5.0 ENVIRONMENTAL CONSEQUENCES

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5.0 ENVIRONMENTAL CONSEQUENCES

5.1. INTRODUCTION TO ANALYSIS

This chapter discusses the potential environmental consequences or impacts resulting from the alternatives, including the Proposed Action and proposed project under review. It describes those potential environmental effects including those that would be considered significant under CEQA. While CEQA requires that a determination of significant impacts be stated in an EIS/EIR, NEPA does not. Under NEPA, significance is used to determine whether an EIS or some other level of documentation is required, and once a decision to prepare an EIS is made, the magnitude of impact is evaluated and no further judgment of significance is required.

CEQA defines a significant effect as a substantial, or potentially substantial, adverse change in the environment (Public Resources Code § 21068). CEQA (Public Resources Code § 21083(b)(1)) stipulates that a "significant effect on the environment" could occur when:

> "A proposed project has the potential to degrade the quality of the environment, curtail the range of the environment, or to achieve short-term, to the disadvantage of long-term, environmental goals."

The Guidelines implementing CEQA direct that scientific data and factual data form the basis for significance determination. The impact discussion in each of the following subchapters identifies the specific criteria for determining the significance of a particular impact. The significance criteria are consistent with the Guidelines implementing CEQA.

The CEQA Guidelines (§ 15382) recognize a significant effect on the environment as:

> "….substantial, or potentially substantial adverse change in any of the physical conditions within the area affected by the project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance. An economic or social change by itself shall not be considered a significant effect on the environment. A social or economic change related to a physical change may be considered in determining whether the physical change is significant."

The Council on Environmental Quality (CEQ) NEPA Guidelines (40 CFR 1508.27) state that the use of the term "significantly" in reference to federal actions requires consideration of both "context" and "intensity". The "significance" of a federal action must be evaluated based on society as a whole and include affected interests, the affected region, and the local area in which the Proposed Action will occur. The NEPA Guidelines (40 CFR 1508.27(b)) provide guidance on how "intensity" or the severity of an impact can be applied in the determination of impacts on specific resources.

5.2. OVERVIEW OF IMPACT ANALYSIS

The Proposed Action, which is the execution of the P.L. 101-514 new CVP water service contract, represents a direct action on the part of Reclamation and EDCWA. Accordingly, an evaluation of the potential impacts of this new water contract was performed at the *project-level*. Project-level detailed analyses focused on the potential impacts of diverting the P.L 101-514 water at two points of diversion (EID's proposed new intake – with a Temperature Control Device to their El Dorado Hills Water Treatment Plant and the American River Pump Station on the North Fork American River). Under the project-level analyses, potential changes in the operation of the coordinated CVP/SWP were evaluated. Any diversion project, given the coordinated nature of the CVP/SWP, has the potential to affect reservoirs, watercourses, and the Delta. Hydrologic modeling (see Subchapter 5.3, Hydrologic Impact Framework, below) was undertaken to quantitatively determine the extent and frequency of any such changes in the hydrologic regime of the CVP/SWP and local area waterways. This modeling output was then used as the basis upon which impact analyses for water-related resources were performed.

The primary analyses, therefore, focused on the hydrological effects of the Proposed Action on potentially affected waterbodies and waterways including those of the local area and broader CVP/SWP, including the Delta.

Program-level analyses addressed more generally, the potential impacts on resources that were non-diversion related. New diversion, conveyance, and treatment facilities are not required to execute the P.L. 101-514 contract as previously noted in Chapter 3.0 (Alternatives Including the Proposed Action and Project Description). However, because of the potential for future construction of such facilities, the potential impacts of such facilities, to the extent known, are disclosed and discussed generally at the program-level. Additionally, the water use areas or Subcontractor service areas were also assessed at the program-level. This included the various facilities, activities, land uses and other potentially affected resources within the Subcontractor service areas that are typically part of ongoing development activities within urban and rural areas. Such activities, land uses and resources have already been analyzed in the adopted El Dorado County General Plan Update and EIR, upon which this EIS/EIR relies. A detailed analysis of those activities, land uses, and resources is not repeated here.

As noted previously in Chapter 1.0 (Introduction), given the Proposed Action as described, CEQA documentation likely will be required and prepared for future projects that would divert, convey, treat and deliver this new CVP water supply. These projects will result from local agencies (e.g., EID, GDPUD, etc.) making use of the new CVP water made available under this water service contract. The project proponents that will use this EIS/EIR will likely do so in one of two possible ways. First, they would be able to rely on the hydrologic, project-level analyses conducted here, thus avoiding any reassessment of instream hydrologic effects for their projects. Second, they could tier off of the more general, program-level analyses conducted in this EIS/EIR for their proposed facilities or, as part of a potential impact assessment associated with the use of this new water supply. In either case, the reliance on information contained in this EIS/EIR would likely be limited to future CEQA-only projects.

Reclamation involvement in these future projects is unlikely, unless there are issues with facility or infrastructure projects crossing or using Reclamation lands or easements. Reclamation has no land use authority and, therefore, would not be involved in future project actions addressing the potential impacts associated with development of water delivery facilities.

So, while a program-level analysis is undertaken for certain non-diversion related resources, activities, and land uses as described for this EIS/EIR, this is not a programmatic NEPA document because further action by Reclamation is not anticipated.

The potential resources and issues addressed in this EIS/EIR were identified through a series of public involvement actions regarding the Proposed Action. A series of informal sessions with various stakeholder groups and agencies was conducted by EDCWA as part of the early project scoping process. The results of this earlier process are reported in the *Preliminary Project Scoping Task Report: CVP Water Services Contract*. As noted previously, a subsequent NOP/NOI process was initiated in 1998 and, again, most recently in the fall of 2006). All processes generated public comment and helped shaped the scope of this EIS/EIR.

As noted previously, for this EIS/EIR, resource evaluations were broken into two categories; **Diversion-related Impacts**, and **Indirect or Non-Diversion-related Impacts**. Diversion-related impacts could potentially affect the following resources and represent the basis for the resource evaluations in this EIS/EIR:

- Water Supply
- Hydropower Generation
- Flood Control
- Water Quality
- Fisheries
- Riparian Resources
- Water-related Recreation
- Water-related Cultural Resources

Indirect or non-diversion related impacts could potentially affect the following resources and represent the basis for the resource evaluations in this EIS/EIR:

- Land Use/Urban Development
- Transportation/Traffic
- Air Quality
- Noise
- Geology, Soils, Mineral Resources, and Paleontological Resources
- Recreation
- Visual Resources
- Cultural Resources
- Terrestrial and Wildlife Resources

The analsyes included in the Impacts and Mitigations Measures for each resource area is also summarized and presented in the Executive Summary, Table ES-1.

5.3. HYDROLOGIC IMPACT FRAMEWORK

Diversion-related impacts relied upon a hydrologic impact framework to generate quantitative data with which to evaluate potential impacts on water-related resources. Such potential impacts were evaluated by comparing the existing hydrologic condition (or Base Condition) with that of the simulated system after implementation of the Proposed Action and alternatives (i.e., diversion of water for the P.L.101-514 contract) using the CALSIM II model. See Subchapter 5.3.2, CALSIM II Operation, for further detail on the underlying assumptions of this approach and some of the inherent constraints and limitations on its use.

The period of record used in the hydrologic modeling for this EIS/EIR extended from 1922 through 1993 (72-years) – data is generated to 1994, but 1994 is removed. The more recent hydrologic record now incorporated into CALSIM II operation (to 2005) was unavailable at the time of preparation of this EIS/EIR. The period of record for the water temperature modeling extended from 1923 through 1993 (71-years). Similarly, early life stage salmon mortality modeling also used a 71-year period of record. These periods, based on the historic hydrologic record, are deemed to be representative of the natural variation in hydrology that is characteristic of California in recent times. It includes dry-periods (1928-1934 and 1977), wet-periods (1986), and variations in between. Extended drought, periods of high precipitation and resultant runoff, as well as "normal" water years were included in this record.

5.3.1. CALSIM II Model

CALSIM II was jointly developed by Reclamation and the California Department of Water Resources (DWR) for planning studies relating to CVP and SWP operations. The primary purpose of CALSIM II is to evaluate the water supply reliability of the CVP and SWP at current or future levels of development (e.g. 2001, 2020), with and without various assumed future facilities, and with different modes of facility operations. An extensive model, CALSIM II simulates monthly operations of the following water storage and conveyance facilities:

- Trinity, Lewiston, and Whiskeytown reservoirs (CVP);
- Spring Creek and Clear Creek tunnels (CVP);
- Shasta and Keswick reservoirs (CVP);
- Oroville Reservoir and the Thermalito Complex (SWP);
- Folsom Reservoir and Lake Natoma (CVP);
- New Melones Reservoir (CVP);
- Millerton Lake (CVP);
- C.W. Jones (CVP), Contra Costa (CVP) and Harvey O. Banks (SWP) pumping plants; and
- San Luis Reservoir (shared by CVP and SWP).

To varying degrees, CALSIM II nodes also define CVP/SWP conveyance facilities including the Tehama-Colusa, Corning, Folsom-South, and Delta-Mendota canals and the California Aqueduct. Other non-CVP/SWP reservoirs or rivers tributary to the Delta also are modeled in CALSIM II, including:

- New Don Pedro Reservoir;
- Lake McClure; and
- Eastman and Hensley lakes.

CALSIM II uses a mass balance approach to simulate the occurrence, regulation, and movement of water from one river reach (computation point or node) to another. Various physical processes (e.g., surface water inflow or accretion, flow from another node, groundwater accretion or depletion, and diversion) are simulated or assumed at each node as necessary. Operational constraints, such as reservoir size, seasonal storage limits, and minimum flow requirements, also are defined for each node. Accordingly, flows are specified as a mean flow for the month, and reservoir storage volumes are specified as end-of-month values. In addition, modeled X2 (2 parts per thousand [ppt] near bottom salinity isohaline) locations are specified as end-of-month locations, Delta outflows are specified as mean outflows for each month, and Delta export-to-inflow (E/I) ratios are specified as mean ratios for each month.

CALSIM II typically simulates system operations for a 72-year period using a monthly time-step. The model assumes that facilities, land use, water supply contracts, and regulatory requirements are constant over this period, representing a fixed level of development (e.g., 2001 or 2020). The historical flow record of October 1921 to September 1994, adjusted for the influence of land use change and upstream flow regulation, is used to represent the possible range of water supply conditions. It is assumed in CALSIM II that past hydrologic conditions are a good indicator of future hydrologic conditions. As discussed later, this concept of stationarity in hydrologic conditions has come under significant scrutiny in recent years, both temporally and spatially, with climate change representing a key causal factor in this uncertainty.

The model simulates one month of operation at a time, with the simulation passing sequentially from one month to the next, and from one year to the next. Each estimate that the model makes regarding stream flow is the result of defined operational priorities (e.g., delivery priorities to water right holders, and water contractors), physical constraints (e.g., storage limitations, available pumping and channel capacities), and regulatory constraints (flood control, minimum instream flow requirements, Delta outflow requirements). Certain decisions, such as the definition of water year type, are triggered once a year, and affect water delivery allocations and specific stream flow requirements. Other decisions, such as specific Delta outflow requirements, vary from month to month. CALSIM II output contains estimated flows and storage conditions at each node for each month of the simulation period. Simulated flows are mean flows for the month, reservoir storage volumes correspond to end-of month storage (HDR/SWRI, 2007).

CALSIM II, together with associated environmental models (e.g., Reclamation's Trinity, Shasta, Whiskeytown, Oroville, and Folsom Reservoir Water Temperature Models; Reclamation's Trinity, Sacramento, Feather, and American (with Automated Temperature Selection Procedure [ATSP]) River Water Temperature Models; Reclamation's Feather, and Sacramento River Early Life Stage Chinook Salmon Mortality Models; the LongTermGen Model; and the General Purpose Output Generation Tool) provided the predictive hydrology and environmental outputs necessary to determine potential water-related resource impacts throughout the CVP/SWP as a result of the Proposed Action and alternatives.

A more detailed discussion of CALSIM II and the modeling impact framework used in this EIS/EIR is provided below (all modeling assumptions specific to the individual model simulations are provided in Modeling Technical Memorandum, included in Appendix H in this Draft EIS/EIR).

At the present time, CALSIM II is considered the best available tool for modeling the integrated CVP and SWP and is the only system-wide hydrologic model being used by Reclamation and DWR to conduct planning and impact analyses of potential projects. While these agencies developed the model for project-related purposes, the model also has been proposed and employed for various other purposes with varying degrees of success. These limitations are discussed in more detail later.

As the official model for California's two largest inter-regional projects with implications for state-wide and Central Valley water operations and planning, CALSIM II results are often at the center of many technical and policy controversies. As such, CALSIM II, not unlike its predecessors, PROSIM 2000 and PROSIM, warrants and, in fact, has received considerable scrutiny from the water resources and environmental communities. The range of issues raised has been diverse, and includes a variety of issues and perspectives related to water supply reliability, environmental management and performance, water demands, economics, documentation, changing hydrology and climate, software, and regulatory compliance.

A primary intended use of CALSIM II is to estimate the impacts and benefits of large-scale proposed projects and regulatory actions on the state-wide system. Much of the initial focus of system-wide modeling of this nature was intended to help determine export quantities and timing. Current analyses using CALSIM II include, among others, proposed CALFED storage projects, including In-Delta storage, North of Delta Off-stream Storage (Sites Reservoir), expansion of Los Vaqueros and Shasta reservoirs, storage in the Upper San Joaquin Basin, and conjunctive use both north and south of the Delta. CALSIM II is also being used to evaluate CALFED conveyance projects such as the proposed expansion of the Banks Pumping Plant to 8,500 cubic feet per second (and possibly 10,300 cfs). Still others address the California Aqueduct/Delta-Mendota Canal Intertie, and the San Luis Reservoir Low Point Improvement Project.

Many local agencies also rely on CALSIM II results to estimate potential impacts on the integrated system based on their own specific project actions. CALSIM II has been used on the Freeport Regional Project, the Lower Yuba River Accord, the Sacramento Area Water Forum Lower American River Flow Standard, to name but a few. Similar to the reliance on predecessor models, the use of CALSIM II and any of its future revisions is anticipated to continue in the future.

5.3.2. CALSIM II Operation

The operations of CALSIM II have been described in numerous documents. The following discussion is taken from DWR (2006, 2005, 2003a, 2003b); Ferreira et al. (2005); Draper et al. (2004); and the Freeport Regional Water Project EIS/EIR (2003).

CALSIM II utilizes optimization techniques to route water through a watershed network on a monthly time-step. A linear programming/mixed integer linear programming solver determines an optimal set of decisions for each time period given a set of weights and system constraints. A key component for specification of the physical and operational constraints is the WRESL language. The model user describes the physical system (e.g., dams, reservoirs, channels, pumping plants, etc.), operational rules (e.g., flood-control diagrams, minimum flows, delivery requirements, etc.), and priorities for allocating water to different uses in WRESL statements.

CALSIM II includes a hydrology developed jointly by Reclamation and DWR. Water diversion requirements of purveyors (demands), natural stream accretions and depletions, river basin inflows, irrigation efficiencies, return flows, non-recoverable losses, and groundwater operation are components that make up the hydrology used in CALSIM II. Sacramento Valley and tributary basin hydrology is developed using a process designed to adjust the historical sequence of monthly stream flows to represent a sequence of flows at either current or future levels of development. Adjustments to historic water supplies are determined by imposing land use on historical meteorological and hydrologic conditions. San Joaquin River basin hydrology is developed using fixed annual demands and regression analysis to develop accretions and depletions. The resulting hydrology represents the water supply available from Central Valley streams to the CVP and SWP at an established level of development.

CALSIM II uses DWR's Artificial Neural Network (ANN) model to simulate the flow-salinity relationships for the Delta. The ANN model correlates DSM2 model-generated salinity at key locations in the Delta with Delta inflows, Delta exports, and Delta Cross Channel operations. The ANN flow-salinity model estimates electrical conductivity at the following four locations for the purpose of modeling Delta water quality standards: Old River at Rock Slough, San Joaquin River at Jersey Point, Sacramento River at Emmaton, and Sacramento River at Collinsville. In its estimates, the ANN model considers antecedent conditions up to 148 days, and considers a "carriage-water" type of effect associated with Delta exports.

The delivery logic CALSIM II utilizes in determining deliveries to North-of-Delta and South-of-Delta CVP and South-of-Delta SWP contractors uses runoff forecast information that incorporates uncertainty and standardized rule curves (i.e., Water Supply Index versus Demand Index Curve) to estimate the water available for delivery and carryover storage. Updates of delivery levels occur monthly from January 1 through May 1 for the SWP and March 1 through May 1 for the CVP as water supply parameters become more certain. The South-of Delta SWP delivery is determined based upon water supply parameters and operational constraints. The CVP system wide delivery and South-of-Delta delivery are determined similarly upon water supply parameters and operational constraints with specific consideration for export constraints.

CALSIM II incorporates procedures for dynamic modeling of Section 3406(b)(2) of the CVPIA and the Environmental Water Account (EWA), under the CALFED Framework and Record of Decision (ROD). Per the October, 1999 Decision and the subsequent February, 2002 Decision, CVPIA 3406(b)(2) accounting procedures are based on system conditions under operations associated with SWRCB D-1485 and D-1641 regulatory requirements. Similarly, the operating guidelines for selection of actions and allocation of assets under the EWA are based on system conditions under operations associated with SWRCB D-1641 regulatory requirements. This requires sequential layering of multiple system requirements and simulations. CVPIA 3406(b)(2) allocates 800 TAF (600 TAF in Shasta critical years) of CVP project water to targeted *fish actions*. The full amount provides support for SWRCB D-1641 implementation. According to monthly accounting, 3406(b)(2) actions are dynamically selected according to an action matrix. Several actions in this matrix have defined reserve amounts that limit 3406(b)(2) expenditures for lower priority actions early in the year such that the higher priority actions can be met later in the year.

5.3.3. CALSIM II Simulations

The utility of CALSIM II in environmental analyses is based on its ability to provide comparative data results. This is an important point since CALSIM II, as with most gross-scale, long time-step (monthly) hydrologic simulations, are appropriate for the purposes upon which they were designed but not necessarily for other evolved and evolving applications. While CALSIM II has, and continues to be used for environmental analyses of specific project (or action) increments, its strength does not lie in those types of applications. Nevertheless, with an integrated CVP/SWP and coordinated operations throughout the many interconnecting watersheds, CALSIM II is a useful and accepted tool to gauge system-wide hydrological changes resulting from a particular action. Again, as noted, it does so within a comparative framework where, the results of the with-project condition are compared against the baseline or no-project condition.

Accordingly, the results from a single simulation may not necessarily represent the exact operations for a specific month or year, but should reflect long-term *trends*. Since CALSIM II is not designed to accurately predict operations and flows, results from individual months should be considered only in the context of overall trends and averages. CALSIM II represents operational or regulatory thresholds through the use of step functions. Due to CALSIM's dynamic responses to system conditions, slight changes in model inputs or operations could trigger responses which may significantly vary on an individual monthly basis between the Base Condition and "Project" simulation. These dynamic responses, however, often average out over longer time periods. It is these longer-term *trends* which are useful in determining potential effects of larger diversion projects on the coordinated CVP/SWP.

Table 5.3-1 identifies the comparisons that were made for this EIS/EIR between simulations to identify the potential effects associated with each of the action alternatives, including the Proposed Action and project. Base Condition denotes Current Conditions under existing hydrology, demands, and operations. As described previously, the nomenclature for the Alternatives uses descriptors identifying the various diversion scenarios included in this environmental analysis. In many of the CALSIM II tables included in the following subchapters, Proposed Action – Scenario A is identified.

This corresponds to Alternative 2A – Proposed Action Scenario A, but is shortened for brevity. Similarly, Alternative 2B corresponds to Proposed Action – Scenario B, and so on.

TABLE 5.3-1

CALSIM II MODELING COMPARISONS

Intended Analysis	Base Scenario	Compared Against
No-Action	(Base Condition – Current Level)	N/A
No-Project	(Base Condition – Current Level)	N/A
Proposed Action or Project (EID/GDPUD Split)	(Base Condition – Current Level)	Alternative 2A – Proposed Action – Scenario A
Proposed Action or Project (Max EID)	(Base Condition – Current Level)	Alternative 2B – Proposed Action – Scenario B
Proposed Action or Project (Max GDPUD)	(Base Condition – Current Level)	Alternative 2C – Proposed Action – Scenario C
Water Transfer Alternative	(Base Condition – Current Level)	Alternative 3 – Water Transfer
Reduced Diversion Alternatives	(Base Condition – Current Level)	Alternative 4C – Reduced Diversion
Future Cumulative	(Base Condition – Current Level)	Future Cumulative Condition
Proposed Action Increment within Future Cumulative[1]	Future No Action	Future Cumulative Condition
Proposed Action Increment within Future Cumulative[1]	(Base Condition) Vs Future Cumulative Condition Minus Proposed Action (Base Condition) Vs Future No Action	

Notes:
1. For increment of Proposed Action on the Future Cumulative Condition, there are two possible evaluations. Both were evaluated.
2. For the analysis of the Reduced Diversion Alternatives, modeling was performed on Alternative 4C – Reduced Diversion (7,500 AFA total) as this represented the largest reduction, relative to the full contract amount of 15,000 AFA. Separate model runs for Alternative 4A – Reduced Diversion (12,500 AFA) and Alternative 4B – Reduced Diversion (10,000 AFA) were not performed. This was considered appropriate given the accepted acuity of CALSIM II (i.e., inability to accurately depict increments of 2,500 AFA) and the fact that the "bookend" reduction of 7,500 AFA was modeled.

Source: Revised from HDR//SWRI (2007).

CALSIM II modeling undertaken for Reclamation's Operations Criteria and Plan (OCAP) Biological Assessment for Delta Smelt was used to provide the foundation for CVP/SWP system-wide baseline conditions simulations used to represent the Base Condition and the Future No Action scenarios.

The modeling output, which total over 2,800 pages, are incorporated into this Draft EIS/EIR, as Appendix I. Due to the physical volume of the printed output, the data are provided on a separate CD within Volume 2 (Technical Appendices) of this Draft EIS/EIR. Alternately, the data CD may be requested from Reclamation or EDCWA during normal business hours.

The specific OCAP simulation relied upon as the initial foundation is identified as: OCAP_2001D10A_TodayEWA_012104, or the OCAP 3 simulation. It is an existing or Current Level simulation with many of the desired baseline assumptions. However, the OCAP 3 simulation did not include the higher Trinity River minimum flow requirements of the ROD for the Trinity River Main Stem Fishery Restoration Environmental Impact Statement/Environmental Impact Report (EIS/EIR). These new requirements were added, and the results reviewed by Reclamation, in a CALSIM II simulation commonly referred to as OCAP 3a. The Base Condition is based on the OCAP 3a simulation. The Future No Action simulation is based on the OCAP_2020D09D_FutureEWA5a simulation.

These two foundation or initial baseline simulations were modified to include updated inputs for lower Yuba River outflow to the Feather River, lower Yuba River diversions at Daguerre Point Dam, Trinity River instream flow requirements downstream of Lewiston Dam (by use of OCAP 3a), and

EID diversion at Folsom Reservoir, as required, and run to produce the existing (Current Level) and Future Level baseline simulations. These initial baseline simulations were then modified as required to implement the specific attributes of the Proposed Action and/or alternatives and, at the time of preparation, represented the most up-to-date renditions of CVP/SWP baseline hydrology.

5.3.4. CALSIM II Limitations

Regardless of the model, they only approximate natural phenomenon. In fact, most models are inherently inexact because the mathematical description is either imperfect and/or our understanding of the inherent processes is incomplete. The mathematical parameters used in models to represent real processes are often uncertain because these parameters are empirically determined or represent multiple processes. Additionally, the initial or starting conditions and/or the boundary conditions in a model may not be well known. CALSIM II, despite its powerful capabilities, remains a model and, as such, is subject to the same issues regarding limitations as any other model.

As noted previously, CALSIM II is able to simulate the integrated CVP/SWP system over the 72-year historical hydrology. In theory, such simulation allows model users to assess the effects that certain actions would have had on the system had they been implemented in any year of the historical record. The ability of the model to represent a *predictive* indicator of the effect of certain actions into the future, however, largely depends on the representative nature of historical hydrology, relative to likely future hydrology. This is a very important point. With growing concerns throughout the scientific community, past hydrology, it is felt, may not be a good indicator of the hydrological conditions one could expect in the future. A good example of this concern is related to global climate change. While most water practitioners accept climate change as an eventual reality and agree with its inevitability, the degree to which it will affect specific resources and the temporal pattern of that effect say, over a season, is still largely a subject of continuing debate. Water managers today have begun to consider global climate change in earnest when planning for the future. Unfortunately, at the time modeling for this Proposed Action was completed, CALSIM II was not well-suited to model perturbed hydrology or other future scenarios where non-stationarity in hydrologic or meteorologic processes are relevant. Current CALSIM II work, however, is moving towards including those types of analyses.

CALSIM II also lacks detailed documentation regarding the known limitations and weakness of the model. Without a clear understanding of the model's formulation, water managers have been wary of applying it in a predictive (absolute) mode. A long-standing issue is that error bars need to be specified for all CALSIM II output; this would be especially applicable where the model was being used in predictive mode (Ferreira et al., 2005).

From a temporal perspective, there is ongoing concern that CALSIM II's monthly time step cannot accurately capture hydrologic variability and, thus, does not compute water exports and export capacity accurately, both of which are significant factors in CVP/SWP operations. CALSIM II's inability to capture within-month variations often results in overestimates of the volume of water the projects can export from the Bay-Delta and makes it seem easier to meet environmental standards than it is in real-time operations. Many of the system's operations function, in fact, on a shorter time scale. CALSIM II cannot represent them well given its current formulation. On the other hand, it is unclear if reducing the time step would result in more accurate or more useful data results given the additional data and assumptions that would be needed to characterize the system at this finer temporal resolution. A daily time step might, in fact, worsen some problems due to questions regarding the precise timing of short events (Ferreira et al., 2005).

CALSIM is also limited by its geographic coverage. For CALSIM II to be a truly State-wide model, it needs to fully cover the Bay Area, Tulare Basin (including the Friant-Kern and Madera canals, eastside San Joaquin reservoirs, and Millerton), Yuba River Basin (for potential water transfer opportunities), Colorado River, Colorado River and Los Angeles aqueducts, and all local Southern California projects. Coupled with a need for greater geographic coverage, CALSIM II should also include management options available in California at both the regional and local levels. Inter– and intra-agency water transfers are now commonplace, as are other management options such as groundwater banking (e.g., aquifer-storage-recovery), conjunctive use, desalination, and water conservation. Accordingly, to effectively simulate the array of potential water operations available within the State, CALSIM II needs to include a wider range of management options, facilities, and regions. It is vital that those involved in the management of California's water be able to analyze how local, regional, and State facilities and options best go together. California does not currently have a model or modeling framework capable of such integrated analysis, to parallel the kinds of integrated management thinking being pursued at local, regional, and state-wide levels (Ferreira et al., 2005).

CALSIM II is also currently lacking in its ability to perform hydropower computations, which is an important component of the federal CVP system. This should ideally include risk-based power capacity evaluation, and possibly incorporate the indexed sequential hydrologic modeling method that Reclamation has used for many years in hydropower capacity analysis. Also, hydropower should not simply be an after-the-fact calculation as it is with the use of the Long-Term Gen Model, but explicitly included in the system objectives and incorporated into CALSIM II.

With respect to groundwater, CALSIM is acknowledged as being significantly limited. Groundwater is modeled as a series of inter-connected lumped-parameter basins. Groundwater pumping, recharge from irrigation, stream-aquifer interaction and inter-basin flow are calculated dynamically by the model. The purpose of the multi-cell groundwater model is to better represent groundwater levels in the vicinity of the streams to better estimate stream gains and losses to aquifers.

In the Sacramento Valley, groundwater is explicitly modeled in CALSIM II using a multiple-cell approach based on Drainage Service Area (DSA) boundaries. For the Sacramento Valley, there are a total of 14 groundwater cells. Currently, no multi-cell model has been developed for the San Joaquin Valley. Instead, stream-aquifer interaction is estimated from historical stream gage data. These flows are fixed and are not dynamically varied according to stream flows or groundwater elevation.

