run Chinook Salmon and Steelhead Adult Immigration (September through March)

The 69-year average water temperatures at the mouth of the Lower American River and at Freeport on the Sacramento River, under the 2030 w/WFP, would be equivalent to or colder than those under the Base Condition during all months of the September through March period, with measurable decreases in the 69-year average temperature potentially occurring during some months (Appendix N).

Although USBR's Lower American River Temperature Model does not account for the influence of Sacramento River water intrusion on water temperatures at the mouth, this bias would be similar among alternatives. Therefore, the remaining temperature assessments are based on temperatures modeled at the mouth of the Lower American River.

During the December through March period, water temperatures at the confluence under the 2030 w/WFP would typically remain sufficiently cool (see Appendix N) to not impact fall-run chinook salmon or steelhead immigration. In addition, based on probability of exceedance, temperatures under the 2030 w/WFP during these months are generally equivalent to or colder than temperatures under the Base Condition (Appendix N).

Based on probability of exceedance, temperatures at the mouth during the September through November period under 2030 w/ WFP would increase measurably, compared to the Base Condition, up to about 20% of the time, but would decrease approximately 33% to 42% of the time (Appendix N). Thus, September through March water temperatures in the lower portion of the Lower American River under the 2030 w/WFP would be expected to have long-term beneficial effects on fall-run chinook salmon adult immigration, and would have no adverse effect on steelhead adult immigration.

Flow- and Temperature-Related Impacts to Fall-run Chinook Salmon Spawning and Incubation (October through February)

Flow-Related Impacts

The 70-year average flow below Nimbus Dam under the 2030 w/WFP would be reduced by approximately 4 to 5% during each month of the October through February period, relative to flows under the Base Condition (Appendix N). The additional diversions that would occur between Nimbus Dam and Watt Avenue under the WFP range from approximately 10 cfs to 30 cfs, depending on the month of the year. Hence, changes in long-term average flows under the 2030 w/WFP for each month of the October through February period are essentially the same at Watt Avenue as those reported above for Nimbus Dam.

Substantial flow reductions could occur frequently at Nimbus Dam under 2030 w/ WFP, relative to the Base Condition, during the October through February period. When flows under the Base Condition are at or below 2,500 cfs, which is the wet year flow objective in the AFRP for this period, flows would be substantially reduced approximately 20 to 30% of the time. Findings are essentially the same at Watt Avenue (Appendix N). Thus, during the October through December portion of this period (when the majority of fall-run chinook salmon spawning occurs annually), 2030 w/WFP could relatively frequently reduce flows, and the initial year-class size of lower American River fall-run chinook salmon could potentially be reduced (due to increased redd superimposition) during some of the years when lower spawning flows are provided.

Temperature-Related Impacts

Under the 2030 w/WFP, changes in the 69-year average water temperature at Nimbus Dam and Watt Avenue during the October through February period would range from less than measurable to a reduction of about 1°F (Appendix N). During October and November, temperatures at Nimbus Dam and Watt Avenue would increase measurably, compared to the Base Condition, up to about 10 to 15% of the time, based on the probability of exceedance (Appendix N). However, measurable temperature decreases would occur at Nimbus Dam and Watt Avenue approximately 50 to 60% of the time.

During the December through February portion of this period, temperatures throughout the Lower American River would remain sufficiently cool as to not impact fall-run chinook salmon spawning and incubation success. In addition, temperatures under 2030 w/ WFP during these months are generally equivalent to or colder than those under the Base Condition.

Finally, the 69-year average annual early lifestage survival (percent survival of emergent fry from egg potential) for fall-run chinook salmon would increase from approximately 84% under the Base Condition to approximately 86% under the 2030 w/WFP, an average increase of about 2% (Appendix N). Thus, temperatures in the river under the 2030 w/WFP during the October through February period would have beneficial effects on spawning and incubation of fall-run chinook salmon.

Flow- and Temperature-Related Impacts to Steelhead Spawning and Incubation (December through March)

No flow- or temperature-related impacts to steelhead spawning or incubation would be expected to occur under the future cumulative condition modeled. For quantitative flow data supporting this impact determination, see Appendix N , Sections 6 and 7. For the quantitative temperature data supporting this impact determination, see Appendix N, Sections 5 and 9.

Flow- and Temperature-Related Impacts to Fall-run Chinook Salmon and Steelhead Juvenile Rearing (March through June)

Flow-Related Impacts

Under the 2030 w/WFP, the 70-year average flow at Watt Avenue would be reduced about 7 to 11% in all months of the March through June period, relative to the Base Condition (Appendix N).

Under the 2030 w/ WFP, the probability of mean monthly flows exceeding 4,500 cfs would be reduced by about 7% during the March through June period, relative to the Base Condition. Under 2030 w/ WFP, flow reductions would occur frequently in some months and somewhat less frequently in others, based on probability of exceedance, when flows would be at or below 4,500 cfs under the Base Condition, which is the wet-year flow objective in the AFRP for this period. For this period, 2,000 cfs is the dry and critical flow objective in the AFRP. When flows under the Base Condition are 2,000 cfs or less, measurable flow reductions would occur about 10% of the time or less during March through May, but about 15 to 20% of the time during June. Over the long-term, flow reductions under 2030 w/ WFP wouldn't be expected to substantially alter the quantity or quality of rearing habitat, partly because the primary period of emigration occurs from mid-February through early March. However, flow reductions when flows are already at relatively low levels may adversely affect rearing success during those years.

Temperature-Related Impacts Assessment

Under the 2030 w/WFP, changes in the 69-year average water temperature at Watt Avenue during the March through June period would range from less than measurable to a reduction of about 0.4°F (Appendix N). During the March through June period, temperatures at Watt Avenue under 2030 w/ WFP would increase measurably, based on the probability exceedance, up to about 25 to 30% of the time (Appendix N) during May and June, with temperatures under 2030 w/ WFP remaining similar to or cooler than the Base Condition 70 to 75% of the time during these months. The majority of temperature increases would be 0.5 °F or less. Temperatures during March and April would remain at or below 65 °F in all years under the 2030 w/WFP. Because the primary period of emigration occurs from mid-February through early March, and because temperatures during March under 2030 w/ WFP would remain below 60°F, the majority of emigrants would not be affected by these occasional increases in temperature. In addition, the frequency and magnitude of temperature increases that would occur from April through June would not be expected to impact the long-term rearing success of juveniles that remain in the river during these months. Furthermore, 2030 w/ WFP would provide improved temperature conditions approximately 50% of the time during June, based on the probability of exceedance, which could benefit late-emigrating juveniles.

The temperature changes discussed above for the March through June period would affect juvenile emigration upstream of Watt Avenue in a manner similar to effects on rearing. Temperature-related impacts to fish emigrating through the lower river (i.e., downstream of Watt Avenue) are assessed based on temperatures at the mouth (see discussion below).

Flow-Related Impacts to Fall-Run Chinook Salmon and Steelhead Juvenile Emigration (February through June)

The primary period of fall-run chinook salmon juvenile emigration occurs from February through June, with the majority of juvenile steelhead emigration occurring during this same period. Generally little, if any, emigration occurs during July and August. Flow-related impacts to salmonid immigration (discussed above) addressed flow changes in February and March. The changes in flows under the 2030 w/WFP during February and March would not be sufficient to adversely affect juvenile fall-run chinook salmon or steelhead emigration. Hence, this discussion will focus primarily on the April through June period of the year.

Adequate flows for emigration from the portion of the river above Watt Avenue would be met by flows which were previously discussed under this impact section (see discussions regarding rearing). Bypass flows at the mouth are used to assess potential flow-related impacts to salmonid emigration through the lower river (i.e., below Watt Avenue).

Under the 2030 w/WFP, the 70-year average flow at the mouth would decrease by approximately 10% to 15% during all months of the April through June period. Flows at the confluence would be reduced much of the time during all months, with substantial reductions in flow at the confluence occurring often (Appendix N). Flows under the 2030 w/WFP would never be reduced to levels that would physically block emigration from the river, when such flow levels would not exist under the Base Condition.

Higher flows and turbidity have been shown to result in higher rates of downstream juvenile emigration. However, much of this information comes from findings associated with large pulse flows following significant precipitation events, not relatively small changes in flow on the order of 10 to 20%. Moreover, high flow and turbidity levels, although known to trigger emigration events, are not necessary for successful emigration of a

salmonid year-class from the river. Consequently, although substantial flow reductions would occur periodically under the 2030 w/WFP during the April through June period, relative to flows under the Base Condition, resultant flows would not be expected to adversely affect the long-term success of juvenile salmonid emigration.