Groundwater availability from aquifers is poorly represented in the model. This results from the fact that aquifers in the northern part of the State (Sacramento Valley) have not been thoroughly investigated regarding their storage and recharge characteristics. Thus, in the model, upper bounds on potential pumping from aquifers remain undefined. Realistic upper bounds to pumping from any of the aquifers represented in the model need to be developed and implemented. In addition, historical groundwater pumping is used to estimate local groundwater sources in the model; however, the information on the historical pumping is very limited, causing these pumping rates to be very uncertain. Improved pumping information is required and an analysis of the effect of this uncertainty on model results needs to be conducted. In general, the level of representation of groundwater in CALSIM II is not optimal.

Finally, CALSIM II is still relatively new and many of today's users remain unfamiliar with its full capabilities and limitations. The fact that CALSIM II is priority-based rather than rule-based, adds to this uncertainty, since the model's structure and logic differ significantly from previous models (e.g., DWRSIM and PROSIM). The strengths and alleged weaknesses of CALSIM II are not only technical (software, data, and methods), but also institutional in how this model has been developed and utilized.

5.3.5. CALSIM III Development

In response to the December 2003 recommendations made by the CALFED Science Program review panel on improvements to the existing CALSIM II model, Reclamation and DWR jointly developed a program to enhance the capabilities of the model and improve on the applicability of the model in use for water resources planning in California. The highest priority in this phase of model development was given to overhauling the representation of the Sacramento Valley hydrology. Among the numerous features of this development project are the following: 1) defining new water budget area boundaries (WBAs) for a higher resolution representation of the physical system, 2) enhancement of methodologies for estimating local water supplies, 3) developing a more accurate representation of the CVP/SWP and non-project demands in the Sacramento Valley, 4) enhancement of procedures for allocating priorities to meet demands from multiple sources of surface water and groundwater, and 5) enhancement of current and/or development of new methodologies for simulating groundwater flow and the surface water-groundwater interaction. This effort will result in a new schematic representation of the water resources system (California Department of Water Resources, Bay-Delta Office, 2007).

5.4. WATER SUPPLY (DIVERSION-RELATED IMPACTS)

This subchapter presents an analysis of potential effects on water supply due to implementation of either the Proposed Action or alternatives. The enumeration of potential impacts addresses environmental conditions through the areas described in the Affected Environment that could be directly affected by the diversion of new CVP contract water from Folsom Reservoir or, through an exchange on the North Fork American River.

5.4.1. CEQA Standards of Significance

For the purposes of this EIS/EIR, impacts on water supply may be deemed significant if implementation of the Proposed Action or its alternatives would:

- Result in a substantial reduction in annual delivery allocations to CVP customers under all water-year types including dry-year sequences;

- Result in a substantial reduction in annual delivery allocations to SWP customers under all water-year types including dry-year sequences;
- Result in a substantial reduction in annual delivery allocations to purveyors of the Sacramento Area Water Forum under their individual Purveyor-Specific Agreements (PSAs);
- Result in a substantial reduction in pumping at the State pumps for annual delivery to South of Delta contractors;
- Result in operations inconsistent with the existing or anticipated CVP-OCAP or COA; and,
- Result in an inadvertent reduction in groundwater aquifer yields in any of the North, Central or South area aquifers

5.4.2. Impacts and Mitigation Measures

Please note that for this subchapter and all resource impact subchapters that follow, the analysis provided under Impacts and Mitigations Measures is summarized and presented in the Executive Summary, Table ES-1.

5.4-1 Effects on delivery allocations to CVP customers.

Alternative 1A – No Action Alternative

Under the No Action Alternative, the contract between Reclamation and EDCWA for delivery of the 15,000 AF would not be established. However, other water supply projects could and, would likely be pursued. These options could cover a range of supplies. For the purposes of this analysis, it was assumed that a non-CVP water supply (e.g., water right) would be acquired. CALSIM II modeling, therefore, could rely on the results from Alternative 3 – Water Transfer Alternative which showed no significant impacts on CVP customers. Similarly, there would be no significant impacts on CVP customers under the No Action Alternative.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no additional water supplies would be acquired. Since no new CVP contract(s), transfers, or independent water supplies (e.g., water rights) would be acquired, the hydrologic baseline for all waterbodies would remain static, at Base Condition levels. No impacts would result to CVP customers under the No Project Alternative.

Alternatives 2A, 2B, and 2C – Proposed Action – All Scenarios

Tables 5.4-1A through 5.4-1D illustrate the 72-year mean differences in simulated annual deliveries to CVP contractors between the Base Condition and Proposed Action – Scenario A, for CVP M&I (North of Delta), Ag (North of Delta), M&I (South of Delta), and Ag (South of Delta) contractors. For each of the CVP contractor categories, there was virtually no difference in the 72-year mean under the Proposed Action – Scenario A, relative to the Base Condition. As noted in Subchapter 5.3.3 (CALSIM II Simulations), the Proposed Action – Scenario A, as labeled in these tables and all ensuing tables in Chapters 5 and 6, correspond to Alternative 2A – Proposed Action - Scenario A, consistent with nomenclature used in the Executive Summary and Chapter 3.0 (Alternatives Including the Proposed Action and Project Description).

TABLE 5.4-1A

ALLOCATIONS TO CVP M&I CONTRACTORS (NORTH OF DELTA) (TAF)

	Base Condition	Proposed Action[1] Scenario A	Absolute Difference	Relative Difference (%)
Mean	30.6	30.6	0.0	0.2
Median	25.3	25.3	0.0	0.0
Min.	8.0	8.0	-9.9	-30.0
Max.	59.4	59.4	7.7	38.0

Note:
1. Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

TABLE 5.4-1B

ALLOCATIONS TO CVP AG CONTRACTORS (NORTH OF DELTA) (TAF)

	Base Condition	Proposed Action[1] Scenario A	Absolute Difference	Relative Difference (%)
Mean	235.4	235.2	-0.2	0.0
Median	295.2	295.0	0.0	0.0
Min.	0.0	0.0	-7.7	-4.5
Max.	359.0	359.0	1.4	11.2

Note:
1. Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

TABLE 5.4-1C

ALLOCATIONS TO CVP M&I CONTRACTORS (SOUTH OF DELTA) (TAF)

	Base Condition	Proposed Action[1] Scenario A	Absolute Difference	Relative Difference (%)
Mean	123.2	123.2	0.0	0.0
Median	134.0	134.1	0.0	0.0
Min.	72.1	72.1	-0.9	-0.6
Max.	144.1	144.1	0.6	0.8

Note:
1. Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

TABLE 5.4-1D

ALLOCATIONS TO CVP AG CONTRACTORS (SOUTH OF DELTA) (TAF)

	Base Condition	Proposed Action[1] Scenario A	Absolute Difference	Relative Difference (%)
Mean	1090.5	1091.4	0.0	0.1
Median	1267.2	1263.9	0.0	0.0
Min.	0.0	0.0	-70.4	-4.9
Max.	1840.6	1840.6	109.6	11.2

Note:
1. Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

CALSIM II modeling simulations, when reviewed over the entire 72-year period of record, however, showed maximum changes in modeled M&I deliveries for any one year ranging from a decrease of 9,900 AF to an increase of 7,700 AF and was confined to North of Delta water purveyors (see Proposed Action – Scenario A, Technical Appendix I, this Draft EIS/EIR). In these years, the deliveries generally corresponded to water year type and, equally important, previous year carryover storage. A careful inspection of individual year trends and relationships between years did not reveal distinguishable bias that would suggest the existence of a genuine impact (see Proposed Action – Scenario A, Technical Appendix I, this Draft EIS/EIR).

For example, the 1944 hydrologic year simulated deliveries to decrease by 9,900 AF North of the Delta. This was a dry water year with a Base Condition delivery allocation of 33,000 AF (above the 72-year mean) and followed three consecutive wet-years. The elevated Base Condition allocation could be achieved with the likely higher carryover storage that would have resulted from the three previous wet-years. By contrast, the 1962 hydrologic year showed a simulated increase in allocations, relative to the Base Condition of 7,700 AF. The 1962 hydrologic year was below-normal water year and followed two dry-years where, CVP M&I deliveries were substantively increased (but starting at a lower Base Condition allocation). North of the Delta, this would not be unusual since in drier years, with other supplies (e.g., water rights) would be restricted and contractors would have no other recourse but to call upon its CVP entitlements.

For all eleven critically-dry years contained in the 72-year simulation, no significant changes in allocations were observable in the modeled results between Alternative 2A – Proposed Action – Scenario A and the Base Condition.

CVP Ag deliveries showed a much wider range of potential single year increases and decreases (e.g., 70,000 AF and 109,000 AF). This is not surprising given the higher volatility in annual and inter-annual delivery consistency experienced by Ag contractors, relative to M&I contractors and, as previously described, is largely reflected in Reclamation water shortage policy.

Given the undetectable changes in simulated deliveries under Alternative 2A – Proposed Action – Scenario A, relative to the Base Condition as reflected in the long-term, 72-year mean, no significant water supply impacts on CVP customers would occur under the action defined by Proposed Action – Scenario A.

Under Alternatives 2B and 2C – Proposed Action – Scenarios B and C, the CALSIM II simulated modeling results were identical (see Proposed Action – Scenario B and C, Technical Appendix I, this Draft EIS/EIR). Alternatives 2B and 2C under the Proposed Action Scenarios B and C would, therefore, have no significant water supply impacts on CVP customers.

Alternative 3 – Water Transfer Alternative

Under Alternative 3 – Water Transfer Alternative, project water needs would be wholly replaced with other water supplies (i.e., assumed water transfer). As noted previously, for EDCWA to affect a water transfer, a willing purveyor with a reliable long-term water supply would have to be identified. While it is possible that a transfer could exist as a CVP water assignment, it is more likely that a water rights transfer would occur. Regardless, as a *transfer* alternative, no additional CVP diversions would occur under this alternative as previously described (i.e., at most, this would involve a re-allocation or shift in existing entitlements). While it is accepted that diversions of water rights do affect CVP yield, the precise manner with which Reclamation would choose to re-adjust its operations to accommodate a lower yield in any given year is highly variable. Whether system operations would be able to detect a change is questionable. In any case, CALSIM II modeling of this alternative revealed that CVP allocations to all categories and CVP areas would remain virtually unchanged from the Base Condition (see Water Transfer Alternative, Technical Appendix I, this Draft EIS/EIR). Alternative 3 – Water Transfer Alternative, therefore, would have no significant water supply impacts on CVP customers.

Alternative 4A – Reduced Diversion Alternative (12,500 AFA)

As shown for Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, the potential impacts on CVP contractors (M&I and Ag) both north and south of the Delta were negligible and were deemed unlikely to represent a significant impact. With a reduced diversion under this alternative to 12,500 AFA, the impacts would be less, than the full 15,000 AFA modeled for Alternatives 2A, 2B and 2C. Alternative 4A – Reduced Diversion Alternative (12,500 AFA), therefore, would result in no significant water supply impacts on CVP customers.

Alternative 4B – Reduced Diversion Alternative (10,000 AFA)

Alternative 4B – Reduced Diversion Alternative (10,000 AFA), with diversions reduced to 10,000 AFA would intuitive have less of a hydrologic effect on water supplies than any of the previous alternatives. As shown for Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, the potential impacts on CVP contractors (M&I and Ag) both north and south of the Delta were negligible and were deemed unlikely to represent a significant impact. With a reduced diversion under this alternative to 10,000 AFA, the impacts would be less, than the full 15,000 AFA modeled for Alternatives 2A, 2B and 2C. Alternative 4B – Reduced Diversion Alternative (10,000 AFA), therefore, would result in no significant water supply impacts on CVP customers.

Alternative 4C – Reduced Diversion Alternative (7,500 AFA)

Under Alternative 4C – Reduced Diversion Alternative (7,500 AFA), with the total diversions reduced by one-half, that is, to 7,500 AF total, the single year decreases under CVP M&I North of Delta were no longer detectable by CALSIM II modeling simulation. Alternative 4C – Reduced Diversion Alternative, therefore, would have no significant water supply impacts on CVP customers.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Alternatives including the Proposed Action – Scenarios.

5.4-2 Effects on delivery allocations to SWP customers.

Alternative 1A – No Action Alternative

Under the No Action Alternative, deliveries to SWP customers would mimic those simulated under Alternative 3 – Water Transfer Alternative. Consistent with the description of Alternative 3 – Water Transfer Alternative, this is a reasonable assumption. Accordingly, no significant impacts on SWP customers would occur under the No Action Alternative.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no additional water supplies would be acquired. Since no new SWP contract(s), transfers, or independent water supplies (e.g., water rights) would be acquired, the hydrologic baseline for all water bodies would remain static, at Base Condition levels. No impacts would result to SWP customers under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios

Table 5.4-2A reveals the CALSIM II simulated delivery allocations to SWP contractors under Alternative 2A – Proposed Action – Scenario A, relative to the Base Condition. Over the 72-year period of record, the mean delivery allocations to SWP customers would approximate 2,860,000 AF under the Base Condition.

TABLE 5.4-2A

ALLOCATIONS TO SWP CONTRACTORS (TAF)

	Base Condition	Proposed Action[1] Scenario A	Absolute Difference	Relative Difference (%)
Mean	2858.9	2855.7	-3.2	-0.2
Median	3232.1	3231.5	0.0	0.0
Min.	173.8	173.8	-54.8	-3.9
Max.	3729.5	3729.5	32.6	1.9

Note:
1. Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

Simulated delivery allocations under Alternative 2A – Proposed Action – Scenario A would decrease annual allocations, on average by 3,200 AF (or 0.2 percent). Similar to CVP simulated allocations, there would be specific year changes that could either increase or decrease, relative to the Base

Condition. Substantial single year decreases occur during dry-year sequences such as the 1931-1934 period where, annual deliveries would be approximately 50,000 AF (or 3-4 percent) less than the Base Condition. The other hydrologic period of note is the 1960-1961 dry period. Simulated SWP delivery allocations would be 26,000 to 33,000 AF less (or 1-3 percent less) than the Base Condition (see Proposed Action – Scenario A, Technical Appendix I, this Draft EIS/EIR).

While the overall 72-year mean change in annual deliveries to SWP customers would not significantly be disrupted by the Proposed Action – Scenario A, as expressed by the 0.2 percent decrease, relative to the Base Condition, specific year decreases of substantial magnitude would occur. The most significant of these, however, are confined to the dry and critically-dry periods, for example 1931-1934 where, Base Condition deliveries would already be low; at approximately 50 percent of the 72-year mean. During these times, it is reasonable to expect that SWP contractors would be already aggressively investigating alternative dry-year supplies, with or without the Proposed Project effects. Accordingly, Alternative 2A – Proposed Action – Scenario A would not, in and of itself, result in significant impacts on SWP water customer deliveries.

For Alternatives 2B and 2C – Proposed Action – Scenarios B and C, the CALSIM II simulated modeling results were identical (see Proposed Action – Scenario B and C, Technical Appendix I, this Draft EIS/EIR) to that of Alternative 2A. Alternatives 2B and 2C – Proposed Action, under Scenarios B and C would, therefore, have no significant water supply impacts on SWP customers.

Alternative 3 – Water Transfer Alternative

Under Alternative 3 – Water Transfer Alternative, the simulated long-term 72-year mean SWP delivery allocation would decrease by 8,700 AF (or 0.5 percent) as shown in Table 5.4-2B. Similar to CVP contractors, notable decreases in SWP customer deliveries under this alternative, relative to the Base Condition were noted during the dry and critically-dry period of 1932-1934. Under this period’s hydrology, modeled deliveries were reduced by approximately 113,000 AF (or about 8 percent), relative to the Base Condition (see Water Transfer Alternative, Technical Appendix I, this Draft EIS/EIR). The other hydrologic period of note is during the late 1980’s, where CALSIM II model output showed decreases in SWP deliveries of about 16,000 AF and 25,000 AF in 1989 and 1990, respectively, under Alternative 3 – Water Transfer Alternative. Intuitively, decreases (or gains for that matter) of these magnitudes do not seem to comport with the increment of diversion contemplated by the project (i.e., 15,000 AF). This anomaly is explained in the discussion of CALSIM II simulations and its limitations in previous chapters. Due to CALSIM's dynamic responses to system conditions, slight changes in model inputs or operations could trigger responses which may significantly vary on an individual monthly basis between the Base Condition simulation and “Project” or “Action” simulation. Focusing on the 72-year mean, as an indicator of delivery trend under this alternative, the mean relative change (as a percent) is less than one percent. In most years, no changes were determined through modeling. It is reasonable to conclude that no significant impacts on SWP customers would occur under Alternative 3 – Water Transfer Alternative when contrasting the actual diversion amount of 15,000 AFA to the simulated CALSIM II output.

TABLE 5.4-2B

ALLOCATIONS TO SWP CONTRACTORS (TAF)

	Base Condition	Proposed Action[1] Scenario A	Absolute Difference	Relative Difference (%)
Mean	2858.9	2855.7	-8.7	-0.5
Median	3232.1	3231.0	0.0	0.0
Min.	173.8	173.8	-118.8	-8.3
Max.	3729.5	3729.5	39.5	1.9

Notes:
1. Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

Alternative 4A – Reduced Diversion Alternative (12,500 AFA)

As shown for Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, the potential impacts on SWP contractors were negligible and were deemed unlikely to represent a significant impact. With a reduced diversion under this alternative to 12,500 AFA, the impacts would be less, than the full 15,000 AFA modeled for Alternatives 2A, 2B and 2C. Alternative 4A – Reduced Diversion Alternative (12,500 AFA), therefore, would result in no significant water supply impacts on SWP contractors.

Alternative 4B – Reduced Diversion Alternative (10,000 AFA)

Alternative 4B – Reduced Diversion Alternative (10,000 AFA), with diversions reduced to 10,000 AFA would intuitive have less of a hydrologic effect on water supplies than any of the previous alternatives. As shown for Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, the potential impacts on SWP contractors were negligible and were deemed unlikely to represent a significant impact. With a reduced diversion under this alternative to 10,000 AFA, the impacts would be less, than the full 15,000 AFA modeled for Alternatives 2A, 2B and 2C. Alternative 4B – Reduced Diversion Alternative (10,000 AFA), therefore, would result in no significant water supply impacts on SWP contractors.

Alternative 4C – Reduced Diversion Alternative (7,500 AFA)

Under Alternative 4C, where diversions were reduced by one-half, CALSIM II modeling simulations could not detect any measurable long-term changes in mean annual delivery allocations. The absolute difference in the 72-year mean annual delivery allocations for SWP customers was 300 AF and, at the delivery volumes assumed, undetectable as a percentage (see Reduced Diversion Alternative, Technical Appendix I, this Draft EIS/EIR). Accordingly, Alternative 4C – Reduced Diversion Alternative (7,500 AFA) would have no significant impact on SWP customer delivery allocations.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Alternatives including the Proposed Action – Scenarios.

5.4-3 Effects of delivery allocations to purveyors of the Sacramento Water Forum Agreement as provided under their Purveyor-Specific Agreements (PSAs).

Alternative 1A – No Action Alternative

Under the No Action Alternative, anticipated effects on Water Forum Agreement purveyors would be similar to those captured by the modeling simulations under Alternative 3 – Water Transfer Alternative. This is because under the No Action Alternative, it is presumed that EDCWA (along with its member participants) would pursue alternative water supplies, most likely in the form of a long-term transfer or assignment. Moreover, such actions, if made with existing Water Forum Agreement purveyors would be made with the full knowledge by the issuing purveyor of what the implications to their water supply entitlements would be. Under the No Action Alternative, there are no significant perceived impacts on the water delivery allocations of the Water Forum Agreement purveyors.

Alternative 1B – No Project Alternative

Under the No Project Alternative, with no changes to water delivery allocations beyond current conditions anywhere, by EDCWA or its member agencies, there would be no impact on the water delivery allocations to the Water Forum Agreement purveyors.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios

Table 5.4-3A shows the delivery allocations at specific nodes with the CALSIM II model framework. The nodes identified include those for: D300 – North Fork American River at the Auburn/PCWA Pumps; D302 – American River at the City of Sacramento Fairbairn WTP (near Howe Avenue); D8 – Folsom Dam and Reservoir; and D167 – City of Sacramento's SWRTP on the Sacramento River just downstream from its confluence with the lower American River.

TABLE 5.4-3A

**ALLOCATIONS TO WATER FORUM PURVEYORS IDENTIFIED BY CALSIM NODE
72-YEAR MEAN ANNUAL SIMULATED DIVERSIONS
(DELIVERY YEAR MARCH – FEBRUARY)
(TAF)**

CALSIM Node	Base Condition	Proposed Action[1] Scenario A	Absolute Difference	Relative Difference (%)
D300	35.1	41.1	6.0	17.1
D8	123.7	129..9	6.2	5.0
D302	124.4	124.4	-0.1	0.0
D167	28.4	28.4	0.0	0.3

Note:
1. Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

Under Alternative 2A – Proposed Action – Scenario A, modeled delivery allocations at the American River Pump Station (D300) and Folsom Dam (D8) showed a long-term average annual increase (based on 72-year hydrologic modeling) of 6,000 AF and 6,200 AF, respectively. This is consistent with the Proposed Action, as defined, for the anticipated project diversions at these locations for both EID and GDPUD. These modeling results indicate that, over the long-term (based on 72-year historic hydrology) and, taking into consideration water availability (through Reclamation imposed shortage policy cutbacks), GDPUD could expect to receive 6,000 AF (or 80 percent) on an average annual basis and EID could expect to receive 6,200 AF (or 83 percent) of their allocated quantities under this action. Individual year allocations, however, would vary depending on water availability and Reclamation operational decisions.

From a water supply impact perspective, Table 5.4-3A confirms that local water purveyors who divert at other locations would not be affected by the Proposed Action; both the American River and Sacramento River diversions of the City of Sacramento remained unchanged, relative to the Base Condition. The Water Forum Agreement purveyors, who divert from Folsom Reservoir, the lower American River, and the Sacramento River would remain unaffected by Alternative 2A – Proposed Action – Scenario A.

A review of the other allocation scenarios (between EID and GDPUD) under Alternatives 2B and 2C indicate that similar results to those of Alternative 2A, based on separate CALSIM II modeling simulations, would also hold true. Table 5.4-3B shows the simulated allocations for each of the same CALSIM II nodes, but this time under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Under this scenario, all of the proposed new contract water is shifted to EID for diversion at Folsom (D8); the modeling results confirm this. No significant changes in the long-term anticipated delivery allocations at any other of the diversion locations are identified. Alternative 2C, with a shift of 11,000 AF to GDPUD and 4,000 AF to EID showed the same trends in the modeling results.

TABLE 5.4-3B

ALLOCATIONS TO WATER FORUM PURVEYORS IDENTIFIED BY CALSIM NODE
72-YEAR MEAN ANNUAL SIMULATED DIVERSIONS
(DELIVERY YEAR MARCH – FEBRUARY)
(TAF)

CALSIM Node	Base Condition	Proposed Action[1] Scenario B	Absolute Difference	Relative Difference (%)
D300	35.1	34.2	-1.0	-2.7
D8	123.7	136..4	12.7	10.2
D302	124.4	124.4	-0.1	0.0
D167	28.4	28.4	0.0	0.3

Note:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.

Under Alternatives 2A, 2B and 2C – Proposed Action – Scenarios A through C, no significant impacts on the anticipated water delivery allocations to any of the Water Forum Agreement purveyors would occur.

Alternative 3 – Water Transfer Alternative and Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives

Under the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), no significant impacts on water delivery allocations to any of the Water Forum Agreement purveyors would occur (see Reduced Diversion Alternative, Technical Appendix I, this Draft EIS/EIR, which was modeled for Alternative 4C). Under Alternative 3 – Water Transfer Alternative, the impacts on the long-term allocations to the same Water Forum Agreement purveyors remain unchanged. However, the actual long-term simulated diversions at both the American River Pump Station and Folsom Reservoir not only increase but, in the case of Folsom Reservoir, significantly so (see Water Transfer Alternative, Technical Appendix I, this Draft EIS/EIR). This is because of the fact that not all purveyors diverting from Folsom Reservoir have Purveyor-Specific Agreements defined under the Water Forum, (i.e., there are diversions occurring outside of those specifically tied to Water Forum PSAs). As far as any potential impacts on the Water Forum Agreement purveyors, however, the anticipated impacts based on modeled simulations would be less than significant under any of these alternatives.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Alternatives including the Proposed Action – Scenarios.

5.4-4 Reduction in pumping at the State pumps for annual delivery to South of Delta contractors.

All Alternatives including Proposed Action – All Scenarios

As illustrated previously in Tables 5.4-1C and 5.4-1D (Allocations to CVP M&I and Ag contractors South of Delta), simulated water deliveries to South of Delta CVP contractors would remain unchanged, relative to the Base Condition under Alternative A – Proposed Action – Scenario A. This condition in annual delivery allocations would be identical under the other scenarios as well as for each of the other alternatives. As noted previously, South-of Delta CVP and SWP delivery within CALSIM II modeling is determined based upon water supply parameters and operational constraints with specific consideration for export constraints; it (CALSIM II modeling output) represents the best indication of how exports have been allocated over the historical period of record. Exports have, are, and will likely continue to be dictated by in-Delta conditions and CALSIM II modeling provides the best available means of detecting long-term trends over an established hydrologic record of how those operational constraints would affect exports. With deliveries to South of Delta contractors unchanged, relative to Base Conditions under all CALSIM II modeling, it is reasonable to conclude that no significant reductions or impairment to pumping levels at the State pumps would occur as a result of the Proposed Action or any alternatives.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Alternatives including the Proposed Action – Scenarios.

5.4-5 Result in operations inconsistent with the existing or anticipated CVP-OCAP or COA.

All Alternatives including Proposed Action – All Scenarios

The proposed new CVP water service contract (including all subcontracts) would be consistent with Reclamation terms and conditions regarding CVP and coordinated CVP/SWP operations, the CVPIA, established Biological Opinions (BiOp), federal and State environmental regulations, and Reclamation law. No variances from these established conditions, specifically as they relate to the CVP-OCAP and COA are anticipated.

As discussed in Subchapters 5.3.3 and 5.3.4, CALSIM II Model, the internal coding of the model incorporates all existing and current operational rules consistent with the CVP-OCAP, COA, and other regulatory and institutional constraints (e.g., environmental regulations, BiOps, SWRCB Decisions, etc.). CALSIM II modeling relied upon for this EIS/EIR, used the modeling assumptions and revisions to the 2004 CVP-OCAP. As noted previously, this EIS/EIR modeling also updated the 2004 CVP-OCAP base CALSIM II modeling in various ways (e.g., City of Sacramento demands). The modeling for this EIS/EIR was completed in July 2007, representing the most up-to-date Reclamation version of CALSIM II available. Since then, work on the CVP-OCAP Biological Assessment(s) have continued; with work closely matching the latest Reclamation CVP-OCAP Biological Assessment on Delta Smelt (revised August, 2008 version). Accordingly, all hydrologic impact analyses and associated environmental evaluations incorporated each of the relevant CVP-OCAP and COA provisions.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Alternatives including the Proposed Action – Scenarios.

5.4-6 Result in an inadvertent reduction in groundwater aquifer yields in any of the North, Central or South area aquifers.

All Alternatives including Proposed Action – All Scenarios

Neither the Proposed Action nor any of the alternatives rely on groundwater supplies, either within El Dorado County or elsewhere. In El Dorado County, as has been discussed previously, no appreciable, commercial groundwater supplies exist that would warrant the municipal and industrial development of such resources by EDCWA or any of its member purveyors. Water transfer alternatives could, however, lead to groundwater pumping from local or adjacent water purveyors who enter into transfer or assignment agreements with EDCWA. For those water purveyors capable of providing a groundwater supply (perhaps as an offset to a direct surface water transfers), they would still be tied to the provisions of the Water Forum Agreement with respect to the basin sustainable yield targets established in the Groundwater Element of the Water Forum Agreement. Accordingly, no impacts on local groundwater aquifers are anticipated as a result of any aspect of this Proposed Action.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Alternatives including the Proposed Action – Scenarios.

5.5. HYDROPOWER (DIVERSION-RELATED IMPACTS)

This subchapter describes the existing hydropower infrastructure and operations of the CVP and includes discussion of the hydropower operations at Folsom Reservoir which, because of its uniquely based multi-purpose infrastructure, possesses important implications to hydropower generation as well as water supply and environmental considerations, namely, coldwater pool management and downstream thermal benefits. The proposed new CVP water service contract is evaluated in the context of its potential effects on CVP hydropower generation and capacity as well as pumping power at Folsom Reservoir.

5.5.1. CEQA Standards of Significance

Specific statutory criteria do not exist for determining impacts related to effects on power supply. Thus, significance standards have been developed specifically for this analysis to address the potential regional and local impacts of implementing the Proposed Action or alternatives.

Hydropower generation at CVP facilities is an important resource for contributing to the reliability of the electrical power system in California. Impacts on CVP hydropower operations can result from increased water diversions that result in both lower reservoir levels and less water flow through turbines.

Cost-related hydropower impacts on a regional scale may result from changes in hydropower generation or dependable capacity. In this environmental document, gross hydropower generation is evaluated, which is the amount of generation before project use. Generation from New Melones Dam is included and the values shown are reduced for transmission loss to represent the energy generation available at the load center near Tracy. The use of dependable hydropower capacity differs from previous environmental documents that used instantaneous hydropower capacity, which corresponds to current reservoir elevation. In response to the WAPA's concerns about the availability of electrical power in California, this document evaluates the amount of hydropower capacity available over a specified, extended period of time. Similar to generation, the dependable capacity in this document is gross (before project use), and includes capacity at New Melones and is adjusted for transmission to reflect capacity at the load center near Tracy.

On a regional scale, a reduction in CVP generation is considered a cost impact because WAPA may no longer have excess energy available for sale or would be required to purchase additional energy for its customers. A reduction in dependable capacity would produce similar cost impacts. This analysis assumed that impacts would be significant if hydropower generation or dependable capacity were substantially reduced by the implementation of the preferred or reduced diversion alternatives.

On a local scale, impacts on hydropower may result from changes in pumping requirements at the Folsom or EID pumping plants due to changes in reservoir elevation. A reduction in reservoir elevation would produce a cost impact because more energy would be required for pumping plants to lift water from Folsom Reservoir for distribution to treatment plants and subsequently, water users.

While hydropower impacts are not expected to have a direct physical environmental effect, implementation of the Alternatives may have economic consequences by reducing existing energy resources that could require replacement from other, less environmentally benign energy resources. It is likely that thermal generation resources that do emit air pollutants would supply some portion of the replacement energy. Estimating when, where and how "dirty" the replacement energy might be would be speculative and is beyond the scope of this EIS/EIR to predict, especially given the interconnection of electric utility generation in the western states. Economic consequences could also occur if the Proposed Action could result in an increase in pumping energy requirements and the passage of that additional cost on to customers.

To quantify the potential impacts on hydropower resources due to the Proposed Action or alternatives, the following specific standards of significance were employed. Impacts were considered significant if they:

- Result in a substantial reduction in CVP hydropower generation at load center (at Tracy) and capacity (including the 1,152 MW PG&E supportable capacity) that would lead to adverse economic impacts on the preference customers of the Western Area Power Administration.
- Result in a substantial increase in annual pumping power costs to purveyors relying on the Folsom Reservoir urban water supply intake (elevation 317 ft msl) due to lowered water levels; and
- Result in a substantial change in hydropower generation opportunities in the upper American River basin.

5.5.2. Impacts and Mitigation Measures

5.5-1 Effects on CVP hydropower generation and capacity.

Alternatives 1A and 1B – No Action Alternative and No Project Alternative

Under both the No Action and No Project alternatives, changes to CVP hydrology would either be identical to the Proposed Action or zero (under the No Project Alternative). Again, while the environmental effects would be less than significant, there would be a definable economic cost under the No Action Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios

Under Alternative 2A – Proposed Action – Scenario A, CVP system hydropower generation at load center would on average, over the 72-year period of record, be reduced by 3.3 GWH (or 0.1 percent), relative to the Base Condition. Long-Term Gen modeling results showed that in almost all hydrologic years (of the 72-year record), a reduction in CVP hydropower generation would occur, relative to the Base Condition (see Proposed Action – Scenario A, Technical Appendix I, this Draft EIS/EIR). These reductions, however, would be small and, as noted above, averaged about one-tenth of one percent of the total CVP system generation at load center. Table 5.5-1A illustrates the 72-year mean change in CVP hydropower generation under Alternative 2A – Proposed Action – Scenario A.

TABLE 5.5-1A

CVP SYSTEM GENERATION AT LOAD CENTER
DIFFERENCE BETWEEN THE BASE CONDITION AND PROPOSED ACTION[1]

	Base Condition (GWH)	Proposed Action Scenario A (GWH)	Absolute Difference	Relative Difference (%)
Mean	4545.1	4541.8	-3.3	-0.1
Median	4421.1	4427.3	-3.0	-0.1
Min.	2256.9	2257.0	-38.2	-1.0
Max.	9672.0	9669.8	15.7	0.4

Note
1. Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
Source: June 2007, Long-Term Gen Modeling Output – 72-year hydrologic record, Unpublished data.

Table 5.5-1B illustrates the anticipated long-term changes in CVP system project use as simulated by Long-Term Gen under Alternative 2A – Proposed Action – Scenario A. Over the 72-year period of record, project use, as defined previously, would increase by 0.7 GWH (an insignificant percentage of the total CVP project use).

TABLE 5.5-1B

CVP SYSTEM PROJECT USE AT LOAD CENTER
DIFFERENCE BETWEEN THE BASE CONDITION AND PROPOSED ACTION[1]

Month	Base Condition (GWH)	Proposed Action Scenario A (GWH)	Absolute Difference	Relative Difference (%)
Mean	1265.7	1266.4	0.7	0.0
Median	1326.1	1324.8	0.3	0.0
Min.	519.2	520.7	-42.2	-3.6
Max.	1778.5	1778.0	38.2	2.3

Note:
1. Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
Source: June 2007, Long-Term Gen Modeling Output – 72-year hydrologic record, Unpublished data.

All other Alternatives under the various Proposed Action scenarios showed similar results with Alternative 2A – Proposed Action – Scenario A (see Proposed Action – Scenarios B and C). With the quantities of diversions contemplated under P.L.101-514, it is not unreasonable or unexpected for modeling results to show this level of change in either CVP hydropower generation or project use. Since the diversions contemplated by all of the Proposed Action scenarios involve varying quantities of allocation between EID and GDPUD, but all occurring from either Folsom Reservoir or a combination of Folsom Reservoir and points upstream, the net impacts on Folsom operations would remain unchanged. A 15,000 acre-foot total diversion from Folsom Reservoir and/or points upstream would also have similar effects on CVP hydropower generation at load center, regardless of how the allocations between EID and GDPUD would be split.

Overall, a net reduction in long-term CVP hydropower production of 3.3 GWH, relative to the annual average CVP energy production of 4,545 GWH is considered to be a less-than-significant impact. Alternatives 2A, 2B and 2c would, therefore, not result in significant impacts on CVP hydropower generation. Having said that, with any reduction in energy production, WAPA could be compelled to reduce surplus energy sales or increase purchases to meet its commitments. In either case, such conditions would represent a definable *economic cost* but an unidentifiable environmental impact. These conditions were discussed previously.

With respect to potential changes in capacity and its effects on preference customers, previous modeling under the Water Forum Agreement analyzed the effects of changing water surface elevations at Folsom Reservoir and the potential implications to increased energy requirements for diverters pumping from the reservoir. The modeling assumed 254,800 AF of *additional* water diverted from the American River basin alone, relative to the 1995 Base Condition and assumed full diversions by EID and GDPUD for the current P.L.101-514 new CVP water service contracts. This was the premise of the Water Forum EIR. Of that additional 254,800 AF, withdrawals from Folsom Reservoir and upstream assumed that 172,000 AF would occur, again with the inclusion of EID and GDPUD's P.L.101-514 contracts.

Despite the significant additional increment of water withdrawal from the American River Watershed under the entire Water Forum Agreement, modeling results (using the power subroutine of PROSIM at the time) showed that under the Water Forum Agreement, few infringements on the 1,152 MW criteria would occur, relative to the Base Condition. The environmental analysis concluded that no significant impact on net CVP capacity available to CVP preference customers would occur under the Water Forum Agreement, relative to the Base Condition (see Draft Environmental Impact Report for the Water Forum Proposal, January 1999). Since the P.L.101-514 new contracts, under the current Proposed Action, were included in the modeling for the Water Forum Agreement, it is not unreasonable to conclude that this action, would not, by itself, result in impacts on net CVP capacity available to CVP preference customers.

Alternative 3 – Water Transfer Alternative and Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives

Under these Alternatives, the results would be the same or less than those applicable to Alternatives 2A, 2B and 2C under the Proposed Action. Diversion quantities considered under these Alternatives were identical or less than those for Alternatives 2A, 2B and 2C. It is reasonable to assume that under any of the Alternatives 4A, 4B and 4C, modeled changes to CVP hydropower generation or capacity would be less than that simulated under Alternatives 2A, 2B and 2C because of the lesser quantities diverted. Accordingly, similar to the Alternative 2A, there would no significant environmental impacts on CVP hydropower generation or capacity under these Alternatives. As noted previously, there would, however, be a definable economic cost.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

All of the alternatives except for Alternative 1B – No Project Alternative would impart economic effects on power supply. There are no feasible mitigation measures that would reduce the economic impact to a less-than-significant level. Consequently, for full disclosure reasons, this EIS/EIR acknowledges that power supply impacts are considered economically significant and unavoidable. For purposes of CEQA, however, the effect is environmentally less than significant, and does not represent a significant unavoidable environmental impact.

5.5-2 Effects on annual pumping power costs to purveyors relying on the Folsom Reservoir urban water supply intake.

Alternative 1A and 1B – No Action Alternative and No Project Alternative

Under both the No Action and No Project alternatives, changes in Folsom Reservoir water surface elevations would either be identical to the Proposed Action or zero (under the No Project Alternative). Again, while the environmental effects would be less than significant, there would be a definable economic cost under the No Action Alternative since, as defined, it is presumed that a water transfer of some kind would be pursued with similar implications to water surface elevations at Folsom Reservoir.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios

Reductions in Folsom Reservoir levels caused by the new water service contract(s) may increase capacity and energy requirements to pump water at the Folsom Pump Plant and the EID pumping plant. Such impacts, like those for hydropower generation, would not be expected to cause direct environmental impacts, but would have economic consequences and increase the demand for other sources of power (depending on the degree of new energy requirements as reflected in reservoir elevation changes).

Under the Water Forum Agreement, analyses of the frequency of Folsom Reservoir water surface elevations during the non-irrigation (November – March) and irrigation (April – October) periods were made. Again, this analysis included the EID and GDPUD new CVP water service contracts under consideration in this action. Using Folsom Reservoir's water surface elevation pumping relationships (i.e., Folsom Reservoir elevations that inhibit gravity flow to the North Fork and Natomas pipelines), it was shown that under the Water Forum Agreement (e.g., where an additional 172,000 AF diversion was imposed, relative to Base Conditions), increased pumping requirements occurred at almost all key reservoir water surface elevations. While the increased frequency of pumping were small (e.g., from pumping requirements 79 percent of the time at water surface elevation below 425 feet msl to 80 percent), these changes would translate into some increased energy usage. Under the Water Forum Agreement, the average annual pumping energy requirements would increase by approximately 5,800 megawatt hours (MWh), relative to the Base Condition. EID's increment of increased energy costs would be subsumed in that 5,800 MWh increase, along with all other diverters from Folsom Reservoir.

Consistent with the Water Forum Agreement, this impact is considered to be less than significant from an environmental perspective, but would be an economically significant impact.

Alternative 3 – Water Transfer Alternative and Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives

Under these Alternatives, the results would be the same or less than those applicable to any of Alternatives 2A, 2B or 2C, all scenarios under the Proposed Action. Diversion quantities considered under these Alternatives were identical or less than those for Alternatives 2A, 2B and 2C. This would apply to Alternative 3 – Water Transfer Alternative. It is reasonable to assume that under any of the Alternatives 4A, 4B or 4C, modeled changes Folsom Reservoir water surface elevations would be less than that simulated under Alternative 2A. Accordingly, similar to Alternative 2A, there would no significant environmental impacts on pumping energy requirements at the Folsom or EID pumping plants. Consistent with the other Alternatives, there would, however, be a definable economic cost with each of these Alternatives.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

The economic impacts identified are unavoidable given that the process of delivering water using the Folsom Reservoir facilities necessitates pumping and consequently, the use of electrical energy. The relatively small size of Folsom Reservoir, coupled with a large storage reservation for flood control, constrains operations from achieving large carryover storage volumes. Any additional use of water from Reservoir that alters the timing of storage, affects pumping requirements and these new CVP water service contracts are no exception. Pumping energy economic impacts are unavoidable and are borne by the Folsom Reservoir water diverters themselves.

5.5-3 Change in hydropower generation opportunities in the upper American River basin.

Alternative 1A and 1B – No Action Alternative and No Project Alternative

Under both the No Action and No Project alternatives, upper American River basin hydrology would remain unaffected in regard to hydropower generation opportunities. Changes in upper basin hydrology would either be identical to Alternative 3 – Water Transfer Alternative or zero (under the No Project Alternative). No impacts on hydropower generation opportunities are anticipated under these two alternatives.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios

Alternatives 2A, 2B and 2C, as defined, would divert water either at Folsom Reservoir or, at a point upstream on the Middle Fork American River at the location of the current American River Pump Station. Upper American River basin hydropower generation, by SMUD (UARP) in El Dorado County or, PG&E and PCWA in Placer County, would remain unaffected by these water service contracts since all contemplated diversions would be well downstream of, or hydrologically disconnected to those hydropower generating projects. Reservoir storage for all hydropower generating facilities in the upper watershed would remain undiminished. Accordingly, Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, would have no impact on hydropower generation opportunities in the Upper American River watersheds.

Alternative 3 – Water Transfer Alternative and Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives

Similar to Alternatives 2A, 2B and 2C, – Proposed Action, All Scenarios, both of these alternatives would not affect upper watershed hydropower generation by virtue of their ability to divert water from Folsom Reservoir or at points well downstream, as is currently assumed. No impacts on upper basin hydropower generation opportunities would occur.

If, however, Alternative 3 – Water Transfer Alternative were to be pursued and ultimately succeed in implementing a new water transfer involving a diversion point on, for example, the South Fork Rubicon River, SMUD's hydropower generation could be affected. If a new diversion were to occur above either the Loon Lake or Robbs Peak powerhouses, SMUD would likely experience lost hydropower generation potential at these facilities. An economic impact on SMUD would occur under such situations. Environmentally, a new analysis would be required to evaluate the downstream effects of such a diversion.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.6. Flood Control (Diversion-Related Impacts)

This subchapter describes the existing flood control facilities and operations within the regional and local study areas, and presents an analysis of the potential effects of the new CVP water service contracts on these flood control elements. The enumeration of potential impacts addresses environmental conditions that could be directly affected by diversion of project water from the North Fork American River and Folsom Reservoir.

5.6.1. <u>CEQA Standards of Significance</u>

Impacts on flood control facilities and/or operations were considered significant if they would:

- Result in a substantial change in the ability to adhere to the flood control diagrams for Folsom Reservoir under current operation or to its long-term re-operation;
- Result in a substantial change in floodplain characteristics that would increase the exposure of persons or property to flood hazards;
- Result in a substantial change in the hydraulic stress imparted to lower American River levees or lower Sacramento River levees;
- Result in operations inconsistent with the Joint Federal Project for Folsom Dam (including the Folsom Dam Safety/Flood Damage Reduction Project); or
- Result in operations inconsistent with SAFCA and Water Forum levee improvement/ stabilization work in the lower American River corridor.

5.6.2. Impacts and Mitigation Measures

5.6-1 Substantial change in the ability to adhere to the flood control diagrams for Folsom Reservoir under current operation or to its long-term re-operation.

Alternative 1B – No Project Alternative

Under the No Project Alternative, diversions from the CVP system would be identical to the existing condition. Consequently, CVP operations would remain unchanged, and Shasta and Folsom reservoirs would continue to provide the same level of flood control protection as under the existing condition. *No impact* would occur.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative

Folsom Reservoir is operated to provide flood control protection from November through April. Under any of the action alternatives (including the No Action Alternative, as defined), increased diversions from the American River Watershed would occur. On a monthly mean basis during the flood control period, the storage in Folsom Reservoir would generally be slightly lower or unchanged under any of the action alternatives (including all scenarios under the Proposed Action), relative to the existing condition (see Proposed Action – Scenarios A, B and C, Technical Appendix I, this Draft EIS/EIR). This would indirectly provide a flood control *benefit* to the region by assisting in the ability to provide or, at the very least, maintain existing flood control reservation space. No adverse effect on Folsom Reservoir's ability to meet or adhere to its flood encroachment curve would occur. Moreover, as a diversion project, by definition, these new contracts would, in no way, affect the long-term or permanent re-operation of Folsom Dam and Reservoir for flood control purposes.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.6-2 Substantial change in floodplain characteristics that would increase the exposure of persons or property to flood hazards including a substantial change in the hydraulic stress imparted to lower American River levees or lower Sacramento River levees.

Alternative 1B – No Project Alternative

Under the No Project Alternative, depletions to the CVP system would be identical to the existing condition. Consequently, no changes to riverine hydraulics or annual hydrology would occur. The resulting condition would that the same levels of flood control protection as under the existing condition would occur. Persons or property would be at no greater risk to flooding, relative to the current condition. This alternative would impart no additional impact threat.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative

Where any structural change to a natural levee, revetment, dike, or terrace embankment occurs, increased risk to flooding can result. Altered characteristics within a floodplain may, depending on the magnitude of change, impart an increased risk of flooding. Additionally, where water is re-routed and flows increased within confined or defined channels, an increase in hydraulic stress may be imparted. Levee stress, a primary causal factor in failure, is often promoted by high flows over prolonged periods of time. In addition to the kinetic energy imparted by high flows, which can generate substantial erosive potential along the wetted embankment, high flows can also act to saturate confining levees. With this saturation, positive pore water pressures can build within older levees. Such pressures in an elevated structure of unconsolidated material (levees) can promote significant structural risks that can result in failures.

Each of the Alternatives (including the No – Action Alternative) except Alternative 1B – No Action Alternative, however, involve a withdrawal of water, not an addition. Overall, from a reservoir storage and flood reservation perspective, these changes would be small, but the amount of water in storage would be less, not more. Hence, the proposed new contracts, by definition, would provide greater flood control protection, relative to existing or Base Conditions. Table 5.6-1 shows the mean monthly flow releases from Nimbus Dam under Alternative 2A – Proposed Action – Scenario A, for the period November through April (flood control period), relative to the Base Condition.

The modeling results confirm the overall long-term reduction in mean monthly flows for most months. Noted increases would be well within the normal operating ranges for lower American River channel flows. Perhaps more importantly, the results confirm the negligible overall change in mean monthly flows, based on CALSIM II hydrologic modeling.

Increased diversions at Folsom Reservoir or points upstream would not result in specific changes to the characteristics of the lower American River floodplain, and there would be no increased risk of flooding. Persons and property within the area protected by these facilities would not experience any significant increase in exposure to flooding hazards, relative to the existing condition. Therefore, there would be no impact.

TABLE 5.6-1

**MEAN MONTHLY FLOWS BELOW NIMBUS DAM
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
DURING THE NOVEMBER THROUGH APRIL FLOOD CONTROL PERIOD
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)**

Month	Base Condition (cfs)	Proposed Project (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Nov	3345.6	3349.0	3.4	-0.1	-190.6 (-21.6)	189.0 (8.2)
Dec	3346.5	3353.1	6.6	0.1	-98.8 (-5.4)	369.6 (8.2)
Jan	4095.6	4094.7	-0.9	0.0	-229.8 (-5.4)	127.5 (8.2)
Feb	5121.6	5117.1	-4.5	-0.3	-321.8 (-21.7)	79.2 (3.2)
Mar	3746.0	3753.7	7.7	0.4	-7.5 (-0.6)	305.0 (12.8)
Apr	3824.6	3821.6	-2.9	-0.1	-247.2 (-6.5)	74.9 (3.0)

Notes:
1 Proposed Action modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2 Absolute Difference – difference between Base Condition and Proposed Project (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3 Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Project, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4 Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Project, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

While future continued development would contribute to losses in surface permeability, it is assumed that appropriate runoff control practices will be implemented as part of the development process to provide mitigation for such changes in the hydraulic characteristics of the floodplain. Therefore, impacts on floodplain characteristics and the associated risk of flooding would be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.6-3 Result in operations inconsistent with the Joint Federal Project for Folsom Dam (including the Folsom Dam Safety/Flood Damage Reduction Project).

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative, and Alternative 1B – No Project Alternative

As noted previously, the Joint Federal Project for Folsom Dam includes two elements; the dam safety element and the flood damage reduction element. The dam safety element focuses on the construction of a new large spillway near the Mormon Island abutment of the dam (along with other existing spillway modifications) and the flood damage reduction element primarily involves the revision to Folsom Reservoir's current Water Control Manual; the existing 400-670 flood encroachment curve. As a new diversion project, neither the new spillway nor the pending revision to the Folsom Reservoir empty space flood reservation curve would be affected by this project. No impacts are anticipated to occur under any of the Alternatives.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.6-4 Result in operations inconsistent with SAFCA and Water Forum levee improvement/stabilization work in the lower American River corridor.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative, and Alternative 1B – No Project Alternative

SAFCA and the Water Forum's levee improvement and stabilization work in the lower American River have included several completed and ongoing initiatives. These include, for the American River Common Features Project:

- American River Common Features - Slurry Wall Construction
- Installation of American River Basin Telemetry Gages
- Bank Protection along the American River Sites 1 through 5
- American River Revegatation Sites
- American River Common Features Jet Grout Contract 1
- American River Erosion Protection RM 1.8
- American River Erosion Sites 7.0R, 10.2L, 6.4L and 6.9
- American River 10.0 Bank Stabilization

And for the North Area/Natomas/NLIP:

- North Area Local Project
  - Garden Highway through levee seepage
  - East/West Levee improvements along Steelhead Creek (aka Natomas East Main Drainage Canal [NEMDC])
  - Cross Canal Levee Improvements Phase 1
  - Dry Creek North Levee
  - Robla Creek - Phase 1, 2, 3
  - Arcade Creek Phase 1
  - NEMDC Pump Station
- Natomas Levee Soil Boring Program
- Sand Cove Park Emergency Streambank Protection Project

- Dry Creek Debris Removal Project - Phase 1
- Sacramento River RM 60.0 Jibbom Street Park Levee Widening

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, including all action alternatives would, again have no effect on these completed and/or ongoing efforts. All project diversions contemplated under the new CVP water service contracts would occur upstream, at Folsom Reservoir or, points further upstream. Any changes to downstream hydrology in the lower American River and points further, would be observed as reductions in flow, to the extent that Reclamation operations at Folsom Dam would make these perceptible. Accordingly, none of the Alternatives would impart any adverse effect on levee improvement work being conducted in the lower American River.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.7. WATER QUALITY (DIVERSION-RELATED IMPACTS)

This subchapter describes the existing water quality conditions within the regional and local study areas, and presents an analysis of potential effects on water quality due to implementation of the Proposed Action or alternatives. The enumeration of potential impacts addresses environmental conditions that could be directly affected by diversion of project water from the North Fork American River and Folsom Reservoir, as defined by the Proposed Action.

5.7.1. CEQA Standards of Significance

Impacts were considered significant if they would:

- Result in reduced dilution potential of known water quality contaminants in Folsom Reservoir, Lake Natoma, the lower American River, or Sacramento River due to increased diversions from the CVP; or,
- Result in reduced Delta water quality or operations contrary to the mandate of the Bay-Delta Water Quality Control Plan, California Inland Surface Waters Plan, Bay-Delta Pollutant Policy Document and Accord, Anti-Degradation Policy, and the pending Bay-Delta Conservation Plan.

5.7.2. Impacts and Mitigation Measures

5.7-1 Effects of increased diversions and changes in CVP operations on water quality in reservoirs and rivers.

Alternative 1A – No Action Alternative

As defined, under the No Action Alternative, diversions throughout the CVP and SWP system would increase, relative to the Base Condition, resulting in a decrease in dilution capacity of CVP and SWP rivers and reservoirs. These diversions, however, would not come from direct CVP or SWP allocations, but rather, from other water right holders within the American River Watershed, similar to Alternative 3 – Water Transfer Alternative. Hydrologically, therefore, the effect of the No Action Alternative on system-wide hydrologic variables would be identical to those of the Proposed Action scenarios described below. Accordingly, any impacts on water quality for waterbodies associated with the CVP project area resulting from reductions in Shasta Reservoir storage, Sacramento River flows, Folsom Reservoir storage or lower American River flows would be less than significant.

Alternative 1B – No Project Alternative

Diversions from the CVP system would be identical to existing conditions. The dilution capacity of CVP and SWP rivers and associated reservoirs, therefore, would remain unchanged under the No Project Alternative, relative to the existing condition. Consequently, there would be no impact on the water quality of CVP and SWP rivers and associated reservoirs.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios and Alternative 3 – Water Transfer Alternative

Increased diversions from Folsom Reservoir or points upstream could be expected to reduce operating storage levels in Folsom Reservoir and thus, also reduce flows in the lower American River. Since CVP reservoirs, in coordination with SWP reservoirs, are operated in an integrated fashion, reduced storage levels in Folsom Reservoir have the potential to also affect storage levels in other reservoirs as well as potentially affect flows in the Sacramento River and into the Delta. Table 5.7-1 shows the simulated mean end-of-month storage in Folsom Reservoir under the Proposed Action – Scenario A, over the 72-year hydrologic period of record.

Mean end-of-month storage changes from the Base Condition are small (e.g., the maximum long-term change in mean end-of-month storage was modeled at 1,600 AF representing a 0.3 percent change). Table 5.7-2 shows the same data for Shasta Reservoir. For Shasta Reservoir, mean end-of-month storage, over the 72-year period of hydrologic record would remain virtually the same, relative to the Base Condition. While absolute differences shown by CALSIM II modeling showed very slight increases (e.g., 1,100 AF), these are considered negligible when compared to total storage in the reservoir and are reflected in the small percentage increases. The influence of coordinated system operations are reflected in the modeling results for Shasta Reservoir where, slight storage changes (increases) are captured by CALSIM II, despite no direct diversions from the Proposed Action emanating in Shasta Reservoir.

Table 5.7-3 shows the mean monthly simulated flows in the lower American River below Nimbus Dam under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition, over the 72-year period of record. Slight decreases in long-term mean monthly flows were modeled for every month except April.

These small reductions in flows, acting indirectly as dilution on the concentrations or levels of water quality parameters, would have a small, and immeasurable potential to adversely affect water quality.