Temperature-Related Impacts to Fall-Run Chinook Salmon and Steelhead Juvenile Emigration (February through June)

With the possible exception of a small percentage of fish that may rear near the mouth of the Lower American River, impacts of river temperatures at the mouth to fall-run chinook salmon and steelhead would be limited to the [up to] several days that it takes emigrants to pass through the lower portion of the river and into the Sacramento River in route to the Delta.

The 69-year average water temperatures expected to occur at the mouth during February and March have been discussed previously under impacts to adult salmonid immigration. Water temperatures at the mouth under the 2030 w/WFP would generally be similar to those under the Base Condition during February and March and would generally be cool enough as to not be of concern to juvenile emigration (Appendix N).

The 69-year average temperatures would not be expected to change measurably under the 2030 w/WFP, relative to the Base Condition during the period April through June (Appendix N). Based on the probability of exceedance, temperatures at the confluence during this period would increase measurably, compared to the Base Condition, up to about 30% of the time (Appendix N) , with temperatures under 2030 w/ WFP remaining similar to or cooler than the Base Condition the rest of the time. Based on the probability of exceedance, temperatures would be measurably cooler approximately 40% of the time in June. Overall, increases in water temperatures that would be expected to occur at the mouth in some years under the 2030 w/ WFP would not occur with sufficient frequency, or be of sufficient magnitude, to adversely affect long-term emigration success of fall-run chinook salmon or steelhead during April, May or June. The more frequent reductions in temperatures at the mouth during June would have beneficial effects on late-emigrating juvenile fall-run chinook salmon and steelhead.

Flow-Related Impacts to Steelhead Rearing (year-round)

During the July through September period, fall-run chinook salmon are not in the river. July through September is generally considered to be the critical summer rearing period for steelhead in the Lower American River.

During the July through September period (Appendix N), flows at Nimbus Dam and Watt Avenue, under the 2030 w/WFP, would typically be reduced in most years, with average reductions ranging from about 350 to 400 cfs, with more substantial reductions occurring in some years. Under 2030 w/ WFP, substantial flow reductions would occur frequently, when flows are at or below 2,500 cfs under the Base Condition, which is the wet year summer flow objective in the AFRP. Based on the probability of exceedance, flows at Nimbus Dam and Watt Avenue would be 2,500 cfs or lower under the Base Condition approximately 40 to 60% of the time, and 2,500 cfs or lower about 45 to 70% of the time under 2030 w/ WFP.

Temperature-Related Impacts to Steelhead Rearing (year-round)

Under the 2030 w/WFP, changes in the 69-year average water temperature at Nimbus Dam and Watt Avenue during spring and the critical summer rearing period would range from less than measurable to reductions of about 1°F. Based on the probability of exceedance, measurable temperature increases could occur about 15 to 30% of the time during some months of this period. Temperature increases would generally be less than 1 °F, and often less than 0.5 °F. However, based on the probability or exceedance, measurable temperature decreases would occur at Nimbus Dam and Watt Avenue from about 10% to 70% of the time during June through September under the 2030 w/WFP (Appendix N). The 69-year average temperatures for the months June through September would be measurably reduced under the 2030 w/WFP, relative to the Base Conditions. Temperature changes under the 2030 w/WFP would, on a long-term basis, have a beneficial effect on steelhead summer rearing in the Lower American River. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

SPLITTAIL

Impact **6.5-7**

Flow- and Temperature-Related Impacts to Splittail (February through May). *Under the supplemental cumulative analysis assumptions, the 2030 w/ WFP would typically reduce, to some degree, the amount of riparian vegetation inundated between RM 8 and 9 (which serves as an index for the lower portion of the river) relative to the Base Condition. However, with few exceptions, substantial amounts of inundated riparian vegetation would remain under the 2030 w/WFP in years when such habitat would occur under the Base Condition. In addition, flow changes under the 2030 w/WFP would have little effect on the availability of in-channel spawning habitat availability, or the amount of potential spawning habitat available from the mouth up to RM 5 – the reach of the river influenced by Sacramento River stage. The analysis also indicates that the frequency of suitable temperatures for splittail spawning below Watt Avenue would not change substantially under the 2030 w/WFP, relative to the Base Condition. Given the uncertainty as to the magnitude and extent of splittail spawning in the Lower American River, and the actual amount of potential spawning habitat at specific flow rates throughout the river, the effects of flow reductions from the February through May period also are uncertain and, therefore, represent a potentially significant impact. This would be a* ***potentially significant future cumulative impact****. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Under the 2030 w/WFP, the 70-year average flows at Watt Avenue would be reduced by about 4 to 8% during each month of the February through May period, relative to flows under the Base Condition.

Using flows at Watt Avenue, the acreage of riparian vegetation inundated between RM 8 and 9 was used as an index of the relative amount of inundated riparian vegetation that would occur in the lower portion of the river for a given flow rate. Under the 2030 w/ WFP, the amount of riparian habitat inundated in this portion of the river would remain unchanged in about 70% to 80% of the years, relative to the Base Condition. However, in most of these years, no riparian vegetation would be inundated under either the 2030 w/ WFP or the Base Condition.

With the exception of March, when the amount of inundated riparian habitat would increase about 1% more often, the amount of such habitat between RM 8 and 9 would be reduced to some degree under the 2030 w/ WFP in the years when riparian habitat would be inundated under the Base Condition. Reductions of more than 20% in the relative amount of inundated habitat between RM 8 and 9 would occur about 3 to 7% of the time during the February through May period under the 2030 w/ WFP, relative to that which would be inundated under the Base Condition. Based on the number of years when riparian habitat would be inundated under the Base Condition, these habitat reductions of 20% or more would occur from about 10% to about 20% of the years during this period that such habitat would exist under the Base Condition. Nevertheless, in most of these years, substantial amounts of inundated riparian habitat would remain available under the 2030 w/WFP. Complete (i.e., 100%) losses of available habitat under the Base Condition would occur up to about 5% of the time during the February through May period. Increases in the availability of inundated riparian vegetation would occur approximately 1% of the time during March.

The number of years that mean monthly water temperatures at Watt Avenue would be within the preferred range for splittail spawning of 48°F to 68°F would not change substantially, if at all, during each month of the February through May period. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

AMERICAN SHAD

Impact **6.5-8** ***Flow- and Temperature-Related Impacts to American Shad (May and June)***. *Under the supplemental cumulative analysis assumptions, flow reductions anticipated to occur during the May through June period would increase the frequency with which mean monthly flows at the mouth would be below the target attraction flow of 3,000 cfs by about 1% to 6%. Flow reductions under the 2030 w/WFP in May and June could reduce the number of adult shad attracted into the river during a few years. However, because American shad spawn opportunistically where suitable conditions are found, potentially attracting fewer adults spawners into the Lower American River in some years would not be expected to adversely impact annual American shad production within the Sacramento River system. Furthermore, direct impacts to the Lower American River sport fishery would be less than substantial in most years. In addition, the frequency with which suitable temperatures for American shad spawning would exist would not differ substantially between the 2030 w/WFP and the Base Condition. Consequently, the combined flow and temperature changes under 2030 w/WFP would not be expected to adversely affect the long-term population trends of American shad in the Lower American River. This would be a* ***less-than-significant future cumulative impact.*** *The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not*

differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Changes in Lower American River flows that could be expected to occur during May and June under the 2030 w/ WFP have been discussed previously under Impact 6.5-5 (Appendix N). In addition to this analysis, an additional analysis was performed to determine the probability that lower American River flows at the mouth would be below 3,000 cfs, the flow level defined by CDFG as that which would be sufficient to maintain the sport fishery. Under the 2030 w/ WFP, mean monthly flows would be below the 3,000 cfs attraction flow at the mouth approximately 1 and 6% more often during May and June, respectively (Appendix N).

The number of years that mean monthly water temperatures at Nimbus Dam and the mouth would be within the preferred temperature range for American shad spawning of 60°F to 70°F would not change substantially during the May through June period. Lower American River water temperatures under the 2030 w/ WFP would remain suitable for American shad rearing (Appendix N). The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

STRIPED BASS

Impact **6.5-9**

Flow- and Temperature-Related Impacts to the Striped Bass Sport Fishery (May and June). *Under the supplemental cumulative analysis assumptions, flow reductions anticipated to occur during the May through June period would increase the frequency with which mean monthly flows at the mouth would be below the target attraction flow of 1,500 cfs by about 1 to 7%. However, flows at the mouth that are believed to be sufficient to maintain the striped bass fishery would be met or exceeded in most years during this period. The frequency with which suitable temperatures for juvenile striped bass rearing in the Lower American River would differ little between the 2030 w/ WFP and the Base Condition during May and June. Consequently, the combined temperature and flow changes under the 2030 w/ WFP would not be expected to adversely affect long-term trends for the striped bass fishery in the lower American River. This would be a* ***less-than-significant future cumulative impact.*** *The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Changes in Lower American River flows that could be expected to occur during May and June under the 2030 w/ WFP have been discussed previously under Impact 6.5-5 (Appendix N). In addition to this analysis, an additional analysis was performed to determine the probability that Lower American River flows at the mouth would be below 1,500 cfs, the flow level defined by CDFG as that which would be sufficient to maintain the sport fishery. Under the 2030 w/ WFP, mean monthly flows in the Lower American River would be below the 1,500 cfs attraction flow threshold at the mouth about 1% more often in May and 7% more often in June, relative to the Base Condition.

The number of years that mean monthly water temperatures at Nimbus Dam would be within the preferred range for striped bass juvenile rearing of 61°F to 73°F would not change substantially during May and June

(Appendix N). The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

SHASTA AND TRINITY RESERVOIRS

COLDWATER FISHERIES

Impact **6.5-10**

Impacts to Shasta Reservoir's Coldwater Fisheries. *Under this supplemental cumulative analysis assumptions, substantial reductions in reservoir storage would occur occasionally during some months of the April through November period of the year. However, because physical habitat availability is not believed to be among the primary factors limiting coldwater fish populations within the reservoir, and because anticipated changes in seasonal storage would not be expected to result in substantial adverse effects on the primary prey base utilized by the reservoir's coldwater fish populations, seasonal reductions in storage expected to occur under 2030 w/ WFP would not significantly affect Shasta Reservoir's coldwater fisheries. This would represent a* ***less-than-significant future cumulative impact.*** *The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Hydrologic conditions with the 2030 w/ WFP would reduce the 70-year average monthly storage in Shasta Reservoir, relative to the Base Condition, by approximately 1 to 4% during all months of the April through November period. Reductions in Shasta storage of more than 10% would occur occasionally during some months of this period. The changes in Shasta Reservoir storage expected to occur under the 2030 w/ WFP would not be expected to substantially affect the coldwater fishery as the availability of physical habitat is not a primary limiting factor for these fish. In addition, the storage reductions would not adversely affect the population dynamics of the primary prey species for the reservoir's coldwater fish populations (Appendix N). The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.5-11**

Impacts to Trinity Reservoir's Coldwater Fisheries. *Under this supplemental cumulative analysis assumptions, substantial reductions in reservoir storage would occur occasionally throughout the April through November period of the year. However, because physical habitat availability is not believed to be among the primary factors limiting coldwater fish populations within the reservoir, and because anticipated changes in seasonal storage would not be expected to result in substantial adverse effects on the primary prey base utilized by the reservoir's coldwater fish populations, seasonal reductions in storage expected to occur under 2030 w/ WFP would not*

*substantially affect Trinity Reservoir's coldwater fisheries. This would represent a **less-than-significant future cumulative impact.** The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Hydrologic conditions with the 2030 w/ WFP would reduce the 70-year average monthly storage in Trinity Reservoir, relative to the Base Condition, by approximately 3 to 6% during all months of the April through November period. Reductions in Trinity storage of more than 10% would occur occasionally within individual years during all months of this period. However, these anticipated changes in mean monthly reservoir storage would not be expected to substantially affect the coldwater fishery as the availability of coldwater fish habitat is not a primary limiting factor for those fish. The storage reductions also would not adversely affect the population dynamics of the primary prey species utilized by the reservoir's coldwater fish populations (Appendix N). The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

WARMWATER FISHERIES

Impact **6.5-12**

Impacts to Shasta Reservoir's Warmwater Fisheries. *Under this supplemental cumulative analysis assumptions, the 70-year average amount of littoral habitat available to warmwater fishes would be reduced by about 2 to 4% during the March through September period (which are the initial rearing months for the reservoir's warmwater fishes of management concern), with even more substantial reductions in reservoir littoral habitat availability in some years during these months. Rates of elevation fluctuation would not change substantially under the 2030 w/ WFP, relative to the Base Condition. However, seasonal changes in 70-year average reservoir littoral habitat under the 2030 w/ WFP would be of sufficient magnitude to potentially affect long-term, average initial year-class strength of the warmwater fish populations of management concern. Reduced littoral habitat availability would be a **potentially significant future cumulative impact** to Shasta Reservoir warmwater fisheries. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Littoral Habitat Availability

The additional diversion demand on the American River system and the Sacramento River under the 2030 w/ WFP would reduce the 70-year average end-of-month water surface elevation in Shasta Reservoir by about 2 to 4 feet during the March through September period. Reductions in average end-of-month elevation of greater than 1 ft would regularly occur during the all months of the March through September period (when warmwater fish

spawning and initial rearing occurs) (Appendix N). Changes in water surface elevation in Shasta Reservoir during the March through September period would result in corresponding changes in the availability of reservoir littoral habitat containing inundated terrestrial vegetation (e.g., willows and button brush). Such shallow, near-shore waters containing physical structure are important to producing and maintaining strong year-classes of warmwater fishes annually.

Reductions in the 70-year average amount of littoral habitat potentially available to warmwater fishes for spawning and/or rearing in Shasta Reservoir under the 2030 w/ WFP would be substantial during some months. Reduction in 70-year average amount of littoral habitat would range from about 2 to 5% during the March through June period, but would range from about 10 to 34% during the period July through September (Appendix N). Thus, on the average, littoral habitat would be reduced over 20% from July through September. More substantial reductions in littoral habitat availability would occur frequently during individuals years of the March through September period. These changes in the availability of littoral habitat, under 2030 w/ WFP, would suggest that such reductions would be likely to adversely affect the long-term initial establishment of warmwater fish year-classes.

Potential for Dewatering Events

Changes in CVP/SWP operations under the 2030 w/ WFP could alter the rates by which water surface elevations in Shasta Reservoir change during each month of the primary warmwater fish spawning period of the year (i.e., March through July). Modeling results indicate that under the 2030 w/ WFP the frequency with which potential nest dewatering events could occur in Shasta Reservoir would change little, if at all, relative to the Base Condition, during some months of the March through July period, with a minor increase in frequency in others. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.5-13**

Impacts to Trinity Reservoir's Warmwater Fisheries. *Under this supplemental cumulative scenario, littoral habitat availability would be reduced by about 10 to 20% during the March through September period, with substantial reductions in littoral habitat availability occurring frequently throughout this period. The potential for nest dewatering events to occur in Trinity Reservoir would not change substantially under the 2030 w/ WFP during the March through July spawning period. However, changes in the availability of littoral habitat under the 2030 w/ WFP would potentially result in adverse affects to the initial establishment of warmwater fish year-classes. Reduced littoral habitat availability would be a* ***potentially significant future cumulative impact*** *to Trinity Reservoir warmwater fisheries. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Littoral Habitat Availability

The additional diversion demand on the American River system and the Sacramento River under the 2030 w/ WFP would reduce the 70-year average end-of-month water surface elevation in Trinity Reservoir by about 5 to over 8 ft during the March through September period (Appendix N). During the March through September

period (when warmwater fish spawning and initial rearing occurs), reductions of greater than 1 foot in average end-of-month elevation would usually occur during the March through September period.

Changes in water surface elevation in Trinity Reservoir during the March through September period would result in corresponding changes in the availability of reservoir littoral habitat containing inundated terrestrial vegetation (e.g., willows and button brush). Reduction in the 70-year average amount of littoral habitat would range from less than 10 to almost 20% during the period March through September (Appendix N). Substantial reductions in littoral habitat availability would frequently occur in Trinity Reservoir under the 2030 w/ WFP, relative to the Base Condition.

Potential for Nest Dewatering Events

Changes in CVP/SWP operations under the 2030 w/ WFP could alter the rates at which water surface elevations in Trinity Reservoir change during each month of the primary warmwater fish spawning period of the year (i.e., March through July). However, modeling results indicate that the frequency with which potential nest dewatering events could occur in Trinity Reservoir under the 2030 w/ WFP, relative to that under the Base Condition, would not change substantially during any month of the warmwater fish spawning period of the year (i.e., March through July) (Appendix N). The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

KESWICK RESERVOIR

Impact **6.5-14**

Impacts to Keswick Reservoir Fisheries. *Under the supplemental cumulative impact assumptions, hydrologic conditions with the 2030 w/ WFP would have little, if any, effect on seasonal storage, elevation, and temperature of Keswick Reservoir. Any minor changes in storage, elevation, or temperature that could occur would not substantially affect the reservoir's fishery resources. This would constitute a* ***less-than-significant future cumulative impact.*** *The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

No storage-, elevation-, or temperature-related impacts to the fishery resources of Keswick Reservoir would be expected to occur because, as a regulating afterbay of Shasta Reservoir, its monthly storage, elevation, and temperature would be expected to remain similar under the 2030 w/ WFP to that which currently exists under the Base Condition. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