TABLE 5.7-1

MEAN END-OF-MONTH STORAGE IN FOLSOM RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (TAF)	Proposed Action (TAF)	Absolute Difference[2] (TAF)	Relative Difference (%)	Maximum Storage Decrease[3] (TAF and %)	Maximum Storage Increase[4] (TAF and %)
Oct	525.8	524.8	-1.0	-0.1	-34.1 (-5.8)	80.3 (19.8)
Nov	453.2	453.1	0.0	-0.1	-47.1 (-13.6)	74.3 (19.5)
Dec	464.9	465.4	0.5	0.1	-13.9 (-4.1)	61.9 (17.4)
Jan	481.6	482.6	1.0	0.3	-10.1 (-3.2)	57.7 (13.3)
Feb	503.2	503.0	-0.2	0.0	-6.2 (-1.4)	15.8 (3.9)
Mar	614.1	614.3	0.2	0.0	-6.5 (-1.5)	20.9 (4.1)
Apr	722.7	721.9	-0.7	-0.1	-11.1 (-1.8)	15.4 (2.0)
May	834.2	833.1	-1.1	-0.2	-10.2 (-2.0)	2.9 (0.3)
Jun	788.4	787.0	-1.4	-0.2	-40.7 (-5.9)	8.6 (1.2)
Jul	650.7	649.1	-1.6	-0.3	-25.9 (-4.5)	26.6 (6.3)
Aug	601.9	600.6	-1.4	-0.3	-28.5 (-6.5)	62.5 (11.8)
Sep	594.4	593.4	-1.0	-0.3	-30.0 (-7.6)	81.5 (19.3)

Notes:
1. Proposed Action – Scenario A, modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Storage Decrease – refers to the largest decrease in end-of-month storage under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Storage Increase – refers to the largest increase in end-of-month storage under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

TABLE 5.7-2

MEAN END-OF-MONTH STORAGE IN SHASTA RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (TAF)	Proposed Action (TAF)	Absolute Difference[2] (TAF)	Relative Difference (%)	Maximum Storage Decrease[3] (TAF and %)	Notes[4]
Oct	2544.8	2545.6	0.8	0.0	-9.0 (-1.4)	1932 (D)
Nov	2593.2	2594.1	0.8	0.1	-12.9 (-0.4)	1973 (BN)
Dec	2727.4	2728.2	0.9	0.1	-4.1 (-0.1)	1981 (D)
Jan	2959.1	2959.9	0.8	0.1	-4.1 (-0.1)	1981 (D)
Feb	3208.2	3208.6	0.5	0.0	-15.4 (-0.6)	1990 (C)
Mar	3552.6	3553.1	0.6	0.0	-15.4 (-0.5)	1990 (C)
Apr	3829.4	3829.8	0.4	0.0	-15.1 (-0.6)	1990 (C)
May	3816.2	3816.4	0.2	0.0	-14.3 (-0.5)	1990 (C)
Jun	3536.6	3537.3	0.8	0.0	-7.4 (-0.4)	1933 (C)
Jul	3079.4	3080.5	1.1	0.0	-11.2 (-0.8)	1933 (C)
Aug	2736.8	2738.2	1.4	0.1	-4.2 (-0.2)	1989 (D)
Sep	2605.4	2606.6	1.1	0.1	-4.8 (-0.2)	1989 (D)

Notes:
1. Proposed Action modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Storage Decrease – refers to the largest decrease in end-of-month storage under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in end-of-month storage occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

TABLE 5.7-3

**MEAN MONTHLY FLOWS BELOW NIMBUS DAM
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)**

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Oct	2441.8	2427.7	-14.1	-0.7	-362.0 (-15.4)	440.8 (15.8)
Nov	3324.2	3299.2	-25.0	-0.3	-582.1 (-20.8)	704.4 (41.6)
Dec	3342.0	3322.9	-19.1	-0.1	-827.8 (-10.8)	446.1 (23.6)
Jan	4088.3	4073.4	-14.9	-0.8	-764.9 (-60.5)	334.6 (24.6)
Feb	5103.3	5115.7	12.4	0.9	-190.7 (-8.1)	720.7 (51.8)
Mar	3729.4	3715.3	-14.1	-0.5	-267.9 (-10.0)	24.8 (3.0)
Apr	3825.3	3829.0	3.7	0.4	-73.7 (-1.7)	339.5 (14.6)
May	3683.2	3675.2	-7.9	-0.2	-58.9 (-2.5)	239.7 (7.3)
Jun	3933.9	3910.4	-23.6	-0.8	-150.6 (-8.7)	531.75 (18.0)
Jul	3846.4	3820.4	-26.0	-0.9	-467.6 (-14.2)	77.2 (1.6)
Aug	2138.4	2103.7	-34.7	-1.7	-1467.9 (-63.9)	405.1 (17.2)
Sep	1503.2	1475.9	-27.4	-2.0	-1156.2 (-67.3)	67.2 (9.4)

Notes:
1. Proposed Action – Scenario B, modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3 Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4 Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Since flows in the Sacramento and American rivers would not be reduced substantially, concentrations of the 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 the implementation of any of the diversion scenarios under the Proposed Action, or the Water Transfer Alternative, relative to existing conditions. Thus, any impacts on water quality for waterbodies associated with the CVP project area resulting from reductions in Shasta Reservoir storage, Sacramento River flows, Folsom Reservoir storage or lower American River flows would be less than significant under all of the alternatives.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.7-2 Effects on Delta water quality or operations contrary to the mandate of the Bay-Delta Water Quality Control Plan, California Inland Surface Waters Plan, Bay-Delta Pollutant Policy Document and Accord, Anti-Degradation Policy, and the pending Bay-Delta Conservation Plan.

Alternative 1A – No Action Alternative

Under the No Action Alternative, there would increases in the total amount of water diverted from the CVP/SWP system, similar to those assumed under Alternative 3 – Water Transfer Alternative (see discussion under Alternative 3 – Water Transfer Alternative). Consequently, there would be no measurable changes in the position of X2 or significant reductions in Delta outflow, relative to the Base Condition.

Alternative 1B – No Project Alternative

Diversions from the CVP system would remain unchanged from the Base Condition under the No Project Alternative. The amount of water flowing into the Delta, therefore, would remain unchanged under the No Project Alternative, resulting in an unchanged X2 position, export/inflow ratio, and dilution capacity within the Delta. Water quality within the Delta would not be affected under the No Project Alternative. Consequently, there would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, and Alternative 3 – Water Transfer Alternative

Table 5.7-4 shows the mean monthly simulated position of X2 (i.e., the position in kilometers eastward from the Golden Gate Bridge of the two parts per thousand [ppt] near-bottom isohaline) over the 72-year period of record under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition.

TABLE 5.7-4

MEAN MONTHLY DELTA X2
DIFFERENCE BETWEEN THE BASE CONDITION AND PROPOSED PROJECT[1]

Month	Absolute Difference (km)	Relative Percent (%)	Maximum[2] (km)	Notes[3]
Oct	0.0	0.0	0.3	1938 (W) 88.1 km to 88.4 km
Nov	0.0	0.0	0.2	1937 (BN) 88.6 km to 88.8 km
Dec	0.0	0.0	0.1	1937 (BN) 83.4 km to 83.4 km
Jan	0.0	0.0	0.4	1937 (BN) 84.6 km to 85.0 km
Feb	0.0	0.0	0.9	1933 (C) 78.2 km to 79.1 km
Mar	0.0	0.0	0.6	1934 (C) 74.1 km to 74.2 km
Apr	0.0	0.0	0.4	1935 (BN) 69.9 km to 70.3 km
May	0.0	0.0	0.1	1934 (C) 76.2 km to 76.2 km
Jun	0.0	0.0	0.2	1932 (D) 74.1 km to 74.3 km
Jul	0.0	0.0	0.1	1932 (D) 75.8 km to 75.8 km
Aug	0.0	0.0	0.0	N/A
Sep	0.0	0.0	0.9	1937 (BN) 83.3 km to 84.2 km

Notes:
1. Proposed Project modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Maximum – refers to the largest increase in distance from Golden Gate Bridge (in km) computed for that month (largest increase over 72-years).
3. Indicates the year where the maximum increase (adverse change) in X2 occurred for that month, identifying the water-year type and the actual mean monthly comparison between the base condition and proposed project in that year.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

For each month, while there were individual years (over the 72-year simulation period) that showed slight changes in X2 position, overall, the long-term mean position remained unchanged. As a surrogate, an unchanging X2 position is a positive indicator that proper export/inflow ratios are maintained in the Delta.

Based on CALSIM II modeling simulations, there would be no shift in the long-term average position of X2 under any of the diversion scenarios of the Proposed Action (see Proposed Action, Scenarios A, B and C, Technical Appendix I, this Draft EIS/EIR). The CALSIM II model simulations conducted included conformance with X2 requirements set forth in the SWRCB Interim Water Quality Control Plan, as well as the Department of the Interior's Final Administrative Proposal for the Management of 3406(b)(2) Water.

As shown in Tables 5.7-1 through 5.7-3, no significant hydrological changes would be expected to reservoir storage in Shasta, Folsom, as well as in lower American River flows. To the extent that any of the Bay-Delta Water Quality Control Plan, California Inland Surface Waters Plan, Bay-Delta Pollutant Policy Document and Accord, Anti-Degradation Policy, and the pending Bay-Delta Conservation Plan are influenced or rely on protective hydrologic regimes and implementable standards, the Proposed Action and all of the alternatives would not be inconsistent with the mandates or operations of those plans.

Accordingly, Alternatives 2A, 2B and 2C – Proposed Action, All Scenarios would have a less-than-significant impact on Delta water quality. Under any of Alternatives 4A, 4B or 4C, these changes would be even less. For Alternative 3 – Water Transfer Alternative, while increased water diversions, relative to the Base Condition are assumed, they would not exceed those simulated under Alternatives 2A, 2B or 2C – Proposed Action scenarios (see Water Transfer Alternative, Technical Appendix I, this Draft EIS/EIR).

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8. FISHERIES AND AQUATIC RESOURCES (DIVERSION-RELATED IMPACTS)

This subchapter describes the fisheries resources and aquatic habitats, including the regional and local area affected environments, and presents an analysis of the potential effects on these resources resulting from implementation of the new CVP water service contracts.

5.8.1. CEQA Standards of Significance

Fisheries and aquatic resources throughout the CVP integrated system, including those in Folsom Reservoir, the North Fork American River, and the lower American River could be adversely affected by implementation of the new CVP water service contracts. The criteria to determine those potential effects were based on a variety of hydrologic indices using CALSIM II, along with several other

Reclamation environmental models (see Subchapter 5.3 and 5.4 for complete discussion). The impact indicators and associated modeling criteria are set out in Table 5.8-1.

5.8.2. Impacts and Mitigation Measures

5.8-1 Effects on warmwater fisheries in Shasta and Trinity reservoirs.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in system-wide hydrology would occur since no new diversions or depletions from the system are assumed. Without any change in CVP/SWP hydrology, no changes from the Base Condition would result. Accordingly, no impacts on warmwater fisheries resources in Shasta and Trinity reservoirs are anticipated under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative

Table 5.8-2 shows the long-term average end-of-month water surface areas within Shasta Reservoir under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Decreases in end-of-month water surface area are small and likely undetectable (e.g., relative difference as a percentage is insignificant and virtually zero). Accordingly, there would be no change in the long-term average end-of-month water surface area in Shasta Reservoir during the March through September period based on simulated CALSIM II modeling results when warmwater fish spawning and initial rearing may be expected.

Hydrologically, no detectable changes in simulated reservoir operations or re-operations are anticipated as a result of the new CVP water service contracts proposed by this action. This is confirmed in CALSIM II hydrologic modeling which showed no detectable change in reservoir water surface area. Accordingly, no impacts on warmwater fisheries in Shasta Reservoir are expected.

Table 5.8-3 shows the mean monthly water surface elevations simulated for Trinity Reservoir under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Modeled mean monthly water surface elevations remain unchanged, in the long-term, under Alternative 2B – Proposed Action – Scenario B.

Similarly, the CALSIM II modeling results showed that for Trinity Reservoir, there would be no long-term changes in water surface elevations under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Differences in the long-term average amount of littoral habitat potentially available to warmwater fish for spawning and/or rearing in either Shasta or Trinity reservoirs would be negligible. While small and infrequent reductions in the availability of littoral habitat would occur on an inter-annual basis, these would not be of sufficient magnitude to substantially reduce long-term average initial year-class strength of warmwater fish populations. Consequently, seasonal reductions in littoral habitat availability would constitute a less-than-significant impact on both Shasta and Trinity reservoir warmwater fisheries.

TABLE 5.8-1

FISHERIES AND AQUATIC RESOURCES DIVERSION-RELATED IMPACT INDICATORS AND SIGNIFICANCE CRITERIA

Impact Indicators	Modeling Criteria
Shasta and Trinity Reservoirs	
Warmwater Fisheries	
Mean number of acres of littoral habitat for each month of the primary spawning and rearing period (i.e., March through September).	Decrease in the long-term average quantity (acres) of littoral habitat, relative to the existing condition, to adversely affect long-term population levels of warmwater fish for any month of this period over the 72-year period of record.
End-of-month reservoir water surface elevation (feet/msl) occurring each month of the primary spawning and rearing period for nest-building warmwater fish (i.e., March through September).	Decrease in reservoir water surface elevation more than nine feet per month, relative to the existing condition, of sufficient frequency to adversely affect long-term population levels of warmwater fish for any month of this period over the 72-year period of record.
Coldwater Fisheries	
End-of-month storage (TAF) for each month of the April through November period.	Decrease in reservoir storage, relative to the existing condition, which also would reduce the coldwater pool, of sufficient magnitude to adversely affect long-term population levels of coldwater fish for any month of this period over the 72-year of record.
Sacramento River	
Monthly mean flows (cfs) released from Keswick Dam for each month of the year.	Decrease in flow, relative to the existing condition, of sufficient magnitude and frequency to decrease the relative habitat availability for upper Sacramento River fish for any month of this period over the 72-year period of record.
Monthly mean flows (cfs) at Freeport for each month of the year.	Decrease in flow, relative to the existing condition, of sufficient magnitude and frequency to decrease the relative habitat availability for lower Sacramento River fish for any month of this period over the 72-year period of record.
Monthly mean water temperatures (°F) at Keswick Dam and Bend Bridge for each month of the year.	Increase in water temperature, relative to the existing condition, of substantial magnitude and frequency to adversely affect spawning and rearing of anadromous salmonids for any month of the year for the 71-year period of record.
Number of years that water temperatures at Keswick Dam and Bend Bridge would exceed the temperature criteria identified by NMFS in its Biological Opinion for Winter-run Chinook Salmon (NMFS 1993).	Increase in the number of years that water temperatures exceed those stipulated in the NMFS Biological Opinion (i.e., 50°F and 60°F), relative to the existing condition, which would adversely affect winter-run Chinook salmon over the 71-year period of record.
Average annual early lifestage survival for fall-, late-fall-, winter-, and spring-run Chinook salmon.	Decrease in annual early lifestage survival for any run Chinook salmon (i.e., fall-, late fall-, winter-, and spring-run Chinook salmon), relative to the existing condition, of sufficient magnitude and frequency to adversely affect the long-term initial year-class strength over the 72-year period of record.
Monthly mean water temperatures (°F) at Freeport for each month of the year.	Increase in temperature, relative to the existing condition, to adversely affect spawning and rearing of anadromous salmonids for any month of the year for the 71-year period of record.
Delta	
Monthly mean Delta outflow (cfs) for each month of the year.	Decrease in Delta outflow, relative to the existing condition, of substantial magnitude and frequency to adversely affect Delta fish resources for any month of the year for the 72-year period of record.
Monthly mean location of X2 and Delta export/inflow ratios for all months of the year, with an emphasis on the February through June period.	Change in position of X2 and Delta export/inflow ratio, relative to the existing condition, to adversely affect spawning and rearing habitat and downstream transport flows over the 72-year period of record.

TABLE 5.8-1

FISHERIES AND AQUATIC RESOURCES DIVERSION-RELATED IMPACT INDICATORS AND SIGNIFICANCE CRITERIA

Impact Indicators	Modeling Criteria
Folsom Reservoir	
Warmwater Fisheries	
Mean number of acres of littoral habitat for each month of the primary spawning and rearing period (i.e., March through September).	Decrease in the long-term average quantity (acres) of littoral habitat, relative to the basis comparison, of sufficient magnitude and frequency to adversely affect long-term population levels of warmwater fish, for any month of this period over the 72-year period of record.
End-of-month reservoir water surface elevation (feet/msl) occurring each month of the primary spawning and rearing period for nest-building warmwater fish (i.e., March through September).	Decrease in reservoir water surface elevation of more than nine feet per month, relative to the existing condition, of sufficient frequency to adversely affect long-term population of warmwater fish, for any month of this period over the 72-year period of record.
Coldwater Fisheries	
End-of-month storage (TAF) for each month of the April through November period.	Decrease in reservoir storage, relative to the existing condition, which also would reduce the coldwater pool, of sufficient magnitude to adversely affect long-term population levels of coldwater fish, for any month of this period over the 72-year period of record.
Nimbus Hatchery	
Monthly mean water temperatures (°F) of water released from Nimbus Dam for each month of the year.	Increase in water temperature, relative to the existing condition, of sufficient magnitude and frequency which would result in reduced hatchery production (using index temperatures of 60°F, 65°F, and 68°F) during any month of this period over the 71-year period of record.
Lower American River	
Fall-Run Chinook Salmon	
Monthly mean flow (cfs) at the mouth for each month of the adult immigration period (i.e., September through December).	Decrease in flow, relative to the existing condition, of sufficient magnitude and frequency to adversely affect upstream passage or olfactory response, for any month of this period over the 72-year period of record.
Lower American River (Continued)	
Monthly mean water temperature (°F) at the mouth of the American River and at Freeport on the Sacramento River for each month of the adult immigration period (i.e., September through December).	Increase in water temperature, relative to the existing condition, of sufficient magnitude and frequency to adversely affect adult immigration, for any month of this period over the 71-year period of record.
Fall-Run Chinook Salmon (Continued)	
Monthly mean flows (cfs) below Nimbus Dam and at Watt Avenue for each month of the spawning and incubation and initial rearing period (i.e., October through February).	Decrease in flow, the existing condition, of sufficient magnitude and frequency to adversely affect long-term initial year-class strength, for any month of this period over the 72-year period of record.
Monthly mean water temperatures (°F) below Nimbus Dam and at Watt Avenue for each month of the spawning and incubation and initial rearing period (i.e., October through February).	Increase in water temperature, relative to the existing condition, of sufficient magnitude and frequency to result in substantial egg and alevin loss (e.g., resulting temperatures >56°F), for any month of this period over the 71-year period of record.
Monthly mean flow (cfs) at Watt Avenue and the mouth for each month of the juvenile rearing and emigration period (i.e., February through June).	Decrease in flow, relative to the existing condition, of sufficient magnitude and frequency to adversely affect juvenile rearing and emigration, for any month of this period over the 72-year period of record.
Monthly mean water temperature (°F) at Watt Avenue, the lower American River mouth, and at Freeport for each month of the juvenile rearing and emigration period (i.e., March through June).	Increase in water temperature, relative to the existing condition, of sufficient magnitude and frequency to adversely affect juvenile rearing and emigration (e.g., resulting temperatures >65°F) for any month of this period over the 71-year period of record.

TABLE 5.8-1

FISHERIES AND AQUATIC RESOURCES DIVERSION-RELATED IMPACT INDICATORS AND SIGNIFICANCE CRITERIA

Impact Indicators	Modeling Criteria
Average annual early lifestage survival.	Decrease in annual early lifestage survival, relative to the existing condition, of sufficient magnitude and frequency to adversely affect long-term initial year-class strength over the 72-year period of record.
Steelhead	
Monthly mean flow (cfs) at the mouth for each month of the adult immigration period (i.e., December through March).	Increase in flow, relative to the existing condition, of sufficient magnitude and frequency to adversely affect upstream passage or olfactory responses for any month of this period over the 72-year period of record.
Monthly mean water temperature (°F) at the mouth of the American River and at Freeport on the Sacramento River for each month of the adult immigration period (i.e., December through March).	Increase in water temperature, relative to the existing condition, of sufficient magnitude and frequency to adversely affect adult immigration for any month of this period over the 71-year period of record.
Monthly mean water temperature (°F) below Nimbus Dam and at Watt Avenue for each month of the spawning and incubation period (i.e., December through March), as well as juvenile rearing (i.e., year-round).	Increase in water temperature, relative to the existing condition, of sufficient magnitude and frequency to result in substantial egg and alevin loss (e.g., resulting temperatures >56°F) or substantial adverse affects to juvenile rearing (e.g., resulting temperatures >65°F) for any month of this period over the 71-year period of record.
Lower American River (Continued)	
Monthly mean flow (cfs) at Watt Avenue for the spawning and incubation period (i.e., December through March), as well as juvenile rearing (i.e., July through September).	Decrease in flow, relative to the existing condition, of sufficient magnitude and frequency to adversely affect initial year-class strength and juvenile rearing for any month of this period over the 72-year period of record.
Steelhead (Continued)	
Monthly mean flow (cfs) at Watt Avenue and the mouth for each month of the juvenile emigration period (i.e., February through June).	Decrease in flow, relative to the existing condition, of sufficient magnitude and frequency, to adversely affect juvenile emigration for any month of this period over the 72-year period of record.
Monthly water mean temperature (°F) at Watt Avenue and the mouth for each month of the juvenile emigration period (February through June).	Increase in water temperature, relative to the existing condition, of sufficient magnitude and frequency to adversely affect juvenile emigration (e.g., resulting temperatures >65°F) for any month of this period over the 71-year period of record.
Splittail	
Monthly mean acreage of flooded riparian habitat at Watt Avenue during each month of the February through May spawning period.	Decrease in long-term average quantity of inundated riparian habitat, relative to the existing condition, of sufficient magnitude and frequency to adversely affect potential splittail habitat availability for each month of this period over the 72-year period of record.
Monthly mean water temperatures (°F) at Watt Avenue and the mouth during each month of the February through May spawning period.	Increase in the frequency, relative to the existing condition, in which water temperatures exceed the reported upper temperature range for splittail spawning (i.e., 68°F) for any month of this period over the 72-year period of record.
American Shad	
Monthly mean flows (cfs) at the mouth during each month of the May through June spawning period.	Substantial decrease in the frequency, relative to the existing condition, in which flows at the mouth are above the CDFG recommended “attraction flow” of 3,000 cfs for American shad spawning migrations during each month of the identified period, over the 71-year period of record.
Monthly mean water temperatures (°F) below Nimbus Dam and the mouth during the May through June spawning period.	Increase in frequency, relative to the existing condition, in which water temperatures exceed the reported upper temperature range for American shad spawning (i.e., 70°F) for any month of the identified period over the 72-year period of record.

TABLE 5.8-1

FISHERIES AND AQUATIC RESOURCES DIVERSION-RELATED IMPACT INDICATORS AND SIGNIFICANCE CRITERIA

Impact Indicators	Modeling Criteria
Striped Bass	
Monthly mean flows (cfs) at the mouth	Decrease of flow, relative to the existing condition, of sufficient magnitude and frequency to adversely affect striped bass juvenile rearing for May and June over the 72-year period of record.
Monthly mean flows (cfs) at the mouth during the May through June striped bass sport fishery.	Substantial decrease in the frequency, relative to the existing condition, in which flows at the mouth are above the CDFG recommended “attraction flow” of 1,500 cfs for the striped bass sport fishery for each month of the identified period over the 72-year period of record.
Monthly mean water temperatures (°F) below Nimbus Dam and at the mouth during the May through June rearing period.	Increase in frequency, relative to the existing condition, in which water temperatures exceed the reported upper temperature range for striped bass rearing (i.e., 73°F) for any month of the identified period over the 71-year period of record.

TABLE 5.8-2

END-OF-MONTH WATER SURFACE AREA IN SHASTA RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (acres)	Proposed Action (acres)	Absolute Difference[2] (acres)	Relative Difference (%)	Maximum Water Surface Area Decrease[3] (acres and %)	Maximum Water Surface Area Increase[4] (acres and %)
Oct	19899.1	19893.4	-5.6	0.0	-157.1 (-0.7)	150.1 (0.7)
Nov	20171.8	20164.4	-7.5	0.0	-106.1 (-0.5)	72.7 (0.4)
Dec	20949.8	20944.2	-5.6	0.0	-106.1 (-0.5)	61.4 (0.3)
Jan	22336.5	22331.0	-5.5	0.0	-106.0 (-0.5)	53.6 (0.3)
Feb	23676.8	23668.9	-7.8	0.0	-112.5 (-0.5)	9.8 (0.1)
Mar	25454.4	25451.2	-3.2	0.0	-105.8 (-0.4)	175.3 (0.6)
Apr	26674.0	26669.1	-4.9	0.0	-93.2 (-0.3)	34.4 (0.2)
May	26525.2	26517.7	-7.4	0.0	-179.3 (-0.3)	31.5 (0.2)
Jun	25171.8	25163.3	-8.4	0.0	-188.9 (-0.7)	76.2 (0.3)
Jul	22931.7	22918.6	-13.0	-0.1	-340.1 (-1.3)	75.8 (0.3)
Aug	21021.4	21009.2	-12.2	-0.1	-392.9 (-1.6)	110.3 (0.5)
Sep	20278.0	20267.9	-10.1	-0.1	-334.7 (-1.4)	56.7 (0.3)

Notes:
1. Proposed Action modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID’s existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in acres), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Water Surface Area Decrease – refers to the largest decrease in end-of-month water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Water Surface Area Increase – refers to the largest increase in end-of-month water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.8-3

MEAN MONTHLY WATER SURFACE ELEVATIONS IN TRINITY RESERVOIR DIFFERENCE BETWEEN BASE CYONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (ft msl)	Proposed Action (ft msl)	Absolute Difference[2] (ft msl)	Relative Difference (%)	Maximum Water Surface Elevation Decrease[3] (ft msl and %)	Notes[4]
Oct	2275.7	2275.6	-0.1	0.0	-2.7 (-0.1)	1964 (D)
Nov	2277.6	2277.5	-0.1	0.0	-1.1 (-0.1)	1992 (C)
Dec	2282.6	2282.5	-0.1	0.0	-1.1(-0.1)	1992 (C)
Jan	2288.0	2288.0	-0.1	0.0	-1.1 (-0.1)	1992 (C)
Feb	2299.8	2299.7	-0.1	0.0	-0.8 (0.0)	1992 (C)
Mar	2309.1	2309.0	-0.1	0.0	-0.8 (0.0)	1992 (C)
Apr	2321.2	2321.1	-0.1	0.0	-0.6 (0.0)	1947 (D)
May	2319.7	2319.7	-0.1	0.0	-0.6 (0.0)	1992 (C)
Jun	2315.5	2315.5	-0.1	0.0	-0.8 (0.0)	1992 (C)
Jul	2303.1	2303.1	0.0	0.0	-0.9 (0.0)	1992 (C)
Aug	2290.6	2290.6	0.0	0.0	-0.8 (0.0)	1991 (C)
Sep	2280.1	2280.0	-0.1	0.0	-2.7 (-0.1)	1963 (W)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in ft msl), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Water Surface Elevation Decrease – refers to the largest decrease in water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in end-of-month storage occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Modeling results for the other Alternatives under the various Proposed Action scenarios showed similar results. Additionally, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative also confirmed that no significant changes in long-term water surface area or water surface elevation would result from these alternatives. Accordingly, no significant impacts on the warmwater fisheries in these reservoirs are anticipated.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8-2 Impacts on Shasta and Trinity reservoirs' coldwater fisheries.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in system-wide hydrology would occur since no new diversions or depletions from the system are assumed. Without any change in CVP/SWP hydrology, no changes from the Base Condition would result. Accordingly, no impacts on current coldwater fisheries resources in Shasta Reservoir are anticipated under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative

Table 5.8-4 shows the long-term average in mean monthly storage in Shasta Reservoir under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Modeling results confirm that long-term average monthly change in Shasta Reservoir storage would be immeasurable. Changes, relative to the Base Condition, would be virtually zero.

TABLE 5.8-4

MEAN MONTHLY STORAGE IN SHASTA RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (TAF)	Proposed Action (TAF)	Absolute Difference[2] (TAF)	Relative Difference (%)	Maximum Storage Decrease[3] (TAF and %)	Notes[4]
Oct	2544.5	2543.5	-1.0	0.0	-29.4 (-0.9)	1966 (BN)
Nov	2593.0	2591.8	-1.3	0.0	-19.9 (-0.7)	1947 (D)
Dec	2727.3	2726.3	-1.0	0.0	-19.9 (-0.7)	1948 (BN)
Jan	2958.19	2957.9	-1.0	0.0	-19.8 (-0.7)	1947 (D)
Feb	3208.1	3206.7	-1.4	-0.1	-22.1 (-0.6)	1946 (BN)
Mar	3552.9	3552.2	-0.6	0.0	-22.1 (-0.6)	1946 (BN)
Apr	3829.4	3828.3	-1.0	0.0	-21.7 (-0.5)	1946 (BN)
May	3816.2	3814.5	-1.6	0.0	-41.8 (-0.9)	1965 (W)
Jun	3536.3	3534.5	-1.8	-0.1	-44.0 (-1.1)	1965 (W)
Jul	3079.3	3076.5	-2.7	-0.1	-79.3 (-0.8)	1965 (W)
Aug	2736.9	2734.7	-2.2	-0.1	-64.8 (-2.0)	1966 (BN)
Sep	2605.5	2603.7	-1.8	-0.1	-62.7 (-1.9)	1965 (W)

Notes:
1. Proposed Action modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Storage Decrease – refers to the largest decrease in end-of-month storage under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4 Indicates the year where the largest decrease in end-of-month storage occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

While individual year increases would occur, relative to the Base Condition (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR), these would be negligible over the long-term. Long-term changes for any month simulated do not exceed one-tenth of one percent, relative to the Base Condition. With such immeasurable changes in reservoir storage during the reservoir refill months (March through May), the coldwater mass balance would likely remain unchanged. Moreover, anticipated changes in seasonal storage would not be expected to result in substantial adverse effects on the primary prey base used by the reservoir's coldwater fish populations. Potential effects on reservoir coldwater fisheries would be less than significant based on these hydrologic indices.