UPPER AND LOWER SACRAMENTO RIVER

Impact **6.5-15**

Flow-Related Impacts to Sacramento River Fisheries. *Under the supplemental cumulative analysis assumptions, the 70-year average flows released from Keswick Dam would not be substantially reduced during any month of the year. The analysis indicates that flow reductions of more than 10% would occur frequently during some months and infrequently during others under 2030 w/ WFP, relative to the Base Condition. The analysis also indicates that the 3, 250 cfs minimum flow objective for Keswick Reservoir stipulated in the NMFS Biological Opinion for the protection of winter-run chinook salmon rearing and downstream passage between 1 October and 31 March would not be violated in any month of this period under either the 2030 w/ WFP or the Base Condition. Flow changes below Keswick Dam that would occur under the 2030 w/ WFP would result in less-than-significant impacts to upper Sacramento River fisheries resources. The analysis for the lower Sacramento River indicates that the 70-year average flows under 2030 w/ WFP would not be substantially reduced relative to the Base Condition. The analysis also indicates that flow reductions of more than 20% would occur occasionally during August and infrequently during all other months of the year. Consequently, any flow-related impacts to lower Sacramento River fisheries or migrating anadromous fishes that could occur under 2030 w/ WFP are considered to be less than significant. Overall, this constitutes a* ***less-than-significant future cumulative impact.*** *The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Flow-Related Impacts in the Upper Sacramento River

Under the 2030 w/ WFP, the 70-year average flow released from Keswick Dam would not be substantially reduced during any month of the year, with changes in the 70-year average flow ranging from an increase of about 1% in September to reductions of up to about 5% (in May and June). Reductions of more than 10% in releases from Keswick Dam would occur occasionally during some months and infrequently during others throughout the yearly period (Appendix N). Reductions of more than 20% in releases from Keswick Dam would occur infrequently, if at all, during all months throughout the year (Appendix N).

The minimum flow objective for Keswick Dam release stipulated in the NMFS Biological Opinion for the protection of winter-run chinook salmon rearing and downstream passage is 3,250 cfs between 1 October and 31 March. Modeling output shows that mean monthly flows below Keswick Dam would never be below 3,250 cfs in any month of the October through March period in any of the 70 years modeled under either the 2030 w/ WFP or the Base Condition (Appendix N).

Flow-Related Impacts in the Lower Sacramento River

The 70-year average flow at Freeport under the 2030 w/ WFP would be reduced by about 3% or less, relative to flows under the Base Condition, during all months. Flow reductions of 1% to 10% would occur regularly in individual years during all months. Flow reductions of 10% or more, relative to Base Condition flows, would occur infrequently during the October through May period, but more frequently during the June through September period. Flow reductions of 20% or more would occur infrequently during all months except August, when flow reductions of 20% or more would occur occasionally (Appendix N). Therefore, because substantial and frequent reductions in lower Sacramento flows would not occur, neither physical habitat availability for fishes residing in the lower Sacramento River nor immigration of adult or emigration of juvenile anadromous fishes would be substantially affected under the 2030 w/ WFP, relative to the Base Condition. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.5-16**

Temperature-Related Impacts to Sacramento River Fisheries Resources. *Under the supplemental cumulative analysis assumptions, the 69-year average temperature at Keswick Dam would increase up to approximately 0.5 °F during the period September through November. Mean monthly temperatures at Keswick Dam would exceed the 56°F threshold stipulated in the NMFS Biological Opinion for winter-run chinook salmon about 1% more often in September, and would exceed the 60°F threshold stipulated for October in the NMFS Biological Opinion for winter-run chinook salmon about 3% more often under the 2030 w/ WFP, relative to the Base Condition. Mean monthly temperatures at Bend Bridge would exceed the 56°F threshold stipulated in the NMFS Biological Opinion for winter-run chinook salmon approximately 1% more often in April and August, approximately 3% more often in May and June, no more often in July, and about 1% less often in September. Although there would be no measurable change in the 69-year average early lifestage salmon survival for fall-, late fall-, winter-, and spring- run chinook salmon, measurable reductions in annual early-lifestage survival could be expected to occur under the 2030 w/ WFP, relative to annual survival estimates under the Base Condition, during some individual years for all runs except late-fall run. Substantial changes in average lower Sacramento River temperatures would not be expected over the 69-year period simulated, although individual months of respective years could exhibit substantial temperature increases. Overall changes in water temperatures represent a* ***significant future cumulative impact.*** *The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Temperature-Related Impacts in the Upper Sacramento River

The 69-year average water temperatures below Keswick Dam under the 2030 w/ WFP would remain essentially equivalent to or slightly colder than that under the Base Condition during the December through August period. Conversely, the 69-year average temperature would increase up to approximately 0.5°F during the period September through November. Under the 2030 w/ WFP, the 69-year average temperatures at Keswick Dam would remain well below 56°F during all months of the year (Appendix N).

An assessment of the 69 individual years modeled indicates that, with the exception of the 56°F threshold being exceeded 3% of the time in March (as opposed to 1% of the time under the Base Condition), mean monthly temperatures below Keswick Dam under 2030 w/ WFP would always be 56°F or lower during the December through July period (Appendix N).

Under the 2030 w/ WFP, mean monthly temperatures at Keswick Dam would not exceed the 56°F threshold stipulated in the NMFS Biological Opinion for winter-run chinook salmon in any additional years in August, but would exceed 56°F 1% more often in September. In addition, under the 2030 w/ WFP, the 56°F threshold would be exceeded 3% more often in October and 1% more often in November, relative to that under the Base Condition. Mean monthly temperatures under 2030 w/ WFP would be below 60°F in all years during November. Finally, mean October temperatures at Keswick Dam would exceed the 60°F threshold stipulated for this month in the NMFS Biological Opinion for winter-run chinook salmon 1% more often under the 2030 w/ WFP, relative to the Base Condition (Appendix N).

With the exception of the 56°F threshold being exceeded about 1% of the time in March and 3% of the time November, mean monthly water temperatures at Bend Bridge, under the 2030 w/ WFP, would be at or below 56°F under in all years during the November through March period. Mean monthly temperatures at Bend Bridge would exceed the 56°F threshold stipulated in the NMFS Biological Opinion for winter-run chinook salmon approximately 1% more often in April and August, and approximately 3% more often in May and June, with no change in the frequency of exceeding 56°F in July, and 1% less often in September (Appendix N). The 60°F threshold would be exceeded 1% less often at Bend Bridge under 2030 w/ WFP, relative to that under the Base Condition (Appendix N).

Mean monthly temperatures at Jelly's Ferry would exceed the 56°F threshold stipulated in the NMFS Biological Opinion for winter-run chinook salmon approximately 3% more often in May, and August, 1% less often in June, and 1% more often in July and September (Appendix N). There would be no change in the probability of exceeding the 60°F threshold at Jelly's Ferry during October under 2030 w/ WFP, relative to that under the Base Condition, (Appendix N).

The 69-year average early life stage survival under the 2030 w/WFP would be reduced, relative to the Base Condition, by 0.9% for fall-run (90.1% vs. 89.2%), 0.1% for late-fall run (99.0% vs. 98.9%), 1.2% for spring-run (87.6% vs. 86.3%), and 1.7% for winter-run (95.7% vs 96.0%). Modeled reductions in survival in excess of 2% relative to survival under the Base Condition would occur 19%, 0%, 7%, and 7%, of the time for fall-run, late-fall run, spring-run, and winter-run, respectively (Appendix N).

Temperature -Related Impacts in the Lower Sacramento River

Under the 2030 w/ WFP, there would be no substantial change in the 69-year average water temperatures at Freeport (RM 46) for all months of the year (Appendix N). However, temperature increases in excess of 0.5°F could occur about 3 to 15% of the time under 2030 w/ WFP, for individual months during the June through September period. Conversely, temperature increases of 0.5°F or more would rarely occur during the October through May period. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

DELTA

Impact **6.5-17**

Delta Fish Populations. *Under the supplemental cumulative analysis assumptions, reductions in Delta outflow of more than 10% would occur occasionally during February, March, and June, but would not occur in any year during April or May. The analysis also indicates that upstream shifts of the position of X2 of 1 km or more also would occur in February, March, and June, but infrequently during April and May. Finally, the analysis indicates that Delta export to inflow ratios under the 2030 w/ WFP would not exceed the maximum export limits for either the February through June (35% of Delta inflow) or the July through January periods (65% of Delta inflow). Although the project would not cause X2 or Delta outflow standards to be violated, the project could result in reductions in outflow and upstream shifts in the position of X2, which could be considered a* ***potentially significant impact*** *to Delta fisheries resources. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

During the yearly period, changes in the 70-year average Delta outflow would range from negligible to reductions of approximately 4% under the 2030 w/ WFP, relative to the Base Condition (Appendix N).