Modeling results for the other Alternatives under the Proposed Action showed similar results; there would be no measurable change in the long-term mean monthly reservoir storage. Additionally, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative also confirmed that no significant changes in long-term water storage in Shasta Reservoir would result from the implementation of these alternatives. Accordingly, no significant impacts on the coldwater fisheries in Shasta Reservoir are anticipated.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8-3 Flow-related impacts on fisheries resources in the upper Sacramento River.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in system-wide hydrology would occur since no new diversions or depletions from the system are assumed. Without any change in CVP/SWP hydrology, no changes from the Base Condition would result. Accordingly, no impacts on current fisheries resources in the upper Sacramento River are anticipated under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative

Additional American River diversions could potentially alter seasonal Sacramento River flows, which could change the relative habitat availability for Sacramento River fish. To assess such flow-related impacts on upper Sacramento River fish, monthly mean flows released from Keswick Dam under each of the alternatives and the existing condition were compared to releases from Keswick Dam under the existing condition for each month of the year. Potential flow-related impacts on lower Sacramento River fish were assessed in the same manner, except that this assessment used modeled flows at Freeport (RM 46).

Table 5.8-5 shows the long-term mean monthly flow releases below Keswick Dam into the upper Sacramento River under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition.

Based on these modeling results, it can be seen that certain months in individual years showed large variations (i.e., decreases) in mean monthly river flows, relative to the Base Condition. The maximums, in individual years, would be significant, however, these are more than offset by both the years when increases in flow releases would occur (based on simulated modeling) and, more importantly, the long-term average over the 72-year period of record. Long-term changes, as decreases as averaged mean monthly releases into the upper Sacramento River from Keswick Dam did not exceed two-tenths of one percent.

TABLE 5.8-5

MEAN MONTHLY SACRAMENTO RIVER FLOW RELEASES BELOW KESWICK DAM DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Notes[4]
Oct	5651.8	5645.8	-6.0	-0.1	-538.5 (-10.7)	1966 (BN)
Nov	5290.3	5286.6	-3.7	0.0	-534.0 (-5.7)	1964 (D)
Dec	6877.8	6870.1	-7.7	-0.1	-369.6 (-3.0)	1967 (W)
Jan	8033.1	8033.1	0.1	0.0	-42.7 (-0.3)	1969 (W)
Feb	10164.0	10172.6	8.5	0.1	-116.7 (-3.3)	1961 (D)
Mar	8313.3	8300.9	-12.4	-0.2	-664.9 (-7.1)	1963 (W)
Apr	7203.6	7211.8	8.2	0.0	-211.6 (-2.6)	1931 (C)
May	8241.9	8251.5	9.7	0.1	-23.0 (-0.3)	1947 (D)
Jun	10365.3	10369.0	3.7	0.0	-292.3 (-2.4)	1961 (D)
Jul	12708.9	12721.4	12.5	0.1	-233.1 (-1.7)	1947 (D)
Aug	10505.2	10497.7	-7.5	-0.1	-229.2 (-2.4)	1965 (W)
Sep	7035.7	7035.0	-0.7	0.0	-250.5 (-3.7)	1948 (BN)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flow releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in mean monthly flow releases occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Modeling results for the other Alternatives under the Proposed Action showed similar results; there would be no measurable change in the long-term mean monthly releases below Keswick Dam. Additionally, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative also confirmed that no significant changes in long-term flows in the upper Sacramento River would result from the implementation of these alternatives. Accordingly, no significant impacts on the fisheries in the upper Sacramento as a result of instream flow (e.g. habitat conditions) changes are anticipated.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8-4 Temperature-related impacts in the upper Sacramento River.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in system-wide hydrology would occur since no new diversions or depletions from the system are assumed. Without any change in CVP/SWP hydrology, no changes in instream water temperatures from the Base Condition would result. Accordingly, no impacts on current fisheries sensitive to water temperature thresholds in the upper Sacramento River are anticipated under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative

Additional diversions as proposed under this action could potentially alter Sacramento River water temperatures seasonally during some years. Changes in Sacramento River water temperatures that could occur as a result of implementation of any of the alternatives would not be expected to be sufficiently large to adversely affect fish species present in the upper Sacramento River, with the possible exceptions of Chinook salmon and steelhead. Elevated water temperatures could reduce spawning and rearing success of these anadromous salmonids because of their low thermal tolerance. For this reason, an assessment of changes to upper Sacramento River water temperatures focused on these fish species. This assessment focused quantitatively on Chinook salmon for the following reasons: (1) thermal requirements of Chinook salmon and steelhead are generally similar; (2) the NMFS BiOp for Winter-run Chinook salmon (NMFS 1993, as revised in 1995) has established quantitative temperature criteria for the upper Sacramento River to protect winter-run Chinook salmon; and (3) Reclamation has developed a Sacramento River Chinook Salmon Mortality Model applicable to all four runs of Chinook salmon. Impact findings for the four runs of Chinook salmon provide a technical basis from which to infer whether steelhead would be adversely affected by seasonal changes in water temperatures.

Table 5.8-6 shows the mean monthly simulated Sacramento River water temperatures at Keswick Dam under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. No changes in modeled long-term water temperatures in the upper Sacramento River downstream of Keswick Dam were evident as a result of the additional 15 TAF diversion from Folsom Reservoir under this Alternative. Increases in water temperatures were simulated for some years (see Table 5.5-5; Maximum Temperature Decrease) and no consistent trend in water year types for these years were observed. Individual yearly maximums (by month) were shown for August and September. In the 1935 hydrologic year, Base Condition revealed water temperatures below Keswick Dam of 59.6°F. Under Alternative 2B – Proposed Action – Scenario B, water temperatures were simulated at 60.8°F; this represented the largest single year, single month increase in modeled water temperatures below Keswick Dam.

Table 5.8-7 shows the same data but for the upper Sacramento River at Bend Bridge. Again, no detectable changes resulted from the hydrologic/river water temperature modeling based on the long-term mean monthly averages. Maximum individual month and year increases occurred in August and September (consistent with the expected changes resulting from Alternative 2B modeled diversions during that period); these maximums were lower than those simulated for the upper Sacramento River below Keswick Dam.

NOAA Fisheries water temperature criteria for the upper Sacramento River are as follows:

- Daily average water temperature not in excess of 56°F at Bend Bridge from April 15 through September 30; and
- Daily average water temperature not in excess of 60°F at Bend Bridge from October 1 through October 31.

TABLE 5.8-6

MEAN MONTHLY SACRAMENTO RIVER WATER TEMPERATURES AT KESWICK DAM DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (°F)	Proposed Action (°F)	Absolute Difference[2] (°F)	Relative Difference (%)	Maximum Temperature Increase[3] (°F and %)	Notes[4]
Oct	53.8	53.8	0.0	0.1	0.7 (1.4)	1964 (D)
Nov	53.0	53.0	0.0	0.0	0.3 (0.6)	1928 (AN)
Dec	48.7	48.7	0.0	0.0	0.1 (0.2)	1961 (D) 1964 (D) 1967 (W) 1981 (D)
Jan	45.1	45.1	0.0	0.0	0.1 (0.2)	1948 (BN) 1967 (W)
Feb	47.4	47.4	0.0	0.0	0.1 (0.2)	1955 (D)
Mar	50.8	50.8	0.0	0.0	0.1 (0.2)	1977 (C) 1978 (AN) 1979 (BN) 1988 (C)
Apr	52.3	52.3	0.0	0.0	0.1 (0.2)	1931 (C)
May	51.6	51.6	0.0	0.0	0.0 (0.0)	n/a
Jun	50.8	50.8	0.0	0.0	0.0 (0.0)	n/a
Jul	51.3	51.3	0.0	0.0	0.2 (0.4)	1977 (C)
Aug	52.2	52.2	0.0	0.0	0.8 (1.5)	1988 (C)
Sep	53.4	53.4	0.0	0.0	1.2 (2.0)	1935 (BN)

Notes:

1. Proposed Action – Scenario B modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Temperature Increase – refers to the largest increase in mean monthly water temperatures releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Largest specific year percent increase for any month shown in parentheses (may not be for the same year as the largest absolute monthly increase).
4. Indicates the year where the largest increase in mean monthly water temperatures occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.8-7

MEAN MONTHLY SACRAMENTO RIVER WATER TEMPERATURES AT BEND BRIDGE DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (°F)	Proposed Action (°F)	Absolute Difference[2] (°F)	Relative Difference (%)	Maximum Temperature Increase[3] (°F and %)	Notes[4]
Oct	55.7	55.8	0.0	0.1	0.5 (0.9)	1929 (C)
Nov	52.2	52.2	0.0	0.0	0.1 (0.2)	1928 (AN) 1931 (D) 1972 (BN) 1973 (AN) 1979 (BN) 1980 (AN)
Dec	47.0	47.0	0.0	0.0	0.1 (0.2)	1964 (D)
Jan	44.8	44.8	0.0	0.0	0.0 (0.0)	n/a
Feb	48.0	48.0	0.0	0.0	0.1 (0.2)	1955 (D)
Mar	51.9	51.9	0.0	0.0	0.1 (0.2)	1977 (C) 1978 (AN) 1988 (C)
Apr	55.3	55.3	0.0	0.0	0.1 (0.2)	1931 (C) 1933 (C)
May	57.1	57.1	0.0	0.0	0.1 (0.2)	1931 (C) 1956 (W)
Jun	57.1	57.1	0.0	0.0	0.2 (0.3)	1961 (D)
Jul	57.0	57.0	0.0	0.0	0.1 (0.2)	1932 (D) 1933 (C) 1947 (D) 1977 (C) 1987 (D) 1988 (C) 1989 (D) 1992 (C)
Aug	57.4	57.4	0.0	0.0	0.6 (1.0)	1988 (C)
Sep	57.9	57.9	0.0	0.0	0.8 (1.3)	1935 (BN)

Notes:
1. Proposed Action – Scenario B modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Temperature Increase – refers to the largest increase in mean monthly water temperatures releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Largest specific year percent increase for any month shown in parentheses (may not be for the same year as the largest absolute monthly increase).
4. Indicates the year where the largest increase in mean monthly water temperatures occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Although the NOAA Fisheries (1993) temperature criteria are stated as daily averages, the available hydrologic and water temperature models allow only for monthly mean temperature analyses and output. Consequently, the assessment was based on monthly mean water temperature data output from Reclamation's existing models.

A close inspection of the 71-year inter-annual modeled water temperatures (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR), showed that, while water temperatures under Alternative 2B often exceeded these temperatures thresholds, the increment of change was both small and infrequent. Moreover, in those months and years where the water temperatures exceeded those criteria, the Base Condition temperatures (prior to the Proposed Action) were already above the stated thresholds. The most compelling indicator of potential water temperature and related thermal effects can be seen in the long-term deviations, from the Base Condition, in mean monthly water temperatures. No measurable changes were observed based on the modeling results.

Finally, Reclamation's Sacramento River Chinook Salmon Mortality Model was used to estimate annual, early lifestage losses (from egg potential) for fall-run, late-fall-run, winter-run, and spring-run Chinook salmon populations. Temperature input to the Sacramento River Chinook Salmon Mortality Model consists of monthly mean temperatures at nine locations between Shasta Dam and Vina Bridge. Mortality estimates for each of the four runs were modeled under each of the alternatives and the existing condition, which were then compared to modeled mortality estimated for each run under the existing condition. Potential impacts on the four Chinook salmon runs in the Sacramento River were evaluated using the same criteria established for the Lower American River Chinook Salmon Mortality Model (see discussion under Lower American River, Fall-Run Chinook Salmon) (Tables 5.8-8 through 5.8-11).

TABLE 5.8-8

SACRAMENTO RIVER
ANNUAL EARLY LIFE STAGE FALL-RUN CHINOOK SALMON SURVIVAL
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)
(PERCENT SURVIVAL)

Base Condition	Proposed Action	Absolute Difference[2]	Relative Difference (%)	Maximum Survival Increase[3]	Maximum Survival Decrease[4]
86.0	86.0	0.0	0.0	0.9 (1.4) 1988 (C)	-1.0 (-1.5) 1935 (BN)

Notes:
1. Proposed Action – Scenario B modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in % survival), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Survival Increase – refers to the largest increase in annual early life stage fall-run Chinook salmon survival under the Proposed Action, relative to the Base Condition. Percent increase, relative to the specific year, shown in parentheses.
4. Maximum Survival Decrease – refers to the largest decrease in annual early life stage fall-run Chinook salmon survival under the Proposed Action, relative to the Base Condition. Percent decrease, relative to the specific year, shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.8-9

SACRAMENTO RIVER
ANNUAL EARLY LIFE STAGE LATE FALL-RUN CHINOOK SALMON SURVIVAL
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)
(PERCENT SURVIVAL)

Base Condition	Proposed Action	Absolute Difference[2]	Relative Difference (%)	Maximum Survival Increase[3]	Maximum Survival Decrease[4]
98.4	98.4	0.0	0.0	0.2 (0.2) 1934 (C)	0.0

Notes:
1. Proposed Action – Scenario B modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in % survival), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Survival Increase – refers to the largest increase in annual early life stage fall-run Chinook salmon survival under the Proposed Action, relative to the Base Condition. Percent increase, relative to the specific year, shown in parentheses.
4. Maximum Survival Decrease – refers to the largest decrease in annual early life stage fall-run Chinook salmon survival under the Proposed Action, relative to the Base Condition. Percent decrease, relative to the specific year, shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.8-10

**SACRAMENTO RIVER
ANNUAL EARLY LIFE STAGE WINTER-RUN CHINOOK SALMON SURVIVAL
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)
(PERCENT SURVIVAL)**

Base Condition	Proposed Action	Absolute Difference[2]	Relative Difference (%)	Maximum Survival Increase[3]	Maximum Survival Decrease[4]
91.8	91.7	0.0	0.0	0.7 (1.0) 1988 (C) 1933 (C)	-3.3 (-3.5) 1935 (BN)

Notes:
1. Proposed Action – Scenario B modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in % survival), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Survival Increase – refers to the largest increase in annual early life stage fall-run Chinook salmon survival under the Proposed Action, relative to the Base Condition. Percent increase, relative to the specific year, shown in parentheses.
4. Maximum Survival Decrease – refers to the largest decrease in annual early life stage fall-run Chinook salmon survival under the Proposed Action, relative to the Base Condition. Percent decrease, relative to the specific year, shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.8-11

**SACRAMENTO RIVER
ANNUAL EARLY LIFE STAGE SPRING-RUN CHINOOK SALMON SURVIVAL
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)
(PERCENT SURVIVAL)**

Base Condition	Proposed Action	Absolute Difference[2]	Relative Difference (%)	Maximum Survival Increase[3]	Maximum Survival Decrease[4]
76.6	76.6	0.0	2.6	2.7 (245.2) 1988 (C)	-1.9 (-52.0) 1935 (BN)

Notes:
1. Proposed Action – Scenario B modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in % survival), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Survival Increase – refers to the largest increase in annual early life stage fall-run Chinook salmon survival under the Proposed Action, relative to the Base Condition. Percent increase, relative to the specific year, shown in parentheses.
4. Maximum Survival Decrease – refers to the largest decrease in annual early life stage fall-run Chinook salmon survival under the Proposed Action, relative to the Base Condition. Percent decrease, relative to the specific year, shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Modeling results from Reclamation's Sacramento River Chinook Salmon Mortality Model as shown in Tables 5.8-8 through 5.8-11 showed that, over the long-term 72-year hydrologic record, there would be no change in simulated early life-stage survival for any of the four runs of Chinook salmon under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. A close inspection of the 72-year results record revealed that inter-annual deviations from the Base Condition occurred, both as decreases as well as increases in early life-stage salmon survival estimates. Overall, these deviations were both small and infrequent as confirmed by the virtual unchanging long-term 72-year estimates for any of the four Chinook salmon runs (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR).

Modeling results for the other Alternatives under the Proposed Action showed similar results; there would be no measurable change in the long-term simulated annual early life-stage survival of any of the four Chinook salmon runs, relative to the Base Condition. Additionally, Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative also confirmed that no significant changes in long-term annual early life-stage survival of any of the four Chinook salmon would result from the implementation of these alternatives. Accordingly, no significant impacts on the fisheries in the upper Sacramento as a result of thermally induced adverse effects on early life-stage survival are anticipated under any of these alternatives.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8-5 Temperature related impacts on fisheries resources in the lower Sacramento River.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in system-wide hydrology would occur since no new diversions or depletions from the system are assumed. Without any change in CVP/SWP hydrology, no changes in instream water temperatures, from the Base Condition would result. Accordingly, no impacts on current fisheries sensitive to water temperature thresholds in the lower Sacramento River are anticipated under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative

Table 5.8-12 shows the mean monthly simulated water temperatures in the lower Sacramento River at Freeport under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Long-term mean monthly water temperatures at this location showed no change under the modeled simulations. Individual month and yearly maximums were observed; these again, centered around the later summer months consistent with the diversion scenarios integrated into the CALSIM II and water temperature modeling (i.e., 15 TAF diverted in August through September).

Modeling results for the other Alternatives under the Proposed Action showed similar results; there would be no measurable change in the long-term mean monthly water temperatures at Freeport on the lower Sacramento River, relative to the Base Condition. Additionally, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative also confirmed that no significant changes in long-term mean monthly water temperatures in the lower Sacramento River would result from the implementation of these alternatives. Accordingly, no significant impacts on fisheries resources in the lower Sacramento as a result of increased water temperatures are anticipated under any of these alternatives.

TABLE 5.8-12

MEAN MONTHLY SACRAMENTO RIVER WATER TEMPERATURES AT FREEPORT DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (°F)	Proposed Action (°F)	Absolute Difference[2] (°F)	Relative Difference (%)	Maximum Temperature Increase[3] (°F and %)	Notes[4]
Oct	60.9	60.9	0.0	0.0	0.2 (0.3)	1945 (BN)
Nov	52.9	52.9	0.0	0.0	0.2 (0.4)	1965 (W)
Dec	45.7	45.7	0.0	0.0	0.1 (0.2)	1948 (BN)
Jan	44.8	44.8	0.0	0.0	0.1 (0.2)	1941 (W) 1943 (D)
Feb	49.5	49.5	0.0	0.0	0.1 (0.2)	1931 (C)
Mar	54.2	54.2	0.0	0.0	0.1 (0.2)	1925 (D) 1926 (D) 1932 (D)
Apr	60.3	60.4	0.0	0.0	0.1 (0.2)	1925 (D) 1928 (AN) 1929 (C) 1946 (BN) 1972 (BN)
May	65.9	65.9	0.0	0.0	0.1 (0.2)	1923 (BN) 1930 (D) 1936 (BN) 1966 (BN) 1974 (W) 1989 (D)
Jun	70.1	70.1	0.0	0.0	0.2 (0.3)	1936 (BN) 1944 (D)
Jul	72.6	72.6	0.0	0.0	0.2 (0.3)	1947 (D)
Aug	72.2	72.2	0.0	0.0	0.3 (0.4)	1944 (D)
Sep	69.2	69.2	0.0	0.0	0.4 (0.6)	1947 (D)

Notes:
1. Proposed Action – Scenario B modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Temperature Increase – refers to the largest increase in mean monthly water temperatures releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Largest specific year percent increase for any month shown in parentheses (may not be for the same year as the largest absolute monthly increase).
4. Indicates the year where the largest increase in mean monthly water temperatures occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8-6 Effects on Delta fisheries resulting from changes in inflow hydrology and water quality changes.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in system-wide hydrology would occur since no new diversions or depletions from the system are assumed. Without any change in CVP/SWP hydrology, no changes in instream water temperatures, from the Base Condition would result. Accordingly, no impacts on current listed (delta smelt) and other species relying on the Delta under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative

Increased surface water diversion under any of the alternatives could alter the quantity of freshwater flowing into and through the Delta. The abundance and distribution of several fish species of management concern that rely heavily upon the Delta for one or more of their lifestages as discussed previously, can be affected by total Delta outflow, the location of X2 (two parts per thousand (ppt) isohaline in the Delta), and the export/inflow ratio. From a water quality perspective, the "X2" salinity standard is a commonly used parameter to assess freshwater inflows to the Delta. It is assumed to be equivalent to an electrical conductivity (EC) of 2.64 mmhos/cm. As freshwater flows into the Delta are reduced, the X2 position shifts upstream, which can adversely affect certain Delta fish species.

To evaluate potential impacts on Delta fish resources, changes in monthly mean Delta outflow for the 72-year period of record under each of the alternatives were determined for each month of the year and were compared to monthly mean Delta outflow under the Base Condition. The frequency and magnitude of differences in Delta outflow were evaluated relative to life history requirements for Delta fish. In addition, changes in monthly mean X2 position were determined for all months of each year, with an emphasis on the February through June period.

Potential impacts on delta smelt, splittail, striped bass, and other Delta fishery resources were considered adverse if hydrology under any of the alternatives showed a substantial decrease in monthly mean Delta outflow, relative to hydrology under the Base Condition, during one or more months of the February through June period, if a substantial shift in the long-term monthly mean X2 position occurred (i.e., more than one kilometer (km)), or if Delta export/inflow ratios were increased to where allowable export limits would be exceeded. The USFWS and Reclamation have in past documents (i.e., *Draft Trinity River Mainstem Fishery Restoration EIS/EIR*) applied a 10 percent modeled exceedance in changes in X2 position during the February through June period to determine potentially significant impacts on fish populations in the Delta. Therefore, the significance criteria utilized in this investigation (i.e., 1 km or more shift in X2 position) to determine potentially significant impacts on Delta fish populations is very conservative (rigorous) relative to the significance criteria utilized by public trust resource agencies in previous documents.

Table 5.8-13 shows the mean monthly position of X2 under the Base Condition. As expected, during the high flow months (corresponding to Central Valley and Sierra Nevada runoff maximums), X2 is lowest (i.e., closest to Golden Gate Bridge). With the onset of summer and through the early to late fall months when tributary inflows decline, the position of X2 migrates further upstream as reduced freshwater flows are unable to maintain X2 at its spring position in the Delta.

Table 5.8-14 shows the mean monthly position of X2 under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition, over the entire 72-year hydrologic simulation period.

TABLE 5.8-13

MEAN MONTHLY DELTA X2 POSITION UNDER THE BASE CONDITION

Month	72-year Mean X2 Position(km)
Oct	86.6
Nov	84.7
Dec	81.9
Jan	77.2
Feb	71.4
Mar	66.5
Apr	66.0
May	67.9
Jun	70.2
Jul	75.1
Aug	79.2
Sep	84.2

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.8-14

MEAN MONTHLY DELTA X2
DIFFERENCE BETWEEN THE BASE CONDITION AND PROPOSED ACTION[1]

Month	Absolute Difference (km)	Relative Percent (%)	Maximum[2] (km)	Notes[3]	
Oct	0.0	0.0	0.3	1952 (W) 1981 (D)	88.7 km to 88.0 km 86.3 km to 86.6 km
Nov	0.0	0.0	0.4	1948 (BN)	84.8 km to 85.2 km
Dec	0.0	0.0	0.3	1931 (C) 1961 (D) 1964 (D) 1966 (BN)	84.4 km to 84.7 km 84.9 km to 85.3 km 75.5 km to 75.8 km 76.7 km to 76.9 km
Jan	0.0	0.0	0.1	1928 (AN) 1931 (C) 1932 (D) 1938 (W) 1941 (W) 1942 (W) 1943 (W) 1964 (D) 1966 (BN) 1967 (W) 1973 (AN) 1981 (D)	80.3 km to 80.4 km 85.4 km to 85.5 km 76.7 km to 76.7 km 63.5 km to 63.6 km 68.1 km to 68.2 km 65.8 km to 66.0 km 72.1 km to 72.2 km 81.2 km to 81.3 km 76.6 km to 76.7 km 70.0 km to 70.1 km 73.5 km to 73.6 km 81.9 km to 82.1 km
Feb	0.0	0.0	0.3	1960 (D)	82.4 km to 82.7 km
Mar	0.0	0.0	0.1	1938 (W) 1948 (BN) 1964 (D)	52.0 km to 52.1 km 77.5 km to 77.5 km 75.2 km to 75.2 km
Apr	0.0	0.0	0.3	1981 (D)	69.5 km to 69.8 km
May	0.0	0.0	0.1	1966 (BN) 1981 (W)	73.9 km to 73.9 km 71.9 km to 72.0 km
Jun	0.0	0.0	0.1	1947 (D)	77.7 km to 77.7 km
Jul	0.0	0.0	0.1	1940 (AN)	75.1 km to 75.2 km
Aug	0.0	0.0	0.0		N/A
Sep	0.0	0.0	0.8	1980 (AN)	82.3 km to 83.2 km

Notes:
1. Proposed Action –Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Maximum – refers to the largest increase in distance from Golden Gate Bridge (in km) computed for that month (largest increase over 72-years).
3. Indicates the year where the maximum increase (adverse change) in X2 occurred for that month, identifying the water-year type and the actual mean monthly comparison between the base condition and proposed project in that year.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

The CALSIM II modeling results show that the long-term simulated mean monthly position of X2 under Alternative 2B – Proposed Action – Scenario B, relative to Base Condition, would not change over the 72-year period of record. Individual monthly maximum increases were shown (by year).

During the February to June period, these maximums were simulated at 0.3 km; representing a 0.3 km upstream migration of X2 for that month of those specific years (see Notes on Table 5.8-14). Interestingly, the 0.3 km maximum upstream shift noted for February and April occurred in only one year of the entire 72-year period of record; 1960 and 1981 respectively, each a dry-year.

Table 5.8-15 shows the modeled mean monthly Delta outflow under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Modeling results confirm that, over the long-term, mean monthly Delta outflow would remain virtually unchanged after the implementation of the proposed new CVP water service contract, relative to the Base Condition. Mean monthly flow changes of these magnitudes are not considered significant (e.g., relative percentages at or less than two-tenths of one percent) to Delta hydrology.

TABLE 5.8-15

MEAN MONTHLY DELTA OUTFLOW
DIFFERENCE BETWEEN THE BASE CONDITION AND PROPOSED ACTION[1]

Month	Absolute Difference (cfs)	Relative Percent (%)	Maximum Outflow Decrease[2] (cfs)	Notes[3]
Oct	-2.8	-0.1	-326.6	1963 (BN) -1.2% Base Flow 26,396
Nov	-23.2	-0.2	-647.7	1964 (D) -3.7% Base Flow 17,419
Dec	-40.5	0.1	-1021.7	1942 (WN) -1.7% Base Flow 59,762
Jan	13.2	0.0	-324.7	1948 (BN) -4.3% Base Flow 7,593
Feb	-5.9	0.1	-622.3	1938 (W) -0.4% Base Flow 145,553
Mar	-22.4	-0.1	-820.0	1981 (D) -3.9% Base Flow 21,131
Apr	12.1	0.0	-67.5	1935 (BN) -0.1% Base Flow 52,066
May	-4.9	0.0	-82.9	1935 (BN) -0.3% Base Flow 26,777
Jun	-3.7	0.0	-102.5	1940 (AN) -1.4% Base Flow 7,419
Jul	12.0	0.1	-77.5	1966 (BN) -1.1% Base Flow 7,052
Aug	-7.2	-0.1	-518.2	1980 (AN) -10.2% Base Flow 5,073
Sep	-5.4	-0.1	-116.5	1951 (AN) -3.6% Base Flow 3,269

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Maximum Outflow Decrease – refers to the largest decrease in mean Delta outflow computed for that month (largest decrease over 72 years).
3. Indicates the year where the maximum decrease (adverse change) in Delta outflow occurred for that month, identifying the water-year type, the decrease in outflow as a percent of the base condition in that year, and the base condition Delta outflow during that month.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Table 5.8-16 shows the modeled mean monthly flows in the lower Sacramento River at Freeport under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition over the entire 72-year hydrologic period of record. The largest mean monthly flow change (i.e., decrease), relative to the Base Condition was simulated to be approximately 43 cfs and would occur in June; this represents three-tenths of one percent change, relative to baseflows. Interestingly, both the long-term mean monthly lower Sacramento River flows for July and September showed *increases*, relative the Base Condition a Maximum mean monthly flow decreases would; however, be substantive in certain months of certain years as illustrated in Table 5.8-16.

TABLE 5.8-16

MEAN MONTHLY SACRAMENTO RIVER FLOWS AT FREEPORT DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]

Month	Absolute Difference (cfs)	Relative Difference (%)	Long-Term Mean Monthly Flows (cfs)	Maximum Flow Decrease[2] (cfs)	Maximum Flow Decrease (%)	Notes[3]
Oct	-35.2	-0.3	12524.6	-871.0	-8.7	1931 (C)
Nov	-21.4	-0.1	15584.5	-647.7	-4.3	1964 (D)
Dec	-9.9	0.1	24725.7	-776.4	-1.1	1965 (W)
Jan	-9.7	-0.1	32503.3	-759.3	-6.3	1960 (D)
Feb	36.7	0.2	38815.3	-265.7	-0.4	1963 (W)
Mar	-26.1	-0.1	33667.2	-801.8	-2.5	1963 (W)
Apr	4.7	0.0	24349.2	-67.7	-0.2	1935 (BN)
May	-19.1	-0.1	19604.6	-1565.2	-8.4	1940 (AN)
Jun	-42.9	-0.3	17304.7	-1536.8	-8.9	1936 (BN)
Jul	17.3	0.1	18337.9	-625.5	-5.0	1931 (C)
Aug	-26.4	-0.2	14513.8	-970.4	-6.1	1944 (D)
Sep	7.7	0.2	12393.8	-1173.8	-9.4	1947 (D)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Maximum Flow Decrease – refers to the largest decrease in mean flow computed for that month (largest decrease over 72 years).
3. Indicates the year where the maximum decrease in Sacramento River flow (in cfs) occurred for that month, identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Nevertheless, such occurrences, when viewed over the entire 72-year period of record, would be infrequent (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR). Overall, the long-term changes in mean monthly lower Sacramento River flows at Freeport would not be significant under Alternative 2B – Proposed Action – Scenario B.

Based on these modeling results, neither the physical habitat availability for fish residing in the Delta, nor immigration of juvenile or adult anadromous fish through the Delta would be substantially affected, relative to the Base Condition based on modeled instream hydrology. Consequently, flow-related potential impacts on Delta fisheries resources or migrating anadromous fish (including listed species) are expected to be less than significant. Overall this constitutes a less-than-significant impact.

Modeling results for the other Alternatives under the Proposed Action showed similar results; there would be no measurable change in the long-term mean monthly X2 position, delta outflow, or lower Sacramento River flows at Freeport. Additionally, modeling results for Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative also confirmed that no significant changes in long-term mean monthly X2 position, delta outflow, and Freeport flows would result from the implementation of these alternatives. Accordingly, no significant impacts on the fisheries in the Delta are anticipated under these alternatives.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8-7 Flow impacts on fisheries resources of the North Fork American River downstream of the American River Pump Station.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in system-wide hydrology would occur since no new diversions or depletions from the system are assumed. Without any change in hydrology, no changes in flow patterns from the Base Condition would result. Accordingly, no impacts on current fisheries and aquatic resources in the North Fork American River along this reach are anticipated under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative

The hydrology of the North Fork American River is unaffected, directly, by the operations of the integrated CVP/SWP. Its reservoirs and operations are influenced, rather, by local operations between PCWA and, to a lesser degree by SMUD. The diversions contemplated under this action will, in part, be withdrawn from the North Fork American River. Potential hydrologic effects on downstream fisheries resources were evaluated based on instream, long-term changes in mean monthly flows in this reach of the North Fork.

Table 5.8-17 illustrates the long-term mean monthly flows in the North Fork American River under the Alternative 2C – Proposed Action – Scenario C, relative to the Base Condition. Alternative 2C assumes a preferential shift in total diversion allocation to GDPUD and, thereby, represents the most significant depletion from the North Fork of all of the alternative diversion scenarios under this action. This, more aggressive analysis, is considered prudent for environmental review and disclosure purposes.

The modeling results illustrate that, while simulated flow changes in the North Fork American River downstream of the American River Pump Station would be small and likely insignificant during the high flow winter months, these changes become more apparent through the summer months. For the July through September period, modeled mean monthly flow reductions approach 25 cfs or 4 percent. At flows in August and September typically between 600-700 cfs in this reach of the river, a 4 percent reduction could impart measurable effects on resident fisheries and aquatic resources. This would be a potentially significant impact.

When the diversion apportionment (between EID and GDPUD) is changed such that GDPUD's allocation is reduced to 7,500 AFA (as opposed to 11,000 AF), the modeling results reflect this change. Table 5.8-18 shows the simulated mean monthly flows in the North Fork American River

TABLE 5.8-17

MEAN MONTHLY NORTH FORK AMERICAN RIVER FLOWS BELOW THE AMERICAN RIVER PUMP STATION SITE DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Notes[4]
Oct	675.6	662.6	-13.4	-2.8	-22.8 (-13.8)	1966 (BN)
Nov	936.5	929.4	-7.1	-1.5	-10.0 (-5.1)	1976 (C)
Dec	1788.8	1782.8	-6.0	-1.0	-8.6 (-4.7)	1971 (W)
Jan	2250.7	2244.4	-6.3	-0.8	-6.3 (-5.8)	Several
Feb	3061.5	3054.9	-6.5	-0.5	-7.8 (-4.7)	1991 (C)
Mar	3138.7	3132.0	-6.7	-0.4	-8.5 (-2.4)	1970 (W)
Apr	3272.7	3262.2	-10.5	-0.5	-11.1 (-3.2)	Several
May	3110.7	3099.3	-11.5	-0.7	-12.2 (-3.3)	Several
Jun	1829.4	1807.5	-21.9	-2.7	-24.0 (-20.4)	Several
Jul	913.1	891.3	-21.8	-3.4	-24.0 (-21.1)	Several
Aug	690.7	667.3	-23.4	-3.8	-28.2 (-23.6)	1966 (BN)
Sep	604.4	587.1	-17.3	-3.5	-29.4 (-21.9)	1981 (D)

Notes:
1. Proposed Action – Scenario C – modeled 11 TAF from PCWA Auburn Pump Station site on an August through October diversion pattern and 4 TAF diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flow releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in mean monthly flow releases occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.8-18

MEAN MONTHLY NORTH FORK AMERICAN RIVER FLOWS BELOW THE AMERICAN RIVER PUMP STATION SITE DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Notes[4]
Oct	675.6	667.4	-8.2	-1.7	-16.8 (-9.3)	1966 (BN)
Nov	936.5	932.3	-4.2	-0.9	-7.1 (-3.5)	1976 (C)
Dec	1788.8	1785.3	-3.5	-0.6	-6.1 (-3.2)	1971 (W)
Jan	2250.7	2246.4	-4.3	-0.5	-4.3 (-3.9)	Several
Feb	3061.5	3057.3	-4.1	-0.3	-5.6 (-3.4)	1991 (C)
Mar	3138.7	3134.3	-4.4	-0.2	-6.2 (-1.7)	1970 (W)
Apr	3272.7	3265.6	-7.1	-0.3	-7.6 (-2.2)	Several
May	3110.7	3102.9	-7.8	-0.4	-8.3 (-2.2)	Several
Jun	1829.4	1814.5	-14.9	-1.9	-16.4 (-13.9)	Several
Jul	913.1	898.3	-14.8	-2.3	-16.3 (-14.3)	Several
Aug	690.7	675.2	-15.4	-2.5	-19.4 (-16.1)	1966 (BN)
Sep	604.4	594.4	-10.0	-2.1	-21.5 (-14.9)	1981 (D)

Notes:
1. Proposed Action – Scenario A – modeled 7.5 TAF from PCWA Auburn Pump Station site and 7.5 TAF from Folsom Reservoir at EID's existing intake; on an August through October diversion pattern.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flow releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in mean monthly flow releases occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

under Alternative 2A – Proposed Action – Scenario A, relative to the Base Condition. Mid-summer modeled flows also show a reduction in long-term expected mean monthly flows under this allocation scenario, but not to the same extent as those under Alternative 2C. Simulated hydrology under this allocation scenario shows that the expected changes would not be large enough to represent a significant impact on resident fisheries and associated instream aquatic resources.

Modeling results under Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative also confirmed that no significant changes in long-term mean monthly flows would occur in the North Fork American River downstream of the American River Pump Station. Under any of the Reduced Diversion Alternatives (Alternatives 4A, 4B or 4C), the diversions by GDPUD would noticeably decrease, relative to the Alternative 2A. By design, these alternatives were intended to offer a lesser hydrologic impact on the river by reducing diversions. Without modeling Alternatives 4A and 4B, it can be deduced from the modeling output from Alternative 2A, which showed a less-than-significant impact, that all of the Reduced Diversions Alternatives would also exhibit a less-than-significant impact.

Accordingly, no significant impacts on the fisheries and aquatic resources, based on modeled hydrology, are anticipated in the North Fork American River.

Mitigation Measures

Alternative 2C – Proposed Action – Scenarios C

Under Alternative 2C – Proposed Action – Scenario C, reductions in simulated mean monthly flows in the North Fork American River downstream of the American River Pump Station, relative to the Base Condition were noted. Although small, these flow reductions could represent a significant impact on resident fisheries and associated aquatic resources within this reach of the North Fork. Potential mitigation measures, which would reduce the impact to a less-than-significant level could include:

1. Altered seasonal diversion pattern; thus, avoiding a peaked mid-summer diversion (August through October as modeled);
2. Re-allocating the diversion quantities between EID and GDPUD, so as to follow Alternative 2A – Scenario A; or
3. Reduction in the overall diversion total as represented by any of the Reduced Diversion Alternatives (e.g., Alternatives 4A, 4B or 4C).

Alternatives 2A and 2B – Proposed Action – Scenarios A and B, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative, and Alternative 1B – No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8-8 Flow impacts on fisheries resources of the North Fork American River upstream of the American River Pump Station site.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in system-wide hydrology would occur since no new diversions or depletions from the system are assumed. Without any change in hydrology, no changes in instream flows from the Base Condition would result. Accordingly, no impacts on current fisheries resources in the North Fork American River upstream of the American River Pump Station are anticipated under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative

Table 5.8-19 shows the modeled mean monthly flows in the North Fork American River under Alternative 2C – Proposed Action – Scenario C, relative to the Base Condition. As expected, without any proposed diversions upstream of the American River Pump Station site, no changes to the anticipated instream hydrology would occur. No impacts on fisheries and aquatic resources upstream of the American River Pump Station site are expected.

TABLE 5.8-19

MEAN MONTHLY NORTH FORK AMERICAN RIVER FLOWS ABOVE THE AMERICAN RIVER PUMP STATION SITE DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Notes[4]
Oct	719.5	719.5	0.0	0.0	0.0	n/a
Nov	971.5	971.5	0.0	0.0	0.0	n/a
Dec	1817.2	1817.2	0.0	0.0	0.0	n/a
Jan	2270.9	2270.9	0.0	0.0	0.0	n/a
Feb	3086.3	3086.3	0.0	0.0	0.0	n/a
Mar	3173.0	3173.0	0.0	0.0	0.0	n/a
Apr	3302.5	3302.5	0.0	0.0	0.0	n/a
May	3165.6	3165.6	0.0	0.0	0.0	n/a
Jun	1904.0	1904.0	0.0	0.0	0.0	n/a
Jul	996.9	996.9	0.0	0.0	0.0	n/a
Aug	768.5	768.5	0.0	0.0	0.0	n/a
Sep	677.0	677.0	0.0	0.0	0.0	n/a

Notes:
1. Proposed Action – Scenario C – modeled 11 TAF from PCWA Auburn Pump Station site on an August through October diversion pattern and 4 TAF diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flow releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in mean monthly flow releases occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Modeling results for the other Alternatives under the Proposed Action showed similar results; there would be no change in the long-term simulated mean monthly flows of the North Fork American River upstream of the American River Pump Station. Similarly, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative also confirmed, through hydrologic modeling, that no changes in flows within this reach of the North Fork would occur. Accordingly, no impacts on the fisheries resources in the North Fork upstream of the American River Pump Station are anticipated.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8-9 Impacts on Folsom Reservoir warmwater fisheries.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in system-wide hydrology would occur since no new diversions or depletions from the system are assumed. Without any change in reservoir hydrology, no changes in either water surface elevations or surface area would result. Littoral habitats and anticipated nesting success would proceed unimpeded. Accordingly, no impacts on Folsom Reservoir's warmwater fisheries would occur under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative

Changes in water surface elevation in Folsom Reservoir during the March through September period could result in measurable corresponding changes in the availability of reservoir littoral habitat containing inundated terrestrial vegetation (willows and button brush). Such shallow, near-shore waters containing physical structure are important to producing and maintaining strong year-classes of warmwater fish annually. Water surface area, in reservoirs supporting gentle sloping nearshore areas, is a good indicator of littoral habitat availability.

Table 5.8-20 shows the modeled end-of-month water surface area (in acres) for Folsom Reservoir under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition over the 72-year hydrologic period of record (this is the same as Table 5.8-9). The maximum computed decrease in any end-of-month water surface area was approximately 15 acres (representing about a two-tenths of one percent reduction, relative to the Base Condition). This reduction would occur in July.

Reductions in the availability of littoral habitat could result in increased predation on young-of-the-year warmwater fisheries, thereby reducing long-term initial year-class strength of warmwater fish populations. Unless willows and other near-shore 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 fisheries could be reduced. From these modeling results, such changes in

TABLE 5.8-20

END-OF-MONTH WATER SURFACE AREA IN FOLSOM RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (acres)	Proposed Action (acres)	Absolute Difference[2] (acres)	Relative Difference (%)	Maximum Water Surface Area Decrease[3] (acres and %)	Maximum Water Surface Area Increase[4] (acres and %)
Oct	7924.0	7917.4	-6.6	-0.1	-286.0 (-3.6)	739.5 (10.7)
Nov	7384.8	7377.0	-7.8	-0.1	-561.0 (-9.0)	686.3 (10.3)
Dec	7432.8	7438.4	5.6	0.1	-151.4 (-2.4)	624.5 (9.8)
Jan	7601.7	7611.1	9.4	0.1	-120.5 (-2.0)	512.2 (8.7)
Feb	7797.9	7796.3	-1.6	0.0	-59.8 (-1.1)	156.5 (2.4)
Mar	8875.4	8879.2	3.8	0.0	-72.5 (-1.5)	191.2 (2.4)
Apr	9718.9	9711.2	-7.7	-0.1	-82.4 (-1.7)	44.5 (0.4)
May	10238.5	10229.9	-8.5	-0.1	-84.5 (-1.9)	16.9 (0.2)
Jun	9907.0	9996.5	-10.5	-0.1	-241.6 (-2.6)	51.0 (0.5)
Jul	8919.1	8903.6	-15.4	-0.2	-427.1 (-4.9)	245.4 (3.5)
Aug	8508.7	8497.7	-11.0	-0.2	-207.0 (-5.6)	575.4 (7.1)
Sep	8446.5	8438.2	-8.3	-0.1	-276.5 (-6.6)	751..2 (10.7)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Project (in acres), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Water Surface Area Decrease – refers to the largest decrease in end-of-month water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Water Surface Area Increase – refers to the largest increase in end-of-month water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

water surface area would not significantly affect Folsom Reservoir's primary warmwater fish-spawning period (March through July) and initial rearing (July through September).

As previously discussed, adverse impacts on spawning from nest-dewatering are assumed to have the potential to occur when reservoir elevation decreases by more than nine feet within a given month. Modeling results from Table 5.8-21 indicate that long-term mean monthly water surface elevations would not measurably change, relative to the Base Condition for any month. Therefore, the frequency with which potential nest-dewatering events could occur in Folsom Reservoir would not increase, relative to existing or current conditions.

Consequently, there would be no adverse effects on available littoral habitat or warmwater fish nesting success. Overall, impacts on Folsom Reservoir warmwater fisheries are considered to be less than significant.

Modeling results for the other Alternatives under the Proposed Action scenarios showed similar results. Additionally, modeling results for Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative also confirmed that no significant changes in long-term mean monthly water surface elevation or end-of-month water surface area would result from the implementation of these alternatives. Accordingly, no significant impacts on the warmwater fisheries in Folsom Reservoir are anticipated.

TABLE 5.8-21

MEAN MONTHLY WATER SURFACE ELEVATIONS IN FOLSOM RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (ft msl)	Proposed Action (ft msl)	Absolute Difference[2] (ft msl)	Relative Difference (%)	Maximum Water Surface Elevation Decrease[3] (ft msl and %)	Maximum Water Surface Elevation Increase[4] (ft msl and %)
Oct	416.6	416.5	-0.2	0.0	-4.2 (1.0)	9.9 (2.5)
Nov	408.1	408.1	0.0	0.0	-7.7 (-2.0)	9.4 (2.3)
Dec	410.2	410.2	0.0	0.0	-2.3 (-0.6)	8.8 (2.2)
Jan	412.2	412.3	0.1	0.0	-1.6 (-0.4)	7.1 (1.7)
Feb	415.0	415.0	0.0	0.0	-0.8 (-0.2)	2.2 (0.6)
Mar	429.0	429.0	0.0	0.0	-0.8 (-0.2)	2.6 (0.6)
Apr	440.3	440.2	-0.1	0.0	-1.1 (-0.2)	1.5 (0.3)
May	451.2	451.1	-0.1	0.0	-1.0 (-0.3)	0.3 (0.1)
Jun	446.2	446.0	-0.2	0.0	-4.8 (-1.1)	0.8 (0.2)
Jul	430.9	430.7	-0.2	0.0	-3.2 (-0.8)	3.3 (0.8)
Aug	425.6	425.4	-0.2	-0.1	-3.5 (-1.0)	7.7 (1.8)
Sep	424.8	424.6	-0.1	0.0	-3.8 (-1.1)	10.1 (2.5)`

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in ft msl), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Water Surface Elevation Decrease – refers to the largest decrease in water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Water Surface Elevation Increase – refers to the largest increase in water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8-10 Impacts on Folsom Reservoir's coldwater fisheries.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in system-wide hydrology would occur. As no new diversions or depletions from the system are assumed, no change in reservoir storage and, therefore, coldwater pool volumes would occur in Folsom Reservoir. Without any change in reservoir storage, coldwater fisheries species relying on Folsom Reservoir's thermal regime would not be affected under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative

Coldwater habitat for fisheries in Folsom Reservoir is largely a function of reservoir storage. This assumes wet-period filling and complete stratification by the onset of summer. Anticipated reductions in reservoir storage would not typically be expected to adversely affect the reservoir's coldwater fisheries because coldwater habitat would remain available within the reservoir during all months of most all years. Moreover, physical habitat availability is not believed to be among the primary factors limiting coldwater fish populations, and anticipated seasonal reductions in storage would not be expected to adversely affect the primary prey species utilized by coldwater fish. Nevertheless, coldwater pool volume, as a habitat characteristic is important.

Table 5.8-22 shows the mean long-term simulated end-of-month storage in Folsom Reservoir under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Long-term modeled storage does not appreciably change with the implementation of the proposed new CVP contracts, relative to the Base Condition. Maximum mean end-of-month storage decreases approximate 1,400 to 1,600 AF (or three-tenths of one percent of the Base Condition storage) and occur during the months of June through August. Coldwater pool development during these months has already been established; recent isothermbaths for Folsom Reservoir have shown that the reservoir is well stratified by this time. Total reservoir storage decreases of these magnitudes (i.e., three-tenths of one percent of the Base Condition storage) would not measurably affect coldwater pool volumes in the reservoir.

TABLE 5.8-22

MEAN END-OF-MONTH STORAGE IN FOLSOM RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (TAF)	Proposed Action (TAF)	Absolute Difference[2] (TAF)	Relative Difference (%)	Maximum Storage Decrease[3] (TAF and %)	Maximum Storage Increase[4] (TAF and %)
Oct	525.8	524.8	-1.0	-0.1	-34.1 (-5.8)	80.3 (19.8)
Nov	453.2	453.1	0.0	-0.1	-47.1 (-13.6)	74.3 (19.5)
Dec	464.9	465.4	0.5	0.1	-13.9 (-4.1)	61.9 (17.4)
Jan	481.6	482.6	1.0	0.3	-10.1 (-3.2)	57.7 (13.3)
Feb	503.2	503.0	-0.2	0.0	-6.2 (-1.4)	15.8 (3.9)
Mar	614.1	614.3	0.2	0.0	-6.5 (-1.5)	20.9 (4.1)
Apr	722.7	721.9	-0.7	-0.1	-11.1 (-1.8)	15.4 (2.0)
May	834.2	833.1	-1.1	-0.2	-10.2 (-2.0)	2.9 (0.3)
Jun	788.4	787.0	-1.4	-0.2	-40.7 (-5.9)	8.6 (1.2)
Jul	650.7	649.1	-1.6	-0.3	-25.9 (-4.5)	26.6 (6.3)
Aug	601.9	600.6	-1.4	-0.3	-28.5 (-6.5)	62.5 (11.8)
Sep	594.4	593.4	-1.0	-0.3	-30.0 (-7.6)	81.5 (19.3)

Notes:
1. Proposed Action – Scenario B, modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Storage Decrease – refers to the largest decrease in end-of-month storage under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Storage Increase – refers to the largest increase in end-of-month storage under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

These relatively small anticipated reductions in reservoir storage would not be expected to adversely affect the reservoir's coldwater fisheries because coldwater habitat would remain available within the reservoir during all months of all years and anticipated seasonal reductions in storage would not be expected to adversely affect the primary prey species utilized by coldwater fish.

Modeling results for the other Alternatives under the Proposed Action scenarios showed similar results; there would be no measurable change in the long-term mean end-of-month storage in Folsom Reservoir. To the extent that reservoir storage influences coldwater pool volume, the insignificant changes in storage would, likewise, translate into immeasurable effects on reservoir coldwater pool volume. Similar modeling results for Alternatives 4A, 4B and 4C – Reduced Diversion Alternative, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative also confirmed that no significant changes in reservoir storage would result from the implementation of any of these alternatives. Accordingly, impacts on the coldwater fisheries in Folsom Reservoir are anticipated to be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8-11 Impacts on Nimbus Fish Hatchery.

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Consequently, flows and associated temperatures in the lower American River would be unchanged from existing conditions, and the temperature of flows entering into the Nimbus Hatchery would be identical to temperatures entering the hatchery under current conditions. Therefore, there would be no impact on water temperatures and resultant fish production at the Nimbus Fish Hatchery under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternatives, and Alternative 1A – No Action Alternative

Overall, water temperature modeling revealed that temperatures of water entering the Nimbus Fish Hatchery from Lake Natoma during the May through September period would remain unchanged, relative to the Base Condition. Table 5.8-23 shows the long-term mean monthly water temperatures below Nimbus Dam under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. The maximum increases in mean monthly water temperatures occurred in September; a 1.6°F increase was simulated for one year (1944 hydrology). For the May through September period (when hatchery temperatures reach annual highs), the range of maximum increases in mean monthly water temperatures was 0.3 to 1.6°F, respectively. As shown in Table 5.8-23, these were single year, monthly maximums over the 72-year period of record. A close inspection of the entire period of record revealed both increases and decreases in modeled water temperatures.

Furthermore, there would be insignificant differences (up to one month increase) in the frequency with which temperatures exceed index temperatures of 60°F, 65°F and 68°F, relative to the existing condition.

TABLE 5.8-23

MEAN MONTHLY WATER TEMPERATURES BELOW NIMBUS DAM DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (°F)	Proposed Action (°F)	Absolute Difference[2] (°F)	Relative Difference (%)	Maximum Temperature Increase[3] (°F and %)	Notes[4]
Oct	60.8	60.8	0.0	0.0	1.0 (1.7)	1945 (BN)
Nov	56.5	56.5	0.0	0.0	0.4 (0.7)	1928 (AN) 1945 (BN) 1948 (BN)
Dec	49.8	49.8	0.0	0.0	0.3 (0.6)	1945 (BN) 1948 (BN)
Jan	46.3	46.3	0.0	0.0	0.3 (0.6)	1945 (BN)
Feb	47.4	47.4	0.0	0.0	0.4 (0.9)	1945 (BN)
Mar	50.8	50.8	0.0	0.0	0.4 (0.8)	1932 (D)
Apr	54.8	54.8	0.0	0.0	0.1 (0.2)	1926 (D) 1929 (C) 1944 (D) 1947 (D) 1948 (BN) 1961 (D) 1972 (BN) 1977 (C) 1980 (AN) 1981 (D) 1983 (W) 1985 (D) 1987 (D) 1988 (C) 1990 (C) 1992 (C)
May	58.8	58.8	0.0	0.0	0.3 (0.4)	1931 (C)
Jun	62.2	62.2	0.0	0.0	0.3 (0.5)	1992 (C)
Jul	64.5	64.5	0.0	0.0	0.8 (1.3)	1947 (D)
Aug	64.9	64.9	0.0	0.0	0.6 (0.9)	1981 (D)
Sep	66.0	66.0	0.0	0.0	1.6 (2.6)	1944 (D)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in °F), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Temperature Increase – refers to the largest increase in mean monthly water temperatures under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Percent increase, relative to the specific year, shown in parentheses.
4. Indicates the year where the largest decrease in water temperatures occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Based on these modeling results, operations of Folsom Dam and Reservoir associated with implementation of the proposed water service contracts would have very little effect on the temperatures of water entering the Nimbus Fish Hatchery from Lake Natoma during the May through September period, relative to the Base Condition. Long-term average temperature of water released from Nimbus Dam would remain unchanged.

Similar changes would result under the other scenarios of the Proposed Action. These small and infrequent differences in water temperature would have little, if any, effect on hatchery operations and resultant fish production. Therefore, impacts on the operation of the Nimbus Hatchery would be less than significant.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.8-12 Impacts on fall-run Chinook salmon and steelhead in the lower American River.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in system-wide hydrology would occur. Without any change in reservoir operations and, therefore, releases, lower American River flows at the mouth would remain unchanged under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Flow- and temperature-related impacts are discussed separately below by species and lifestage. Organizationally, flow- and temperature-related impacts on fall-run Chinook salmon and steelhead are discussed together, followed by impact discussions for splittail, American shad, and striped bass.

Minimal potential changes in lower American River flows and water temperatures under any of the Alternatives – Proposed Action Scenarios or other alternatives, relative to the Base Condition, would not be expected to adversely affect fall-run Chinook salmon and steelhead immigration, spawning and incubation, or juvenile rearing and emigration.

Flow-Related Impacts on Fall-Run Chinook Salmon/Steelhead Adult Immigration (September Through March)

Flows in the lower American River have rarely been at the minimums prescribed under D-893; typical flow releases follow modified D-1400 and AFRP targets as voluntarily set by Reclamation in cooperation with the Lower American River Operations (LAROPS) Group.

As assessment of flow-related impacts on Chinook salmon adult immigration is determined by reviewing projected flows at the mouth of the American River during the September through December period. This is the period when returning lower American River Chinook salmon adults migrate through the Sacramento River in search of their natal stream to spawn. The same would be true for steelhead during the December through March period. Reduced flows at the mouth are of concern primarily because less flow could result in insufficient olfactory cues for immigrating adult salmonids, thereby making it more difficult for them to "home" to the lower American River. Insufficient flow could result in higher rates of straying to other Central Valley rivers.