Reductions in Delta outflow of more than 10% under the 2030 w/ WFP, relative to the Base Condition, could occur about 9% to 17% more often in February, March and June. Reductions in Delta outflow of more than 10% would not occur in any year during April and May (Appendix N).

Under the 2030 w/ WFP, the greatest upstream shifts in the 70-year average position of X2, relative to its mean monthly position under the Base Condition, would be up to approximately 0.7 km (Appendix N). During the February through June period considered important for providing appropriate spawning and rearing conditions and downstream transport flows for various fish species, upstream shifts in the position of X2 of more than 1 km would occur 14 to 21% more often in February, March, and June. Upstream shifts in the position of X2 of more than 3 km would occur about 1 to 4% more often in April and May (Appendix N).

Modeling output also showed that the Delta export to inflow ratios under the 2030 w/ WFP would not exceed the maximum export limits for either the February through June (35% of Delta inflow) or the July through January period (65% of Delta inflow) as set by the SWRCB Interim Water Quality Control Plan. The impacts to fisheries resources and aquatic habitat identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.6 CUMULATIVE FLOOD CONTROL IMPACTS

The supplemental cumulative analysis is based on a set of alternative future cumulative conditions throughout the CVP/SWP, as described in Section 6.1.2, Alternative Cumulative Conditions. As an alternative future cumulative scenario, the supplemental analysis still includes the implementation of the Water Forum Proposal and other reasonably foreseeable future actions. The analysis does not assume any development of additional Sacramento River supplies because no specific proposals are available. The impacts to flood control identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.6-1**

Ability to Meet Flood Control Diagrams of CVP Reservoirs. *Increased diversions from CVP/SWP reservoirs under this future cumulative condition would result in reduced storage during the flood control season, increasing the ability to meet flood control needs. This would be a* ***less-than-significant future cumulative impact.*** *The impacts to flood control identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

For an analysis flood control capability throughout the CVP/SWP at either USBR or DWR controlled reservoirs, it is intuitive that increased diversions from these reservoirs in the future would have the cumulative effect of resulting in a net beneficial impact to flood control operations system-wide. This beneficial condition results from the fact that with increased diversions from these reservoirs, each reservoir would commence the flood control season (November 15) with reduced storage, thereby increasing their ability to meet the early season flood control diagrams. Consequently, throughout the remainder of the flood control season, increased diversions anticipated in the future would also have the effect of reducing reservoir storage, thereby further assisting in the ability to maintain the required empty space storage during these times.

Based on the supplemental future cumulative condition reduced 70-year average end-of-month reservoir storage in Folsom Reservoir, relative to the Base Condition, would occur in all months of the flood control season. Reductions in storage would range from approximately 21,000 AF to 34,000 AF. For Shasta Reservoir, reductions in 70-year average end-of-month storage would range from approximately 31,000 AF to 68,000 AF relative to the Base Condition over the entire flood control season. At the outset of the flood control season, however, reductions in storage could be as high as approximately 450,000 AF (maximum end-of-month reservoir storage for October). Such reductions, relative to the Base Condition, would have an overall effect of enhancing the ability to meet and maintain reservoir operations within established flood control diagrams during the flood control season and, therefore, result in a net beneficial impact. The impacts to flood control identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.7 CUMULATIVE POWER SUPPLY IMPACTS

The supplemental cumulative impacts analysis is based on a set of alternative future cumulative conditions throughout the CVP/SWP, as described in Section 6.1.2, Alternative Cumulative Conditions. As an alternative future cumulative scenario, the supplemental analysis still includes implementation of the Water Forum Proposal and other reasonably foreseeable future actions. The analysis does not assume any development of additional Sacramento River supplies because no specific proposals are available. Under this set of supplemental

assumptions, analysis indicates that impacts to CVP hydropower operations and pumping energy requirements will occur in nearly all years. Impacts to CVP hydropower could result from increased surface water diversions and overall lower reservoir levels across the system. Lower reservoir water surface elevations would result in lower hydraulic head, and consequently lower generation potential at existing power generating plants. At Folsom Reservoir, lower water surface levels could also contribute to increased pumping power requirements for users relying on the Folsom Pumping Plant and the EID Pumping Plant. The impacts to power supply identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

CVP hydropower operations under this future cumulative condition are likely to be characterized by reductions to: capacity available for WAPA's preference customers, WAPA surplus capacity sales, and annual average CVP energy production. These cumulative impacts would be considered significant insofar as rates to CVP hydropower customers could increase in response to decreased CVP surplus capacity sales revenues and/or increased WAPA energy and capacity purchases for preference customers.

In the future, reductions in Folsom Reservoir water surface levels could increase pumping requirements at the Folsom and EID pumping plants. Folsom Reservoir storage is expected to be, on average, lower in the future relative to current conditions due, in part, to the increased demands placed on the American River system and increased demands system-wide. This is likely to remain a significant cumulative impact

Impact **6.7-1** ***Reduced CVP Hydropower Capacity and Generation.*** *Under this future cumulative condition, which includes the WFP and other reasonably foreseeable future system-wide actions (e.g. 2030 out-of-basin CVP/SWP demands, increased Sacramento Valley demands, and increased Trinity River flows), no substantial reduction in average annual surplus capacity or capacity for use by WAPA's preference customers would occur. Under this future cumulative condition, WAPA's capacity peak maximum of 1,152 megawatts would not be met in 45 of the 828 months studied, as compared to 42 months for the Base Condition. However, under the supplemental future cumulative condition average annual CVP energy production would be reduced by 223 Gwh compared to the Base Condition. This change in annual average CVP energy production, which is roughly equivalent to a 5% reduction, is considered to represent a* **significant impact**. *The impacts to power supply identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Changes to hydropower operations caused by future cumulative actions are many and varied. Some changes are directly attributable to observable phenomenon; for example, lower reservoir storage directly predicts lower electrical capacity. Other changes are not as clear; for example, lower reservoir storage could result in fewer water spills and more water through the generator turbines during a year. An examination of the supplemental future cumulative results suggests the following: CVP electrical capacity at the generators is lower in most months of most years, but not so low as to affect the 1,152 MW in many months. Project use capacity is lower in the future cumulative condition in some years because of less deliveries (increased deficiencies) to CVP contractors. The reduction in Project Use capacity is approximately equal to the overall reduction in CVP capacity at the generators, thus surplus capacity is unchanged between the future cumulative and base conditions. And, CVP energy production is reduced by virtue of lower reservoir storages diminishing the efficiency (kwh/af) of water released through the power plants, even though Project Use energy requirements are less in the future cumulative condition. The impacts to power supply identified in this supplemental

analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.7-2** ***Increased Energy Requirements for Diverters Pumping from Folsom Reservoir.*** *Under the supplemental future cumulative condition, which includes the WFP and other reasonably foreseeable future system-wide actions (e.g. 2030 out-of-basin CVP/SWP demands, increased Sacramento Valley demands, and increased Trinity River flows), changes in pumping requirements for those who pump water from Folsom Reservoir would occur. Under the supplemental future cumulative condition, it is anticipated that an approximate 140% increase in average annual pumping energy would be required. While this cumulative impact would be environmentally less-than-significant, it represents an* ***economically significant impact****. The impacts to power supply identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Two factors associated with the supplemental future cumulative condition affect the amount of energy required by diverters pumping from Folsom Reservoir. The first of these is the reduction in Folsom water storage attributable to future operations. This reduction in storage decreases the opportunities to deliver water by gravity flow and increases the hydraulic lift required to pump water from the reservoir. A second and more influential effect is that significantly more water will be pumped from Folsom in the future. An estimate of the proportion of increased energy requirements by effect suggests that as much as 115% of the 140% increase is caused by increased diversions and the remaining 25% is caused by other future operational influences which increase the hydraulic lift. The impacts to power supply identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.8 CUMULATIVE VEGETATION AND WILDLIFE IMPACTS

The supplemental cumulative impact analysis is based on a set of alternative future cumulative conditions throughout the CVP/SWP, as described in Section 6.1.2, Alternative Cumulative Conditions. As an alternative future cumulative scenario, the supplemental analysis still includes implementation of the WFP and other reasonably foreseeable future actions. Under this alternative set of assumptions, analysis indicates that significant future impacts to vegetation and wildlife associated with the lower American River would occur, as a result of reduced mean monthly flows. Future flows associated with the Sacramento River and Sacramento-San Joaquin Delta and surface water elevations of affected reservoirs would not be reduced with sufficient magnitude and frequency to adversely affect riparian vegetation and associated special-status species and habitat. The impacts to vegetation and wildlife identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.8-1** ***Special Status Species, Riparian Vegetation, and Backwater Ponds Associated with the Lower American River.*** *Under this set of assumptions for future conditions, the cumulative impact analysis indicates that the range of flows within the minimum/optimal range of 1,300 to 4,000 cfs would vary by 3 or fewer years during the 70-year period of record, in comparison to base conditions. As a result, reduced flows under these future cumulative conditions would not result in an adverse effect to the special-status species (including the Valley Elderberry Longhorn Beetle) that are dependent on riparian vegetation and backwater ponds*

*associated with Lower American River. This would be a **less-than-significant** future cumulative impact. The impacts to vegetation and wildlife identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Under this set of alternative assumptions for future conditions, the cumulative impact analysis indicates that flows in the lower American River would be further reduced. However, during the critical growing season months of April through July, the number of occurrences in which mean monthly flows of the lower American River would be within the minimum/optimal flow range of 1,300 to 4,000 cfs would vary by 3 or fewer years during the 70-year period of record, in comparison to base conditions. As a result, reduced flows under these future cumulative conditions would not result in an adverse effect to the special-status species (including the Valley Elderberry Longhorn Beetle) that are dependent on riparian vegetation and backwater ponds associated with Lower American River. This would be a less-than-significant future cumulative impact. The impacts to vegetation and wildlife identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.8-2** ***Special Status Species and Riparian Vegetation Associated with the Sacramento River and Sacramento-San Joaquin Delta.*** *Under this set of assumptions for future conditions, the cumulative impact analysis indicates that flows in the lower American River would be further reduced. However, during the critical growing season months of April through July, the number of occurrences in which mean monthly flows of the lower American River would be within the minimum/optimal flow range of 1,300 to 4,000 cfs would vary by 3 or fewer years during the 70-year period of record, in comparison to base conditions. As a result, reduced flows under these future cumulative conditions would not result in an adverse effect to the special-status species (including the Valley Elderberry Longhorn Beetle) that are dependent on riparian vegetation and backwater ponds associated with Lower American River. This would be a **less-than-significant** future cumulative impact. The impacts to vegetation and wildlife identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Based on this alternative future cumulative scenario, additional diversions and potential CVP operations would result in decreases in Sacramento River mean monthly flows. Compared to base conditions, average mean monthly flows of the Sacramento River would be reduced by approximately 3% (715 cfs), during the critical growing season months (March - July). During the remaining months of the growing season (August - October) flows would be reduced, on average, by approximately 3% (317 cfs). As a result, mean monthly flows would not be reduced with sufficient magnitude and frequency to significantly alter existing riparian vegetation dependent on Sacramento River flows and Delta inflows. Because riparian vegetation would not be adversely affected and open water (river) habitat would be available, the special-status species dependent on such habitat would not be adversely affected. This would be a less-than-significant future cumulative impact. The impacts to vegetation and wildlife identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.8-3** ***Vegetation Associated with Reservoirs.*** *Under this set of assumptions for future conditions, the cumulative impact analysis indicates that, in comparison to base conditions, mean monthly surface water elevations at Folsom, Shasta, and Trinity reservoirs would be reduced by less than 1%*

during the months of the growing season (March-October). Because the draw down zones at these reservoirs are vegetated with non-native plants that do not form a contiguous riparian community, minor fluctuations in surface water elevations would not adversely affect important habitat values at these reservoirs. Consequently, this would be a ***less-than-significant future cumulative impact****. The impacts to vegetation and wildlife identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Based on this alternative future cumulative scenario, additional diversions and potential CVP operations would result in more frequent declines in the water surface elevation of Folsom, Shasta, and Trinity reservoirs. However, during the months of the growing season (March-October) mean monthly surface water elevations at Folsom, Shasta, and Trinity reservoirs would be reduced by less than 1%. Compared to base conditions, future month-end surface water elevations would be reduced by approximately 4 feet at Folsom and Shasta reservoirs and by approximately 8 feet at Trinity Reservoir. Because the draw down zones at these reservoirs are vegetated with non-native plants that do not form a contiguous riparian community, minor fluctuations in surface water elevations would not adversely affect important habitat values at these reservoirs. In addition, Keswick and Whiskeytown Reservoirs would continue to operate as regulating reservoirs for the larger upstream dams, so their pattern of elevation changes would not change under future cumulative conditions. This would be considered a less-than-significant cumulative impact. The impacts to vegetation and wildlife identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.9 CUMULATIVE RECREATION IMPACTS

The supplemental cumulative impact analysis is based on a set of alternative assumptions about future cumulative cumulative conditions throughout the CVP/SWP, as described in Section 6.1.2, Alternative Cumulative Conditions. The alternative future cumulative scenario includes implementation of the WFP and other reasonably foreseeable future actions. Under this alternative set of assumptions, analysis indicates that significant cumulative impacts to future recreation opportunities associated with the lower American River and Folsom Reservoir would occur. Future flows associated with the Sacramento River and Sacramento-San Joaquin Delta and surface water elevations of the other affected reservoirs would not be reduced with sufficient magnitude and frequency to result in significant cumulative impacts to recreational opportunities. The impacts to recreation identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.9-1**

Cumulative Impacts on the Lower American River Recreation Opportunities. *Under the alternative set of assumptions for future conditions, the supplemental cumulative impact analysis indicates that flows in the lower American River would be further reduced compared to baseline conditions. For example, during the months of May through September, the number of occurrences in which mean monthly flows of the lower American River would be reduced below the minimum threshold of 1,750 cfs would increase by as much as 40%, in comparison to base conditions. The WFP would contribute to this cumulative impact. This would be a* ***significant future cumulative impact****. The impacts to recreation identified in this*

supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Based on the future cumulative scenario evaluated for 2030, additional diversions and potential CVP operations would result in substantial decreases in Lower American River mean monthly flows during the high recreation use season. Compared to the Base Conditions, mean monthly flows during the period of May through September would be approximately 10% lower under the future cumulative condition. Mean monthly flows would fall below the 1,750 cfs minimum flow for rafting and boating in approximately 20 to 40% more years during most months of the summer recreation season. The greater frequency of inadequate flows for rafting and boating would substantially diminish recreation opportunities on the Lower American River and would be considered a significant cumulative impact. The impacts to recreation identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.9-2** ***Cumulative Impacts to Folsom Reservoir Recreation Opportunities.*** *Under the alternative set of assumptions for future conditions, the supplemental cumulative impact analysis indicates that, in comparison to base conditions, surface water elevations at Folsom Reservoir would be further reduced. For example, during the recreational use period of the year (primarily May- September), the number of occurrences in which lake levels would decline below the minimum 412-foot elevation for use of marina wet slips would increase by more than 10%, in comparison to base conditions. Reduced lake levels under the cumulative condition would also adversely affect swimming beaches. The WFP would contribute to this cumulative condition and it would be a* ***significant future cumulative impact****. The impacts to recreation identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Based on the supplemental cumulative analysis, additional diversions and potential CVP operations would result in more frequent declines in the water surface elevation of Folsom Reservoir during the high recreation use season. Compared to the Base Conditions, month-end elevations would typically average about 3 feet lower during the May through September period under the future cumulative condition. Month-end elevations would fall below the 420-foot elevation necessary to maintain all boat ramps in operation and keep swimming beaches useable slightly more often than Base Conditions early in the season and in approximately 20% more years than under Base Conditions in the later months of the season. Also, month-end elevations would decline below the 412-foot level necessary to keep wet slips in operation in approximately 10 to 25% more years, depending on the month of the season. The greater frequency of water surface elevation declines would substantially diminish recreation opportunities on the Folsom Reservoir and would be considered a significant cumulative impact. The impacts to recreation identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.9-3** ***Sacramento River and Sacramento-San Joaquin Delta Recreation Opportunities Under Future Cumulative Conditions.*** *Under the alternative set of assumptions for future conditions, the supplemental cumulative impact analysis indicates that during the critical recreation season months of May through September mean monthly flows in the Sacramento River would be reduced by approximately 3%, in comparison to base conditions. Flows would not be reduced with sufficient magnitude and frequency to adversely affect recreational opportunities associated with the Sacramento River and Sacramento-San Joaquin*

*Delta. This would be a **less-than-significant future cumulative impact**. The impacts to recreation identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Based on the supplemental cumulative analysis for 2030, additional diversions and potential CVP operations would result in small decreases in Sacramento River mean monthly flows during the high recreation use season. Compared to the Base Conditions, mean monthly flows during the period of May through September would be approximately 3% lower under the future cumulative condition. The summer flows in the Sacramento River remain sufficient to support water-dependent and water-enhanced recreation activity. On the upper Sacramento River, mean monthly flows below Keswick Reservoir during the May to September recreation season range between approximately 6,500 cfs to over 12,000 cfs. On the lower Sacramento River, mean monthly flows at Freeport during the May to September recreation season range between approximately 14,000 cfs to over 18,000 cfs. The change in frequency of reduced flows for rafting and boating would not be sufficient to substantially diminish recreation opportunities on the upper and lower Sacramento River and would be considered a less-than-significant cumulative impact. The impacts to recreation identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.9-4**