Table 5.8-24 shows the modeled mean month flows in the lower American River measured at the mouth under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition, over the entire 72-year period of record. In each of the months, with the exception of February, modeling simulations revealed a long-term decrease in mean monthly flows. These decreases range from a high of about 35 cfs (for August) to a low of about 3 cfs (for April). Inter-annual variability is high; both between years and with respect to the range of maximum flow decreases and increases. The mid-summer period (i.e., June through September) showed the largest flow decreases over the long-term.

TABLE 5.8-24

**MEAN MONTHLY FLOWS AT THE MOUTH
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)**

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Oct	2248.3	2234.0	-14.2	-0.7	-356.7 (-17.3)	443.4 (17.5)
Nov	3175.8	3150.3	-25.5	-0.3	-585.7 (-22.5)	703.8 (44.8)
Dec	3233.0	3211.1	-21.8	-0.2	-833.9 (-11.3)	445.4 (25.3)
Jan	3990.3	3969.9	-20.4	-1.1	-764.9 (-65.4)	329.7 (26.2)
Feb	5010.8	5014.9	4.1	0.6	-190.0 (-8.1)	708.4 (55.8)
Mar	3632.4	3609.5	-22.9	-1.0	-267.6 (-10.8)	18.8 (1.6)
Apr	3698.9	3695.8	-3.1	-0.1	-73.6 (-2.0)	328.1 (15.1)
May	3470.0	3455.5	-14.5	-0.5	-59.2 (-4.3)	239.6 (8.0)
Jun	3674.9	3647.1	-27.8	-1.0	-150.3 (-10.7)	526.4 (19.4)
Jul	3475.2	3448.3	-26.9	-1.1	-466.9 (-16.0)	78.4 (1.8)
Aug	1797.7	1763.0	-34.7	-1.9	-1465.2 (-76.4)	405.1 (27.0)
Sep	1243.4	1216.4	-27.0	-2.5	-1152.2 (-75.4)	127.7 (14.6)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

August and September are the two months where Base Condition flows (current condition averages) are typically at their lowest. Long-term mean monthly flows at the mouth during September are typically around 1,200 cfs. Under Alternative 2B – Proposed Action – Scenario B, a 27 cfs (or 2.5 percent) decrease in flows would occur based on the CALSIM II modeling simulation. While a long-term 2.5 percent decrease in flows could be considered relatively small and, most likely represents an insignificant change in hydrology, the listed status of fall-run Chinook salmon compels a closer inspection of the modeling results over the entire 72-year period of record.

Modeled results showed that in two-thirds of the years (48 out of 72 years), decreases in mean monthly flows at the mouth would occur in September, relative to the Base Condition. Removing the largest negative outlier (i.e., a simulated 1947; with a 1,152 cfs decrease), the long-term mean monthly flow decrease is *relaxed* to about 11 cfs (or 0.9 percent) (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR). Alternatively, however, of those 48 years, seven years revealed mean monthly flow decreases, relative to the Base Condition, greater than 3 percent; with each of these years except one, having Base Condition flows well below the 72-year mean of 1,243 cfs. Exacerbation of instream flow conditions, especially during critically low flow periods would be of concern regarding the attraction of fall-run Chinook salmon adults immigrating into the lower American River. Accordingly, this is considered a potentially significant effect.

For steelhead, an inspection of the December through March flow results revealed that while long-term decreases in mean monthly lower American River flows at the mouth would occur, these would not be of sufficient magnitude to affect returning adults. Average base flow conditions during this time of year are already high (e.g., over 3,200 cfs for December) and the proposed diversions would not measurably affect instream flows (see Table 5.8-24).

Modeling results for the other Alternatives under the various Proposed Action scenarios showed similar results; there would be decreased long-term mean monthly flows in the lower American River at the mouth for the month of September. Modeling results for Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative; however, did not show the same degree of anticipated long-term flow decreases.

Mitigation Measures

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios

Under Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, reductions in simulated mean monthly flows in the lower American River at the mouth during the month of September, relative to the Base Condition were noted. Although small, these flow reductions could represent a significant impact on fall-run adult Chinook salmon immigration. Potential mitigation measures, which would reduce the impact to a less-than-significant level, could include:

1. Altered seasonal diversion pattern (e.g., a more evenly distributed monthly pattern); thus, avoiding a peaked mid-summer diversion (August through October as modeled); or,
2. Reduction in the overall diversion total as represented by the various Reduced Diversion Alternatives (Alternatives 4A, 4B or 4C) – although such reductions would not be necessary in all years.

Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative, and Alternative 1B – No Project Alternative

No mitigation would be required for any of the Alternatives.

Temperature-Related Impacts on Fall-Run Chinook Salmon/Steelhead Adult Immigration (September Through March)

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Consequently, flows and associated temperatures in the lower American River and lower Sacramento River would remain unchanged from existing conditions. Accordingly, there would be no temperature-related impacts on fall-run Chinook salmon/steelhead adult immigration under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Reclamation's Lower American River Temperature Model does not account for the influence of Sacramento River water intrusion on water temperatures at the mouth. Therefore, the temperature assessments are based on temperatures modeled at the mouth of the lower American River and at Freeport on the Sacramento River. Tables 5.8-25 and 5.8-26 show the mean monthly water temperatures modeled at these two locations, respectively, under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition.

TABLE 5.8-25

**MEAN MONTHLY WATER TEMPERATURES AT THE MOUTHDIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)**

Month	Base Condition (°F)	Proposed Action (°F)	Absolute Difference[2] (°F)	Relative Difference (%)	Maximum Temperature Increase[3] (°F and %)	Notes[4]
Oct	61.2	61.2	0.0	0.0	0.8 (1.3)	1945 (BN)
Nov	55.6	55.6	0.0	0.0	0.5 (0.9)	1965 (W)
Dec	48.5	48.4	0.0	0.0	0.4 (0.8)	1945 (BN)
Jan	45.8	45.8	0.0	0.0	0.4 (0.9)	1945 (BN)
Feb	48.2	48.2	0.0	0.0	0.4 (0.8)	1945 (BN)
Mar	52.3	52.3	0.0	0.0	0.5 (0.9)	1932 (D)
Sep	68.0	68.0	0.0	0.0	2.8 (4.1)	1947 (D)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in °F), representative of the mean difference over the 71-years (subject to rounding).
3. Maximum Temperature Increase – refers to the largest increase in mean monthly water temperatures under the Proposed Action, relative to the Base Condition, computed for that month (over 71 years). Percent increase, relative to the specific year, shown in parentheses.
4. Indicates the year where the largest decrease in water temperatures occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

TABLE 5.8-26

**MEAN MONTHLY SACRAMENTO RIVER WATER TEMPERATURES AT FREEPORT
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]**

Month	Absolute Difference (°F)	Relative Difference (%)	Long-Term Mean Monthly Temperatures (°F)	Maximum Temperature Increase[2] (°F)	Number of Years with Temperature Increase[3]	Number of Years with Temperature Decrease[4]
Oct	0.0	0.0	60.9	0.2	1 (1.4%)	12 (16.9%)
Nov	0.0	0.0	52.9	0.2	1 (1.4%)	14 (19.7%)
Dec	0.0	0.0	45.7	0.1	1 (1.4%)	7 (9.8%)
Jan	0.0	0.0	44.8	0.1	2 (2.8%)	3 (4.2%)
Feb	0.0	0.0	49.5	0.1	1 (1.4%)	4 (5.6%)
Mar	0.0	0.0	54.2	0.1	3 (4.2%)	1 (1.4%)
Sep	0.0	0.0	69.2	0.4	1 (1.4%)	9 (12.7%)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Maximum Temperature Increase – refers to the largest increase in mean monthly water temperatures computed for that month (largest decrease over 71 years).
3. Indicates the number of years (and as a percentage) for that month where Sacramento River water temperatures would be increased by the increment shown in the Maximum Temperature Increase column over the 71-year period of water temperature record.
4. Indicates the number of years (and as a percentage) where there would be a decrease in Sacramento River water temperatures for that month over the 71-year period of water temperature record.

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

Modeling results confirm that the long-term average water temperatures at both locations under Alternative 2B – Proposed Action – Scenario B, would remain virtually unchanged, relative to the Base Condition during all months of the September through March adult immigration period. Therefore, changes in water temperature under Alternatives 2A, 2B or 2C or under any of the Reduced Diversion Alternatives (Alternatives 4A, 4B or 4C) would be a less-than-significant impact on fall-run Chinook salmon/steelhead adult immigration.

Similar results would occur under Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative. Therefore, temperature-related impacts on fall-run Chinook salmon/steelhead adult immigration would be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

Flow-Related Impacts on Fall-Run Chinook Salmon Spawning and Incubation (October Through February)

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no flow-related impacts on fall-run Chinook salmon/steelhead spawning and incubation under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

All flow-related impact assessments regarding fall-run Chinook salmon spawning and incubation were based on flows below Nimbus Dam and at Watt Avenue, with a greater emphasis placed on flows below Nimbus Dam. Aerial redd surveys conducted by CDFG in past years have shown that 98 percent of all spawning occurs upstream of Watt Avenue, and 88 percent of spawning occurs upstream of RM 17 (located just upstream of Ancil Hoffman Park). Hence, the majority of spawning occurs upstream of RM 17.

Tables 5.8-27 and 5.8-28 show the modeled mean monthly flows at Nimbus Dam and at Watt Avenue under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition.

Modeled monthly mean flows in this reach of the lower American River would remain essentially unchanged from the Base Condition. Long-term flows would not be expected to change by more than one percent. Most importantly, flows at this time of year are at their highest.

Differences in flows in the lower flow ranges are more crucial for salmon survival. During October, November, and December, flows would be nearly identical to those under the Base Condition in almost all years. Flow reductions below 2,000 cfs could reduce the amount of available Chinook

TABLE 5.8-27

MEAN MONTHLY FLOWS BELOW NIMBUS DAM
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Oct	2441.8	2427.7	-14.1	-0.7	-362.0 (-15.4)	440.8 (15.8)
Nov	3324.2	3299.2	-25.0	-0.3	-582.1 (-20.8)	704.4 (41.6)
Dec	3342.0	3322.9	-19.1	-0.1	-827.8 (-10.8)	446.1 (23.6)
Jan	4088.3	4073.4	-14.9	-0.8	-764.9 (-60.5)	334.6 (23.6)
Feb	5103.3	5115.7	12.4	0.9	-190.7 (-8.1)	720.7 (51.8)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.8-28

MEAN MONTHLY FLOWS AT WATT AVENUE
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Project (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Oct	2402.7	2388.8	-13.9	-0.7	-362.0 (-16.0)	440.8 (16.1)
Nov	3399.7	3374.1	-25.5	-0.3	-586.1 (-21.3)	703.8 (42.0)
Dec	3337.4	3315.5	-21.8	-0.2	-833.9 (-10.8)	445.4 (23.8)
Jan	4107.3	4086.9	-20.4	-1.0	-764.9 (-59.4)	329.7 (24.0)
Feb	5134.9	5139.0	4.1	0.6	-190.0 (-7.7)	708.4 (50.8)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

salmon spawning habitat, which could result in increased redd superimposition during years when adult returns are high enough for spawning habitat to be limiting. For any year, minimal differences in flow would occur when flows under the existing condition are 2,000 cfs or less. Such reductions inflow, therefore, would not be expected to be of substantial magnitude or occur with sufficient frequency to have a significant adverse effect on long-term initial year-class strength of lower American River fall-run Chinook salmon. Overall, there would be no substantial adverse effects resulting from reduced flows that would result in potential flow-related impacts on fall-run Chinook salmon spawning and incubation.

Similar results would occur under the other Alternatives of the various Proposed Action scenarios as well as the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative. Therefore, flow-related impacts on fall-run Chinook salmon/steelhead spawning and incubation would be less than significant.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

Temperature-Related Impacts on Fall-Run Chinook Salmon Spawning and Incubation (October Through February)

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no water temperature-related impacts on fall-run Chinook salmon spawning and incubation under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Under Alternative 2B – Proposed Action – Scenario B, long-term average water temperatures would be equivalent to those under the Base Condition during October at Watt Avenue, and during the November through February period below Nimbus Dam, as shown in Tables 5.8-29 and 5.8-30. No long-term changes in mean monthly water temperatures were observed. Watt Avenue is the location of concern in October because air temperatures tend to warm the river as it moves downstream. Conversely, water temperatures below Nimbus Dam are usually warmer than water temperatures at Watt Avenue in the winter season.

The October water temperatures at Watt Avenue would be essentially equivalent or less than the Base Condition in 64 months of the 71 months included in the modeling analysis (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR). The October water temperature at Watt Avenue would increase by more than 0.3°F in up to seven months of the simulation, with the greatest increase of 0.9°F (based on 1944 hydrology). The November through February monthly mean water temperatures below Nimbus Dam would be essentially equivalent to the existing condition in 275 of the 284 months included in the water temperature modeling analysis (Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR). November water temperatures below Nimbus Dam would increase by more than 0.2°F in five years of the 71 years modeled, and by up to one year in February. However, December, January, and February water temperatures below Nimbus Dam would be below 56°F in all 71 years modeled.

The long-term average annual early lifestage survival for fall-run Chinook salmon in the American River, as shown in Table 5.8-31, would remain unchanged, relative to the Base Condition.

TABLE 5.8-29

MEAN MONTHLY WATER TEMPERATURES AT WATT AVENUE DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (°F)	Proposed Action (°F)	Absolute Difference[2] (°F)	Relative Difference (%)	Maximum Temperature Increase[3] (°F and %)	Notes[4]
Oct	61.0	61.0	0.0	0.0	0.9 (1.5)	1945 (BN)
Nov	55.9	55.9	0.0	0.0	0.5 (0.9)	1965 (W)
Dec	49.0	48.9	0.0	0.0	0.3 (0.6)	1948 (BN)
Jan	46.0	46.0	0.0	0.0	0.3 (0.7)	1945 (BN)
Feb	47.9	47.9	0.0	0.0	0.4 (0.8)	1945 (BN)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in °F), representative of the mean difference over the 71-years (subject to rounding).
3. Maximum Temperature Increase – refers to the largest increase in mean monthly water temperatures under the Proposed Project, relative to the Base Condition, computed for that month (over 71 years). Percent increase, relative to the specific year, shown in parentheses.
4. Indicates the year where the largest decrease in water temperatures occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

TABLE 5.8-30

MEAN MONTHLY WATER TEMPERATURES BELOW NIMBUS DAM DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (°F)	Proposed Action (°F)	Absolute Difference[2] (°F)	Relative Difference (%)	Maximum Temperature Increase[3] (°F and %)	Notes[4]
Oct	60.8	60.8	0.0	0.0	1.0 (1.7)	1945 (BN)
Nov	56.5	56.5	0.0	0.0	0.4 (0.7)	1928 (AN) 1945 (BN) 1948 (BN)
Dec	49.8	49.8	0.0	0.0	0.3 (0.6)	1945 (BN) 1948 (BN)
Jan	46.3	46.3	0.0	0.0	0.3 (0.6)	1945 (BN)
Feb	47.4	47.4	0.0	0.0	0.4 (0.9)	1945 (BN)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in °F), representative of the mean difference over the 71-years (subject to rounding).
3. Maximum Temperature Increase – refers to the largest increase in mean monthly water temperatures under the Proposed Action, relative to the Base Condition, computed for that month (over 71 years). Percent increase, relative to the specific year, shown in parentheses.
4. Indicates the year where the largest decrease in water temperatures occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

TABLE 5.8-31

AMERICAN RIVER
EARLY LIFE-STAGE FALL-RUN CHINOOK SALMON SURVIVAL
OVER THE 72-YEAR PERIOD OF RECORD (1922-1993)
(PERCENT SURVIVAL)

	Base Condition	Proposed Action[1]	Absolute Difference	Relative Difference
Mean	84.9	84.9	0.0	0.0
Median	85.4	85.6	0.1	0.1
Minimum	73.8	73.9	-2.2	-2.6
Maximum	93.7	93.8	0.9	1.1

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
The period minimum (decrease in percent survival) occurred in 1944. Computed percent survival, however, in 1944 was 86.0% under the Base Condition and 83.8% under the Proposed Action.

Based on these modeling results, any small temperature changes in the lower American River resulting from Alternative 2B – Proposed Action – Scenario B, during the October through February period would not adversely affect spawning and incubation success of fall-run Chinook salmon. Therefore, potential temperature-related impacts on fall-run Chinook salmon spawning and incubation would be less than significant.

Similar results would occur under the Alternatives under the various Proposed Action scenarios as well as the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative. Therefore, temperature-related impacts on fall-run Chinook salmon spawning and incubation would be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

Flow– and Temperature-Related Impacts on Steelhead Spawning and Incubation (December Through March)

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no flow- or water temperature-related impacts on steelhead spawning or incubation under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Monthly mean flows simulated over the long-term below Nimbus Dam and at Watt Avenue associated with Alternative 2B – Proposed Action – Scenario B, would be essentially equivalent to the Base Condition. These data are shown in Tables 5.8-32 and 5.8-33.

TABLE 5.8-32

MEAN MONTHLY FLOWS BELOW NIMBUS DAM DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Dec	3342.0	3322.9	-19.1	-0.1	-827.8 (-10.8)	446.1 (23.6)
Jan	4088.3	4073.4	-14.9	-0.8	-764.9 (-60.5)	334.6 (24.6)
Feb	5103.3	5115.7	12.4	0.9	-190.7 (-8.1)	720.7 (51.8)
Mar	3729.4	3715.3	-14.1	-0.5	-267.9 (-10.0)	24.8 (3.0)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.8-33

MEAN MONTHLY FLOWS AT WATT AVENUE DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Dec	3337.4	3315.5	-21.8	-0.2	-833.9 (-10.8)	445.4 (23.8)
Jan	4107.3	4086.9	-20.4	-1.0	-764.9 (-59.4)	329.7 (24.0)
Feb	5134.9	5139.0	4.1	0.6	-190.0 (-7.7)	708.4 (50.8)
Mar	3759.7	3736.9	-22.8	-0.9	-267.6 (-10.3)	18.8 (1.4)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

In addition, monthly mean water temperatures below Nimbus Dam and at Watt Avenue would be similar to the Base Condition in 279 and 280 months of the 284 months included in the modeling analysis, respectively (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR). Moreover, under each of the alternatives, water temperatures below Nimbus Dam would remain below 56°F for all months of the 71 years modeled for the spawning and incubation period for steelhead. December, January, February, and March water temperatures at Watt Avenue would be below 56°F in all 71 years modeled.

Based on these modeling results, flow- and temperature-related impacts on steelhead spawning or incubation under Alternative 2B – Proposed Action – Scenario B would be less than significant.

Similar results from CALSIM II and the Reclamation Water Temperature Model were observed for the other Alternatives under the various Proposed Action scenarios as well as the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative. Therefore, flow- and temperature-related impacts on steelhead spawning or incubation would be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

Flow-Related Impacts on Fall-Run Chinook Salmon and Steelhead Juvenile Rearing (March Through June)

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no flow-related impacts on fall-run Chinook salmon and steelhead juvenile rearing under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The majority of juvenile salmonid rearing is believed to occur upstream of Watt Avenue. Moreover, depletions generally exceed tributary accretions to the river throughout the March through June period (generally resulting in lower flows at Watt Avenue than below Nimbus Dam). Accordingly, all flow-related impact assessments for fall-run Chinook salmon and steelhead rearing are based on flows at Watt Avenue. Table 5.8-34 shows the simulated mean monthly flow at Watt Avenue under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition.

TABLE 5.8-34

MEAN MONTHLY FLOWS AT WATT AVENUE
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Mar	3759.7	3736.9	-22.8	-0.9	-267.6 (-10.3)	18.8 (1.4)
Apr	3859.3	3854.9	-4.4	-0.1	-73.6 (-1.9)	328.1 (13.7)
May	3660.6	3646.0	-14.5	-0.5	-59.2 (-3.7)	239.6 (7.4)
Jun	3876.4	3848.6	-27.8	-0.9	-150.3 (-9.1)	526.4 (18.2)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Small changes in monthly mean flows would be expected to occur at Watt Avenue under the other Alternatives relative to the existing condition. The long-term average flow at Watt Avenue would be within 0.9 percent of the flow under the Base Condition for any given month during the March through June period. Such flow reductions are not of sufficient frequency or magnitude (i.e., generally 50 cfs or less) to result in significant adverse effects on long-term juvenile fall-run Chinook salmon or steelhead rearing success. Therefore, potential flow-related impacts on fall-run Chinook salmon and steelhead juvenile rearing under any alternative would be less than significant.

Similar results from CALSIM II were observed for the other Alternatives under the various Proposed Action scenarios as well as the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative. Therefore, there would be no flow-related impacts on either -run Chinook salmon and steelhead juvenile rearing.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

Temperature-Related Impacts on Fall-Run Chinook Salmon and Steelhead Juvenile Rearing (March Through June)

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no water temperature-related impacts on fall-run Chinook salmon and steelhead juvenile rearing under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Modeling of Alternative 2B – Proposed Project – Scenario B indicated that the long-term average water temperature at Watt Avenue would not change during any month of the March through June period, relative to the existing condition (see Table 5.8-35).

Monthly mean water temperatures at Watt Avenue would be essentially equivalent to the Base Condition in 281 of the 284 months included in the water temperature modeling analysis (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR). Moreover, there would not be any additional occurrences during the March through April period for all the 71 years modeled in which water temperatures would be above 65°F, relative to the Base Condition (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR). For May, there would be seven years where water temperatures would exceed 65°F; however, in each of these years, Base Condition temperatures would already be above 65°F. Alternative 2B – Proposed Action – Scenario

TABLE 5.8-35

MEAN MONTHLY WATER TEMPERATURES AT WATT AVENUE DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (°F)	Proposed Action (°F)	Absolute Difference[2] (°F)	Relative Difference (%)	Maximum Temperature Increase[3] (°F and %)	Notes[4]
Mar	51.8	51.8	0.0	0.0	0.4 (0.8)	1932 (D)
Apr	56.1	56.1	0.0	0.0	0.1 (0.2)	1925 (D) 1929 (C) 1944 (D) 1947 (D) 1961 (D) 1972 (BN) 1977 (C) 1980 (AN) 1981 (D) 1983 (W) 1984 (W) 1985 (D) 1987 (D) 1988 (C) 1990 (C) 1992 (C)
May	60.5	60.5	0.0	0.0	0.2 (0.3)	1930 (D) 1990 (C)
Jun	64.2	64.2	0.0	0.0	0.3 (0.5)	1990 (C)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in °F), representative of the mean difference over the 71-years (subject to rounding).
3. Maximum Temperature Increase – refers to the largest increase in mean monthly water temperatures under the Proposed Project, relative to the Base Condition, computed for that month (over 71 years). Percent increase, relative to the specific year, shown in parentheses.
4. Indicates the year where the largest decrease in water temperatures occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

B does not add or increase the frequency with which the 65°F temperature threshold would be exceeded. For June, Base Condition water temperatures already exceed 65°F in 21 of the 71 years modeled. Based on the modeling results, Alternative 2B – Proposed Action – Scenario B, would actually result in one less year (for June) where water temperatures would exceed 65°F.

Consequently, although infrequent temperature increases at Watt Avenue would occur during the March through June period, resultant water temperatures would not exceed threshold temperature criteria for juvenile rearing (65°F). Consequently, impacts on juvenile salmon and steelhead rearing would be less than significant.

Water temperature modeling results for the other Alternatives under the various Proposed Action scenarios as well as the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative showed similar results. Therefore, temperature-related impacts on either -run Chinook salmon and steelhead juvenile rearing would be less than significant.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

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

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no flow-related impacts on fall-run Chinook salmon and steelhead juvenile emigration under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The primary period of fall-run Chinook salmon juvenile emigration occurs from February to 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 on salmonid immigration discussed above addressed flow changes in February and March. As previously concluded for adult immigration, potential changes in flows under each of the alternatives during February through March would not adversely affect juvenile fall-run Chinook salmon or steelhead rearing and, therefore, also would not adversely affect emigration. Hence, this discussion focuses primarily on the April through June period.

Small decreases in monthly mean flows would be expected to occur at the American River mouth. Simulated long-term average flow at the mouth would decrease slightly (approximately 1 percent or less) in the April through June period (see Table 5.8-36).

TABLE 5.8-36

**MEAN MONTHLY FLOWS AT THE MOUTH
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)**

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Apr	3698.9	3695.8	-3.1	-0.1	-73.6 (-2.0)	328.1 (15.1)
May	3470.0	3455.5	-14.5	-0.5	-59.2 (-4.3)	239.6 (8.0)
Jun	3674.9	3647.1	-27.8	-1.0	-150.3 (-10.7)	526.4 (19.4)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Juvenile salmonid emigration surveys conducted by CDFG have shown no direct relationship between peak emigration of juvenile Chinook salmon and peak spring flows (Snider et al. 1997). Moreover, emigrating fish are more likely to be adversely affected by events when flows are high, then ramp down quickly (resulting in isolation and stranding). Adverse changes in flow ramping rates would not be expected to occur under Alternative 2B – Proposed Action – Scenario B. Operational control for Nimbus Dam releases will still be maintained by Reclamation, through coordination and interaction with the LAROPS group. Consequently, although small flow reductions at the mouth would occur in a few years during the April through June period, resultant flows would not be expected to adversely affect the success of juvenile salmonid emigration. Therefore, potential flow-related impacts on fall-run Chinook salmon and steelhead juvenile emigration would be less than significant.

Similar results from CALSIM II were observed for the other Alternatives under the various Proposed Action scenarios as well as the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative. Therefore, there would be no flow-related impacts on either fall-run Chinook salmon and steelhead juvenile emigration.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

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

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no temperature-related impacts on fall-run Chinook salmon and steelhead juvenile emigration under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

With the possible exception of a small percentage of fish that may rear near the mouth of the lower American River, potential impacts associated with elevated water temperatures at the mouth to fall-run Chinook salmon and steelhead would be limited to the several days that it takes emigrants to pass through the lower portion of the river and into the Sacramento River en route to the Delta. Water temperatures near the mouth during the primary emigration period (February into June) are often largely affected by intrusion of Sacramento River water, which is not accounted for by Reclamation's Lower American River Temperature Model. Consequently, actual temperatures near the mouth would likely be somewhere between temperatures modeled for the mouth, and temperatures modeled for the Sacramento River at Freeport (RM 46), located 14 miles downstream of the lower American River's confluence. For this reason, the long-term average temperatures are discussed for both of these locations. Tables 5.8-37 and 5.8-38 show the mean monthly water temperatures at the mouth of the American River and Freeport on the lower Sacramento River, respectively, as simulated under Alternative 2B – Proposed Action – Scenario B.

TABLE 5.8-37

MEAN MONTHLY WATER TEMPERATURES AT THE MOUTH DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (°F)	Proposed Action (°F)	Absolute Difference[2] (°F)	Relative Difference (%)	Maximum Temperature Increase[3] (°F and %)	Notes[4]
Feb	48.2	48.2	0.0	0.0	0.4 (0.8)	1945 (BN)
Mar	52.3	52.3	0.0	0.0	0.5 (0.9)	1932 (D)
Apr	56.8	56.8	0.0	0.0	0.1 (0.2)	1925 (D) 1929 (C) 1947 (D) 1961 (D) 1972 (BN) 1976 (C) 1981 (D) 1983 (W) 1985 (D) 1987 (D) 1990 (C) 1992 (C)
May	61.4	61.4	0.0	0.0	0.2 (0.3)	1990 (C)
Jun	65.2	65.2	0.0	0.0	0.3 (0.4)	1990 (C) 1992 (C)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in °F), representative of the mean difference over the 71-years (subject to rounding).
3. Maximum Temperature Increase – refers to the largest increase in mean monthly water temperatures under the Proposed Action, relative to the Base Condition, computed for that month (over 71 years). Percent increase, relative to the specific year, shown in parentheses.
4. Indicates the year where the largest decrease in water temperatures occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

TABLE 5.8-38

MEAN MONTHLY SACRAMENTO RIVER WATER TEMPERATURES AT FREEPORT DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]

Month	Absolute Difference (°F)	Relative Difference (%)	Long-Term Mean Monthly Temperatures (°F)	Maximum Temperature Increase[2] (°F)	Number of Years with Temperature Increase[3]	Number of Years with Temperature Decrease[4]
Feb	0.0	0.0	49.5	0.1	1 (1.4%)	4 (5.6%)
Mar	0.0	0.0	54.2	0.1	3 (4.2%)	0
Apr	0.0	0.0	60.4	0.1	5 (7.0%)	2 (2.8%)
May	0.0	0.0	65.9	0.1	6 (8.5%)	2 (2.8%)
Jun	0.0	0.0	70.1	0.2	2 (2.8%)	1 (1.4%)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Maximum Temperature Increase – refers to the largest increase in mean monthly water temperatures computed for that month (largest decrease over 71 years).
3. Indicates the number of years (and as a percentage) for that month where Sacramento River water temperatures would be increased by the increment shown in the Maximum Temperature Increase column over the 71-year period of water temperature record.
4. Indicates the number of years (and as a percentage) where there would be a decrease in Sacramento River water temperatures for that month over the 71-year period of water temperature record.