Lake Natoma, Whiskeytown, Keswick, Shasta, and Trinity Reservoirs Recreation Opportunities Under Future Cumulative Conditions. *Under the alternative set of assumptions for future conditions, the supplemental cumulative impact analysis indicates that, in comparison to base conditions, mean monthly surface water elevations at Shasta and Trinity reservoirs would be reduced by less than 1% during the recreational use period of the year (primarily May-September), which would not substantially diminish recreation opportunities. Because Lake Natoma, Whiskeytown, and Keswick reservoirs serve as regulating reservoirs, the pattern of surface water elevations changes at these reservoirs is not expected to change substantially under cumulative conditions. This would be a **less-than-significant future cumulative impact.** The impacts to recreation identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Based on the supplemental cumulative analysis for 2030, additional diversions and potential CVP operations would result in slightly greater declines in the water surface elevation of Shasta and Trinity Reservoirs during the high recreation use season. Compared to the Base Conditions, month-end elevations would typically decrease by less than one-half of 1% during the May through September period under the future cumulative condition. Month-end elevations would fall below the 941-foot elevation necessary to maintain at least one boat ramp in operation in each major arm of Shasta Reservoir typically only one year more often under the alternative cumulative conditions compared to Base Conditions. Keswick and Whiskeytown Reservoirs would continue to operate as regulating reservoirs for the larger upstream dams, so their pattern of elevation changes would not change under future cumulative conditions. The change in frequency of water surface elevations would not be substantial and would not substantially diminish recreation opportunities on the Shasta, Trinity, Keswick, and Whiskeytown Reservoirs; this would be considered a less-than-significant cumulative impact. The impacts to recreation identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.10 CUMULATIVE LAND USE AND GROWTH-INDUCING IMPACTS

One of the coequal objectives of the WFP is "to provide a reliable and safe water supply for the region's economic health and planned development through the year 2030." Under the WFP, water would be utilized by purveyors which serve jurisdictions in the water service study area. With sufficient water, jurisdictions can make decisions about how much and what type of development to approve, in accordance with planned land uses, recognizing that water supply is not a constraint.

Land use designations established in the most recent general plans for the jurisdictions in the water service study area represent the maximum long-term level of growth approved by city and county decision-makers. Because the WFP addresses the region's water demands through the year 2030, and the buildout years of the general plans are not able to be precisely predicted, the reliable water supply provided by the WFP to each purveyor may fall short of, just meet, or exceed water demand at buildout. The diversions provided for in the WFP are intended to accommodate each agency's projected surface water need in 2030 considering such factors as projected growth rate, water rights, conservation levels, availability of alternative water supplies, environmental considerations, and other factors. Section 4.10, Land Use and Growth-Inducing Impacts, of the WFP Draft EIR evaluates the WFP's potential land use effects in relation to the adopted general plans for long-term growth of the communities in the water service study area.

6.11 CUMULATIVE AESTHETICS IMPACTS

The supplemental cumulative impact analysis is based on a set of alternative future cumulative conditions throughout the CVP/SWP, as described in Section 6.1.2, Alternative Cumulative Conditions. The alternative future cumulative scenario includes implementation of the WFP and other reasonably foreseeable future actions. The impacts to aesthetics identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Discernible aesthetic impacts along river corridors are primarily associated with adverse impacts to localized vegetation. As previously discussed, significant reductions in river flow can result in a reduced expanse of the water area, which can result in the thinning of the riparian corridor, loss of valuable border zone vegetation, and subsequent degradation of wildlife habitat. Under this set of alternative assumptions, analysis indicates that future impacts to the aesthetic quality could occur, as a result of adverse impacts to riparian vegetation and wildlife habitat associated with the lower American River. Flows would not be reduced with sufficient magnitude and frequency to significantly alter existing riparian vegetation and habitat dependent on Sacramento River flows and Delta inflows. As a result, the aesthetic quality of the Sacramento River and Sacramento-San Joaquin Delta would not be adversely affected.

Discernible aesthetic impacts among reservoirs are generally assumed to occur with reductions in surface water elevations of greater than 10 feet. As a result, significant aesthetic effects of reservoirs would be based primarily on the frequency in which future surface water elevations would be reduced by more than 10 feet, in comparison to base conditions. Under this set of alternative assumptions, analysis of future cumulative conditions indicates that impacts to the aesthetic quality of reservoirs would not occur.

Impact **6.11-1**

Aesthetic Value of the Lower American River. *Under this set of assumptions for future conditions, the cumulative impact analysis indicates that flows in the lower American River would be further reduced. However, during the*

critical growing season months of April through July, the number of occurrences in which mean monthly flows of the lower American River would be within the minimum/optimal flow range of 1,300 to 4,000 cfs would vary by 3 or fewer years during the 70-year period of record, in comparison to base conditions. As a result, reduced flows under future cumulative conditions would not result in an adverse effect to riparian vegetation and habitat and, as such, would not result in an adverse affect to the aesthetic quality of the lower American River. This would be a ***less-than-significant future cumulative impact.*** *The impacts to aesthetics identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Under the set of assumptions for future conditions used in the WFP Draft EIR, the cumulative impact analysis indicates that flows in the lower American River would be further reduced. However, during the critical growing season months of April through July, the number of occurrences in which mean monthly flows of the lower American River would be within the minimum/optimal flow range of 1,300 to 4,000 cfs would vary by 3 or fewer years during the 70-year period of record, in comparison to base conditions. As a result, reduced flows under future cumulative conditions would not result in an adverse effect to the special-status species (including the Valley Elderberry Longhorn Beetle) that are dependent on riparian vegetation and backwater ponds associated with Lower American River. This would be a less-than-significant future cumulative impact. The impacts to aesthetics identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.11-2**

Aesthetic Value of the Sacramento River and Sacramento-San Joaquin Delta. *Under this set of assumptions for future conditions, the cumulative impact analysis indicates that mean monthly flows in the Sacramento River would be reduced by approximately 3%, in comparison to base conditions, during the critical growing season months of April through July. Flows would not be reduced with sufficient magnitude and frequency to significantly alter existing riparian vegetation dependent on Sacramento River flows and Delta inflows. As a result, the aesthetic quality of the Sacramento River and Sacramento-San Joaquin Delta would not be adversely affected. This would be a* ***less-than-significant future cumulative impact****. The impacts to aesthetics identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Based on this alternative future cumulative scenario, additional diversions and potential CVP operations would result in decreases in Sacramento River mean monthly flows. Compared to base conditions, average mean monthly flows of the Sacramento River would be reduced by approximately 3% (715 cfs), during the critical growing season months (April - July). During the remaining months of the growing season (August - October) flows would be reduced, on average, by approximately 3% (377 cfs). As a result, mean monthly flows would not be reduced with sufficient magnitude and frequency to significantly alter existing riparian vegetation dependent on Sacramento River flows and the Sacramento San Joaquin Delta inflows. As a result, the aesthetic quality of

the Sacramento River and Sacramento-San Joaquin Delta, under future cumulative conditions, would not be adversely affected. This would be a less-than-significant future cumulative impact. The impacts to aesthetics identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.11-3**

Aesthetic Value of Reservoirs. *Under this set of assumptions for future conditions, the cumulative impact analysis indicates that mean monthly surface water elevations at Folsom, Shasta, and Trinity reservoirs would be reduced by less than 5 feet, in comparison to base conditions. In addition, because Lake Natoma, Whiskeytown, and Keswick Reservoir serve as regulating reservoirs, future surface water elevations at these reservoirs are not expected to change substantially. Consequently, this would be a* ***less-than-significant future cumulative impact.*** *The impacts to aesthetics identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

Based on this alternative future cumulative scenario, additional diversions and potential CVP operations would result in more frequent declines in the water surface elevation of Folsom, Shasta, and Trinity reservoirs. However, compared to base conditions, future mean monthly surface water elevations at Folsom, Shasta, and Trinity reservoirs would be reduced by less than 1%. Based on the 70-year hydrologic period of record, month-end surface water elevations would be reduced, on average, by approximately 4 feet or less at Folsom and Shasta reservoirs and approximately 8 feet or less at Trinity Reservoir. In addition, Keswick and Whiskeytown Reservoirs would continue to operate as regulating reservoirs for the larger upstream dams, so their pattern of elevation changes would not change under future cumulative conditions. This would be considered a less-than-significant cumulative impact. The impacts to aesthetics identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.12 CUMULATIVE CULTURAL RESOURCES IMPACTS

Under the alternative future cumulative condition conducted for the supplemental cumulative analysis, which includes the WFP and other reasonably foreseeable future system-wide actions (e.g., out-of-basin CVP/SWP demands, increased Sacramento Valley demands, and increased Trinity River flows), changes (e.g., lowered reservoir storage and river flows) in the hydrology of CVP/SWP waterbodies and watercourses are expected. Such changes have the potential to affect known and unknown cultural resource sites within Folsom Reservoir, the Lower American River, and the Lower Sacramento River through any combination of increased exposure, inundation, or physical deterioration caused by increased wave action. The impacts to cultural resources identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

This section provides a discussion of the potential impacts to cultural resources that could occur in Folsom Reservoir, the Lower American River, and the Lower Sacramento River under the alternative future cumulative condition conducted for the supplemental cumulative impacts analysis, relative to existing conditions.

Impact **6.12-1**

Physical Deterioration of Cultural Resource Sites in Folsom Reservoir. *Under this alternative future cumulative condition, Folsom Reservoir water surface elevations would be reduced more frequently and/or by greater magnitudes compared to that occurring solely as a result of the WFP. Future reductions in the 70-year monthly average water surface elevation would be approximately 3 to 4 ft, relative to existing elevations. Such reductions would result in a lowered zone where water-level fluctuations would be the most pronounced. The effect of this lowered fluctuation zone on cultural resources would be to expose sites that historically had experienced a higher degree of protection from erosion and other physical destructive forces. Under this alternative future cumulative condition, this would be a* ***potentially significant cumulative impact****. The impacts to cultural resources identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

It is expected that increased diversions system-wide would occur in the future. These increased diversions, both out-of-basin and those within and outside of the WFP in the American River watershed, would have the overall system-wide effect of lowered storage and water surface elevations in Folsom Reservoir. Such reductions would lower the zone where water-level fluctuations would be the most pronounced, and also increase the number of fluctuations in this zone each year. The long-term effect on cultural resources would be to expose sites that historically have been somewhat protected from erosion and hydrologic sorting through wave action, to increased vandalism, and to more rapid breakdown of organic remains through repeated wetting and drying. The impacts to cultural resources identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.12-2**

Inundation or Exposure of Cultural Resource Sites in the Lower American River. *Under this alternative future cumulative condition, river flows in the Lower American River would be reduced more frequently and/or by greater magnitudes compared to that occurring solely as a result of the WFP. With overall reductions in 70-year monthly average river flows at any location along the Lower American River (up to 16% , but generally much lower), the potential for inundation of cultural resource sites along the Lower American River would be less than that existing today. Such reductions would also not exceed those historically recorded, thereby avoiding further exposure of any cultural remains which are presently submerged. This would represent a* ***less-than-significant cumulative impact****. The impacts to cultural resources identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

It is expected that, under this alternative future cumulative condition, mean monthly river flows in the lower American River below Nimbus Dam would be lower than at present, implying that no new areas (or cultural resources) would be inundated. Overall reduction in 70-year monthly average river flows could approximate 16% but, would generally be much lower. Additionally, minimum mean monthly flows would generally be slightly lower (approximately 10 t 20 cfs), relative to current conditions. This slight reduction in minimum mean monthly flows would have negligible effects on the water surface elevation, suggesting that any cultural remains which presently are submerged (e.g., old shipwrecks) would continue to be submerged. It is expected that future changes in river flows along the lower American River between Nimbus Dam and the river mouth would have a less-than-significant cumulative effect on cultural resources. The impacts to cultural resources

identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

Impact **6.12-3**

Inundation or Exposure of Cultural Resource Sites in the Lower Sacramento River. *Under this alternative future cumulative condition, flows in the Lower Sacramento River would be reduced more frequently and/or by greater magnitudes compared to that occurring solely as a result of the WFP. Such reductions on a 70-year monthly average, however, are anticipated to be generally less than 3% , relative to existing flow conditions. These reductions would be small enough that exposure of submerged cultural resources would be highly unlikely. Moreover, any cultural resources within the river banks and floodplain would not be affected since flows would, on average, be lower, and it is assumed that the existing levee system would continue to provide channelized protection of the floodplain areas. This would be considered a* ***less-than-significant cumulative impact****. The impacts to cultural resources identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.*

It is expected that future increased water demands would result in decreased flows on the Lower Sacramento River for most of the year, with somewhat higher minimum mean monthly flows during the winter and early spring (February-April). It is conceivable that decreased flows could expose submerged cultural resources (e.g., shipwrecks), however, the decrease would be small enough (i.e., generally less than 3%, relative to existing flow conditions) that such exposure would be highly unlikely. Cultural resources along the river banks and within the floodplain would not be affected since, on average, flows would be lower, and it is assumed that the existing levee system would continue to contain river flows within the channelized portion of the river. It is expected that future changes in river flows along the lower Sacramento River near Freeport under this alternative cumulative condition would have a less-than-significant cumulative impact on cultural resources. The impacts to cultural resources identified in this supplemental analysis do not differ substantially from the impacts identified in the cumulative impact analysis in the WFP Draft EIR.

6.13 CUMULATIVE SOILS AND GEOLOGY IMPACTS

The supplemental cumulative impacts analysis is based on a set of alternative cumulative future conditions throughout the CVP/SWP, as described in Section 6.1.1, Alternative Cumulative Conditions. Since hydrologic analyses (i.e., determined through an evaluation of PROSIM output) did not factor in to the cumulative impacts assessment for soils and geology in the WFP Draft EIR, the alternative cumulative scenario for hydrologic conditions captured in the supplemental cumulative impacts analysis would not affect soils and geology throughout the region. Therefore, there would be no change to the cumulative impact determinations for soils and geology from those of the WFP Draft EIR.

6.14 MITIGATION MEASURES FOR CUMULATIVE IMPACTS AND LEVEL OF SIGNIFICANCE AFTER MITIGATION

CUMULATIVE IMPACT MITIGATION MEASURES

The WFP includes many provisions to reduce impacts, including cumulative impacts on the CVP system, Sacramento River, and Bay-Delta (refer to Section 4.1.5 of the WFP Draft EIR). In addition, mitigation measures are identified to address significant project impacts, as warranted, in Section 4.2 through 4.13 of the WFP Draft EIR for each environmental topic area.

The State CEQA Guidelines indicate that the focus of an EIR's discussion of mitigation for cumulative effects is on the measures necessary to mitigate or avoid the project's contribution to a cumulative impact. Section 15130(b)(3) of the Guidelines indicates that "[a]n EIR shall examine reasonable, feasible options for mitigating or avoiding the project's contribution to any significant cumulative effects." The identified mitigation measures for project impacts would also serve to lessen or mitigate for the WFP's contribution to the effects of the alternative future cumulative scenario modeled in the supplemental cumulative analysis. Therefore, this Final EIR also recognizes them as mitigation for cumulative impacts.

Even with the provisions in the WFP and the project mitigation measures identified in the WFP Draft EIR, unless additional water supplies are developed, there would still be remaining cumulative impacts on the CVP system, Sacramento River, and the Bay-Delta.

Many of the actions necessary to mitigate or avoid the remaining cumulative impacts are the responsibility of USBR and other federal and state agencies with jurisdiction over the affected resources, such as CALFED, USFWS, NMFS, and CDFG. The number and range of potential policy decisions and actions, or combination thereof, are considerable, and it is not feasible to predict which measures can and should be implemented by the involved federal and state agencies. Decision-making about systemwide, water resource management policies, programs, and mitigation actions is ongoing through the CALFED process, USBR implementation of the CVPIA, consultation with USFWS and NMFS in compliance with the Endangered Species Act, and other efforts. These decisions are influenced by statewide interests and state and federal mandates that are beyond the control of the Water Forum participants. Therefore, attempting to define other potential cumulative impact mitigation measures in this Final EIR, beyond those already included in the WFP or identified in the WFP Draft EIR for the project impacts, would be only speculative at this time.

LEVEL OF SIGNIFICANCE OF CUMULATIVE IMPACTS AFTER MITIGATION

The ability to entirely avoid or mitigate cumulative impacts to a less-than-significant level depends on numerous state and federal policy decisions and actions beyond the control of the Water Forum participants. If additional water supplies are developed, or diversions are reduced, it is conceivable that cumulative impacts could be mitigated by policy decisions and actions by the relevant state and federal agencies. However, it is not yet feasible to reliably predict the outcome of the various state and federal water resource management programs.

Although the provisions of the WFP and identified mitigation measures for project impacts would also help reduce cumulative impacts, it cannot be assured at this time that the significant cumulative impacts described in this Final EIR would be avoided or reduced to a less-than-significant level. Because of the uncertainty, it is necessary for CEQA compliance purposes to recognize and disclose that the cumulative impacts identified in this Final EIR could be significant and unavoidable. Consequently, any significant cumulative impacts described in Sections 6.2 through 6.13 of this Final EIR are considered to be potentially significant and unavoidable.