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

Long-term monthly mean temperatures at the American River mouth would remain unchanged, relative to the Base Condition. Mean monthly water temperatures would remain essentially identical in 351 months of the 355 months included in the analysis (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR).

Long-term monthly mean temperatures at Freeport on the Sacramento River also remain unchanged, relative to the Base Condition. In only two months of two years, out of 355 months are temperature increases of 0.2°F or greater observed at Freeport (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR).

Based on the results discussed above, water temperatures would not adversely affect emigration during the February through June period, relative to the Base Condition. Therefore, potential temperature related impacts on fall-run Chinook salmon and steelhead juvenile emigration under any alternative would be less-than significant.

Reclamation Water Temperature Model results for both the American and Sacramento rivers for the other Alternatives under the various Proposed Action scenarios as well as the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative revealed similar trends. Accordingly, water temperature-related impacts on either fall-run Chinook salmon or steelhead juvenile emigration during the February to June period would be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

Flow-Related Impacts on Steelhead Rearing (July Through September)

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no flow-related impacts on juvenile steelhead rearing success under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Table 5.8-39 shows the mean monthly flows below Nimbus Dam under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition.

Small decreases in the long-term monthly mean flows would be expected to occur below Nimbus Dam, relative to the Base Condition. The long-term average flow below Nimbus Dam would decrease by less than two percent, relative to the Base Condition during the July through September period. September is a month of concern since flows in the lower American River are typically at, or near their lowest for the year. The long-term 72-year average mean monthly flows at this location are approximately 1,500 cfs.

As noted previously, three significant dry-years (1947, 1981, and 1989) reveal flow reductions of 1,156, 123, and 204 cfs, respectively, relative to the Base Condition for those years. A close inspection of the 72-year modeling output for September confirms that these years represented significant outliers. Without these years, the long-term mean monthly flows below Nimbus Dam

TABLE 5.8-39

**MEAN MONTHLY FLOWS BELOW NIMBUS DAM
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)**

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Jul	3846.4	3820.4	-26.0	-0.9	-467.6 (-14.2)	77.2 (1.6)
Aug	2138.4	2103.7	-34.7	-1.7	-1467.9 (-63.9)	405.1 (17.2)
Sep	1503.2	1475.9	-27.4	-2.0	-1156.2 (-67.3)	67.2 (9.4)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

would change by less than 7 cfs or, 0.5 percent from Base Condition flows. The outlier years tend to skew the 72-year means; the mean, therefore, is not representative of the magnitude and frequency of deviation that would be expected over the entire period of hydrologic record.

Based on these findings, flow reductions are not expected to reduce juvenile steelhead rearing habitat. Further, steelhead populations in the lower American River are believed to be more limited by instream temperature conditions during the July through September period, rather than by flows. While the two are related, several factors influence their interrelated effects. Channel structure, wetted perimeter, tortuosity, and the presence of shaded riverine aquatic cover all play a role in affecting this relationship. Therefore, small and infrequent reductions in flow would not be expected to adversely affect long-term rearing success of juvenile steelhead. Therefore potential flow-related impacts on steelhead rearing would be less than significant.

CALSIM II modeling of river flows below Nimbus Dam for the other Alternatives under the various Proposed Action scenarios as well as the Reduced Diversion Alternatives (Alternative 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative revealed similar trends. Accordingly, flow-related impacts on the rearing success of juvenile steelhead would be less than significant.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

Temperature-Related Impacts on Steelhead Rearing (July Through September)

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no temperature-related impacts on juvenile steelhead rearing success under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The long-term average water temperatures below Nimbus Dam, Watt Avenue, and the mouth would not increase during July, August and September under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Mean monthly water temperatures, over the 71-year period of record, would remain identical to the Base Condition at each of these three locations on the lower American River. As noted previously, maximum increases would occur below Nimbus Dam. From the water temperature modeling, individual month and year increases during this time period (July through September) would occur (e.g. 0.3°F at the mouth; 0.2°F at Watt Avenue; and 1.6°F below Nimbus Dam). These magnitudes of temperature increases at the mouth, Watt Avenue, and below Nimbus Dam would be rare; occurring in one, three, and one years, respectively, out of the 71-year period of water temperature modeling record.

Therefore, the small and infrequent increases in water temperature that would occur would not be expected to adversely affect long-term rearing success of juvenile steelhead. Therefore, potential temperature-related impacts on steelhead rearing would be less than significant.

Reclamation's American River Water Temperature modeling of river flows below Nimbus Dam to the mouth for the other Alternatives under the various Proposed Action scenarios as well as the Reduced Diversion Alternatives (Alternative 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative revealed similar or reduced temperature trends. Accordingly, water temperature-related impacts on the rearing success of juvenile steelhead would be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.8-13 Impacts on splittail in the lower American River.

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no flow or temperature-related impacts on splittail habitat under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

River flows at Watt Avenue can be used as an indicator of the acreage of usable riparian vegetation inundated between RM 8 and RM 9. With unchanging flows, the amount of riparian habitat inundated in the lower portion of the river can be assumed to remain unaffected. Substantial changes (i.e., reductions) in flows, both in magnitude and frequency over the entire 72-year period of record would be necessary to impart significant effects on riparian habitats relied on by splittail.

Table 5.8-40 shows the modeled mean monthly flows in the lower American River at Watt Avenue under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Small reductions in the overall, long-term average mean monthly flows occur for the months of February through May. These reductions do not exceed one percent, relative to Base Condition flows.

TABLE 5.8-40

MEAN MONTHLY FLOWS AT WATT AVENUE DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Oct	2402.7	2388.8	-13.9	-0.7	-362.0 (-16.0)	440.8 (16.1)
Nov	3399.7	3374.1	-25.5	-0.3	-586.1 (-21.3)	703.8 (42.0)
Dec	3337.4	3315.5	-21.8	-0.2	-833.9 (-10.8)	445.4 (23.8)
Jan	4107.3	4086.9	-20.4	-1.0	-764.9 (-59.4)	329.7 (24.0)
Feb	5134.9	5139.0	4.1	0.6	-190.0 (-7.7)	708.4 (50.8)
Mar	3759.7	3736.9	-22.8	-0.9	-267.6 (-10.3)	18.8 (1.4)
Apr	3859.3	3854.9	-4.4	-0.1	-73.6 (-1.9)	328.1 (13.7)
May	3660.6	3646.0	-14.5	-0.5	-59.2 (-3.7)	239.6 (7.4)
Jun	3876.4	3848.6	-27.8	-0.9	-150.3 (-9.1)	526.4 (18.2)
Jul	3768.7	3741.9	-26.9	-0.9	-466.9 (-14.4)	78.4 (1.7)
Aug	2058.6	2023.9	-34.7	-1.7	-1465.2 (-65.9)	405.1 (18.9)
Sep	1440.4	1413.8	-27.1	-2.0	-1152.2 (-69.5)	83.3 (12.9)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Substantial changes in the frequency of habitat reductions would not be expected to occur during February, March, April, or May of any year based on these modeling results. In some years, riparian vegetation would not be inundated at all. Inter-annual variability for these months, over the 71-year period of record is high. Modeling results confirm that maximum mean monthly flow increases significantly exceed the simulated maximum mean monthly flow decreases.

During the February through May splittail spawning period, the long-term average usable inundated riparian habitat between RM 8 and RM 9 would not decrease relative to the Base Condition. In addition, flow changes would have little, if any, 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. Ultimately, these reductions in flow would not be expected to be of substantial magnitude and/or to occur with enough frequency to have a significant adverse effect on the long-term population trends of lower American River splittail.

As shown previously, long-term monthly mean temperatures at Watt Avenue under the Alternatives are essentially equivalent to or less than the Base Condition. Over the 71-year period of simulation, there would be no additional occurrences where February through May water temperatures at Watt Avenue would be above 68°F; the upper limit of the reported preferred range for splittail spawning, relative to the existing condition. Therefore, temperature-related conditions to splittail spawning would be considered a less-than-significant impact.

Flows at Watt Avenue to the mouth simulated under the Alternatives under the various Proposed Action scenarios as well as for the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative revealed similar trends. Accordingly, flow- and temperature-related impacts on splittail spawning and riparian habitats would be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.8-14 Impacts on American shad in the lower American River.

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no flow- or temperature-related impacts on American shad under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The long-term average flow at the American river mouth would be reduced by one percent or less during May and June, relative to the Base Condition (see Table 5.8-41). Flow reductions in May and June could potentially reduce the number of adult shad attracted into the river during a few years. However, American shad spawn opportunistically where suitable conditions are found, so that production of American shad within the Sacramento River system would likely remain unaffected. Any flow-related impacts on American shad are considered to be less than significant.

TABLE 5.8-41

**MEAN MONTHLY FLOWS AT THE MOUTH
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)**

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
May	3470.0	3455.5	-14.5	-0.5	-59.2 (-4.3)	239.6 (8.0)
Jun	3674.9	3647.1	-27.8	-1.0	-150.3 (-10.7)	526.4 (19.4)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

In addition, analysis was performed to determine the frequency with which lower American River flows at the mouth in May and June would be reduced below 3,000 cfs, the flow level defined by CDFG as that which would be sufficient to maintain the sport fishery for American shad by implementation of the proposed new CVP water service contracts, relative to current conditions. The simulations showed that in May, one year (1953, a wet-year) would Alternative 2B – Proposed Action – Scenario B, reduce flows from the Base Condition to levels below 3,000 cfs. In June of that same hydrologic year (1953), simulated flows increased to over 5,400 cfs; potentially offsetting any reduction below 3,000 cfs experienced during that water year. An inspection of the June record revealed no year where flows at the mouth would be below 3,000 cfs as a result of Alternative 2B – Proposed Action – Scenario B. Flow-related adverse effects on American shad within the lower American are not considered significant given the hydrologic modeling results generated and relied upon.

Overall long-term monthly mean water temperatures in May and June below Nimbus Dam and at the mouth would remain unchanged from the Base Condition (e.g., 58.8°F and 62.2°F below Nimbus Dam and 61.4°F and 65.2°F at the mouth). Below Nimbus Dam, May and June water temperatures would be within the reported preferred range for American shad spawning of 60°F to 70°F in all 71-years. At the mouth, the same would apply for the month of May. For June, however, in three years, water temperatures under Alternative 2B – Proposed Action – Scenario B, would be above the 70°F threshold. In each of those three years, Base Condition water temperatures would already be above 70°F. The proposed new CVP water service contracts impart no additional incursions beyond the 70°F temperature threshold.

The frequency in which suitable temperatures for American shad spawning occurs would not substantially differ from the Base Condition and consequently, temperature-related impacts on American shad are considered to be less than significant. Overall, impacts associated with the implementation of the proposed new CVP water service contracts on American shad would be less than significant.

CALSIM II and Reclamation's American River Water Temperature modeling of river flows and water temperatures below Nimbus Dam to the mouth for the Alternatives under the various Proposed Action scenarios as well as the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative revealed similar data trends. Accordingly, flow- or temperature-related impacts on American shad would be less than significant under these scenarios or alternatives.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.8-15 Impacts on striped bass in the lower American River.

Alternative 1B – No Project Alternative

There would be no additional diversions from the CVP system under the No Project Alternative. Accordingly, there would be no flow- or temperature-related impacts on the striped bass fishery under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The flow-related impact assessment conducted for fall-run Chinook salmon and steelhead adequately addresses potential flow-related impacts on striped bass juvenile rearing, which occurs during the months of May and June. In addition, analysis was performed to determine the frequency with which lower American River flows at the mouth in May and June would be reduced below 1,500 cfs, the attraction flow index level defined by CDFG as that which would be sufficient to maintain the sport fishery for striped bass.

The simulations showed that in May, Alternative 2B – Proposed Action – Scenario B would impart no flow reductions below 1,500 cfs from the Base Condition. For June, two years (1959, a Below Normal Year and 1981, a Dry Year), simulated flows decreased under Alternative 2B – Proposed Action – Scenario B, to below 1,500 cfs. In all other simulations, resultant flows below 1,500 cfs would only occur where the Base Condition flows had already been below 1,500 cfs. The proposed new CVP water service contracts are attributable to two additional years, in June, where flows at the mouth of the lower American River would be reduced to levels below 1,500 cfs. Neither the frequency nor magnitude of these occurrences would suggest a potentially significant flow-related impact (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR).

Flows at the mouth of the lower American River are believed to be at sufficient levels to maintain the striped bass fishery under current conditions, and would be met or exceeded in most years during both May and June. Furthermore, substantial changes in the strength of the striped bass fishery would not be expected to occur when May and/or June monthly mean flows periodically fall below

1,500 cfs, and consequently, flow-related impacts on the striped bass fishery would be less than significant.

The number of years that monthly mean water temperatures would be within the reported preferred range for striped bass juvenile rearing of 61°F to 73°F would not change substantially, relative to the Base Condition. For both the river reaches below Nimbus Dam and at the mouth of the lower American River, there would be no additional years, when the mean monthly May of June water temperatures would exceed the 73°F threshold (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR).

Thus, the frequency of suitable water temperatures for juvenile striped bass rearing in the lower American River would remain essentially unchanged. Accordingly, temperature-related impacts on juvenile striped bass rearing are considered to be less than significant, relative to current conditions. Overall, potential flow- or temperature-related impacts on striped bass would be less than significant.

CALSIM II and Reclamation's American River Water Temperature modeling of river flows and water temperatures below Nimbus Dam to the mouth for the other Alternatives under the various Proposed Action scenarios as well as the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative revealed similar results. Accordingly, flow- or temperature-related impacts on the striped bass fishery would be less than significant under these scenarios or alternatives.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.9. Riparian Resources (Diversion-Related Impacts)

This subchapter describes existing riparian resources riparian resources, i.e., riparian and wetland vegetation and associated species that utilize it for habitat. The regional setting for these resources includes the lower American and Sacramento rivers and reservoirs that may be influenced by the new CVP water service contracts. The discussion identifies conclusions and determinations for each species and critical habitat. The impact assessment focuses on habitats and special-status species. Special-status species include those that are listed as threatened or endangered by the CDFG or the USFWS, species proposed for State or federal listing, species designated as "species of concern" by USFWS or "special concern species" by CDFG, and species tracked by the CNDDB or California Native Plant Society (CNPS).

5.9.1. CEQA Standards of Significance

Impacts on riparian resources were considered significant if they would:

- Result in significant effects on riparian vegetation due to changes in water surface elevations at Shasta, Trinity or Folsom reservoirs;

- Result in significant effects on riparian vegetation in the upper Sacramento River due to changes in river flows;
- Result in significant effects on riparian vegetation in the lower Sacramento River and Delta due to changes in river flows;
- Result in significant effects on sensitive-species relying on Delta habitats, including estuarine wetlands;
- Result in significant effects on riparian vegetation in the lower American River;
- Result in significant effects on backwater pond hydrology in lower American River and its subsequent effect on pond vegetation;
- Result in effects on special-status species dependent on lower American River riparian and open water habitats;
- Result in effects on species dependent on Folsom Reservoir nearshore and open water habitats; and,
- Result in direct hydrological impacts on the California red-legged frog (CRLF) and Foothill yellow-legged frog.

5.9.2. Impacts and Mitigation Measures

The analysis of potential diversion-related impacts on riparian vegetation, habitats, and associated sensitive species evaluates potential changes in reservoir water levels and river flows. CALSIM II modeling data were used to assess hydrologic changes in CVP system waterbodies using the comparative methodology of gauging the long-term 72-year differences between the Base Condition and the proposed implementation of the new CVP water service contracts and the various alternative actions.

5.9-1 Effects on vegetation associated with changes in water surface elevations in Folsom, Shasta, and Trinity reservoirs.

Alternative 1B – No Project Alternative

Under the No Project Alternative, there would be no new diversions from the CVP system, relative to the Base Condition. Consequently, Shasta, Trinity, and Folsom reservoir elevations and their inherent vegetative/weedy herbaceous plants would be identical to the existing condition, and there would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Folsom, Shasta, and Trinity reservoirs have water levels that fluctuate frequently on an annual basis due to joint operational prescriptions aimed at maintaining multiple beneficial uses. Non-native, disturbance-adapted (or weedy) vegetation becomes established in areas below the high water line during the growing season. The drawdown zone at each of these reservoirs due to flood control operations and seasonal depletions to consumptive demands and downstream releases is vegetated primarily with weedy herbaceous plants and scattered willow shrubs that do not form a contiguous riparian community. These areas are not considered to have high habitat value for typically associated terrestrial wildlife species. Due to the inherent fluctuations in reservoir water levels, quality nearshore vegetation, and the habitat it would provide, rarely establishes itself or persists. This condition is identical for all Alternatives including the various scenarios under the Proposed Action, Alternative 3 – Water Transfer Alternatives, the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C) and Alternative 1A – No Action Alternative. Accordingly, inherent conditions in these reservoirs with respect to weedy herbaceous plants and willow shrubs are not expected to be affected by the new CVP water service contracts; the impacts are considered to be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.9-2 Effects on riparian vegetation of the upper Sacramento River.

Alternative 1B – No Project Alternative

Under the No Project Alternative, there would be no new diversions from the CVP system, relative to the Base Condition. Consequently, inherent vegetative/weedy herbaceous plants within and along the upper Sacramento River would be identical to the existing condition, and there would be ***no impact***.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Much of the Sacramento River is confined by levees that reduced the natural diversity of riparian vegetation. Agricultural land (e.g., rice, dry grains, pastures, orchards, vineyards, and row and truck crops) is common along the lower reaches of the Sacramento River, but is less common in the upper portions (CDFG 1988). The bands of riparian vegetation that occur along the Sacramento River are similar to those found along the lower American River, but are somewhat narrower and not as botanically diverse. The riparian communities consist of Valley oak, Fremont cottonwood, wild grape, box elder, elderberry, and willow. Freshwater, emergent wetlands occur in the slow moving backwaters and are primarily dominated by tules, cattails, rushes, and sedges (SAFCA and Reclamation 1994). Although riparian vegetation occurs along the Sacramento River, these areas are confined to narrow bands between the river and the river side of the levee.

The wildlife species inhabiting the riparian habitats along the lower Sacramento River are essentially the same as those found along the lower American River. These include, but are not limited to, black phoebe, sora, great horned owl, Swainson's hawk, ash-throated flycatcher, wood duck, great blue heron, great egret, green heron, California ground squirrel, and coyote. The freshwater/

emergent wetlands represent habitat for many wildlife species, including reptiles and amphibians such as the western pond turtle, bullfrog, and Pacific tree frog. Agricultural areas adjacent to the river also provide foraging habitat for many raptor species.

The analysis for riparian vegetation evaluates potential changes in flows under any of the alternatives during the peak growing season. The peak growing season for riparian vegetation is typically March through July with the remainder of the growing season extending from August through October. The analysis of effects on riparian vegetation of the upper Sacramento River is based on changes in monthly mean river flows below Keswick Dam resulting from the implementation of the new CVP water service contracts.

Table 5.9-1 shows the modeled mean monthly flows in the upper Sacramento River below Keswick Dam under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition over the entire 72-year period of simulated hydrologic record. Flow changes under Alternative 2B – Proposed Action – Scenario B are very minor; with mean monthly average changes, across the year, generally less than two-tenths of one percent, relative to Base Condition flows. These changes are considered negligible and immeasurable in the context of their potential effects on riparian vegetation and the species that depend on them within the upper Sacramento River.

TABLE 5.9-1

MEAN MONTHLY SACRAMENTO RIVER FLOW RELEASES BELOW KESWICK DAM DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Notes[4]
Oct	5651.8	5645.8	-6.0	-0.1	-538.5 (-10.7)	1966 (BN)
Nov	5290.3	5286.6	-3.7	0.0	-534.0 (-5.7)	1964 (D)
Dec	6877.8	6870.1	-7.7	-0.1	-369.6 (-3.0)	1967 (W)
Jan	8033.1	8033.1	0.1	0.0	-42.7 (-0.3)	1969 (W)
Feb	10164.0	10172.6	8.5	0.1	-116.7 (-3.3)	1961 (D)
Mar	8313.3	8300.9	-12.4	-0.2	-664.9 (-7.1)	1963 (W)
Apr	7203.6	7211.8	8.2	0.0	-211.6 (-2.6)	1931 (C)
May	8241.9	8251.5	9.7	0.1	-23.0 (-0.3)	1947 (D)
Jun	10365.3	10369.0	3.7	0.0	-292.3 (-2.4)	1961 (D)
Jul	12708.9	12721.4	12.5	0.1	-233.1 (-1.7)	1947 (D)
Aug	10505.2	10497.7	-7.5	-0.1	-229.2 (-2.4)	1965 (W)
Sep	7035.7	7035.0	-0.7	0.0	-250.5 (-3.7)	1948 (BN)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flow releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in mean monthly flow releases occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

CALSIM II modeling results for Alternatives 2A and 2C – Proposed Action – Scenarios A and C, along with Alternative 3 – Water Transfer Alternative, the Reduced Diversion Alternatives (Alternative 4A, 4B and 4C), and Alternative 1A – No Action Alternative revealed similar inconsequential changes in mean monthly simulated flows in the upper Sacramento River, relative to

Base Condition flows (see Proposed Action – Scenarios A and C, Water Transfer Alternative, and No Action Alternative, Technical Appendix I, this Draft EIS/EIR).

Based on these modeling results and the discussions herein, there would be no anticipated affect on riparian vegetation communities along the upper Sacramento River. This would be considered a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.9-3 Effects on riparian vegetation in the lower Sacramento River and Delta.

Alternative 1B – No Project Alternative

Under the No Project Alternative, there would be no new diversions from the CVP system, relative to the Base Condition. Consequently, flow changes in the lower Sacramento River and any hydrologically-induced changes in the position of X2 would be identical to the existing condition. Accordingly, there would be no impacts on riparian vegetation, habitats, and wetlands in these waterbodies.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The analysis of potential effects on riparian vegetation of the lower Sacramento River and the Delta is based on changes in river flows below Freeport caused by the implementation of the new CVP water service contracts. As discussed previously, the growing season for riparian vegetation is typically from March though October, with peak growing periods associated with the months of March through July. In addition to lower Sacramento River flows, the Delta wetlands are very sensitive to fluctuations in water salinity, which are determined by water flows into the Delta. The long-term position of X2 can also be examined to assess any changes in salinity that would potentially affect Delta vegetation.

Table 5.9-2 shows the modeled mean monthly flows in the lower Sacramento River at Freeport under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition, for those growing season months (March through October) over the 72-year period of record. Overall, changes in mean monthly flows under Alternative 2B – Proposed Action – Scenario B, relative to Base Condition flows are negligible. There is no appreciable difference or change in mean monthly flows, over the long-term, throughout the growing season months or during the peak growing season months.

Table 5.9-3 reveals the mean monthly position of X2 under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition, during the growing season, over the entire 72-year hydrologic period of simulation.

TABLE 5.9-2

MEAN MONTHLY SACRAMENTO RIVER FLOWS AT FREEPORT DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]

Month	Absolute Difference (cfs)	Relative Difference (%)	Long-Term Mean Monthly Flows (cfs)	Maximum Flow Decrease[2] (cfs)	Maximum Flow Decrease (%)	Notes[3]
Oct	-35.2	-0.3	12524.6	-871.0	-8.7	1931 (C)
Mar	-26.1	-0.1	33667.2	-801.8	-2.5	1963 (W)
Apr	4.7	0.0	24349.2	-67.7	-0.2	1935 (BN)
May	-19.1	-0.1	19604.6	-1565.2	-8.4	1940 (AN)
Jun	-42.9	-0.3	17304.7	-1536.8	-8.9	1936 (BN)
Jul	17.3	0.1	18337.9	-625.5	-5.0	1931 (C)
Aug	-26.4	-0.2	14513.8	-970.4	-6.1	1944 (D)
Sep	7.7	0.2	12393.8	-1173.8	-9.4	1947 (D)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Maximum Flow Decrease – refers to the largest decrease in mean flow computed for that month (largest decrease over 72 years).
3. Indicates the year where the maximum decrease in Sacramento River flow (in cfs) occurred for that month, identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

TABLE 5.9-3

MEAN MONTHLY DELTA X2 DIFFERENCE BETWEEN THE BASE CONDITION AND PROPOSED ACTION[1]

Month	Absolute Difference (km)	Relative Percent (%)	Maximum[2] (km)	Notes[3]	
Oct	0.0	0.0	0.3	1952 (W) 1981 (D)	88.7 km to 88.0 km 86.3 km to 86.6 km
Mar	0.0	0.0	0.1	1938 (W) 1948 (BN) 1964 (D)	52.0 km to 52.1 km 77.5 km to 77.5 km 75.2 km to 75.2 km
Apr	0.0	0.0	0.3	1981 (D)	69.5 km to 69.8 km
May	0.0	0.0	0.1	1966 (BN) 1981 (W)	73.9 km to 73.9 km 71.9 km to 72.0 km
Jun	0.0	0.0	0.1	1947 (D)	77.7 km to 77.7 km
Jul	0.0	0.0	0.1	1940 (AN)	75.1 km to 75.2 km
Aug	0.0	0.0	0.0	N/A	
Sep	0.0	0.0	0.8	1980 (AN)	82.3 km to 83.2 km

Notes"
1. Proposed Action –Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Maximum – refers to the largest increase in distance from Golden Gate Bridge (in km) computed for that month (largest increase over 72-years).
3. Indicates the year where the maximum increase (adverse change) in X2 occurred for that month, identifying the water-year type and the actual mean monthly comparison between the base condition and proposed project in that year.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

CALSIM II modeling results show that, over the long-term, shifts in X2 upstream was undetectable. The data also indicate that the maximum shifts occurred only infrequently. Anticipated changes in Delta salinity; at least as reflected in simulated X2 positioning, would be virtually undetectable and would, therefore, have an insignificant effect on Delta vegetation and wetlands.

The CALSIM II modeling results for Alternatives 2A and 2C – Proposed Action – Scenarios A and C, along with Alternative 3 – Water Transfer Alternative, the Reduced Diversion Alternatives

(Alternatives 4A, 4B and 4C), and Alternative 1A – No Action Alternative revealed similar inconsequential changes in mean monthly X2 position, relative to Base Condition flows (see Proposed Action – Scenarios A and C, Water Transfer Alternative, and No Action Alternative, Technical Appendix I, this Draft EIS/EIR).

Based on these modeling results and the discussions herein, there would be no anticipated affect on riparian vegetation communities within the Delta insofar as changing salinity effects and decreased inflows from the Sacramento River is concerned. Accordingly, this would be considered a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.9-4 Effects on Delta habitats of special-status species (non-fisheries).

Alternative 1B – No Project Alternative

Under the No Project Alternative, there would be no new diversions from the CVP system, relative to the Base Condition. Consequently, flow changes in the lower Sacramento River and any hydrologically-induced changes in the position of X2 would be identical to the existing condition. Accordingly, there would be no impacts on special-status species relying on Delta habitats.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

A number of special-status species are known to occur in a range of Delta habitats. As discussed previously, Table 5.9-2 revealed the negligible extent to which flows in the lower Sacramento River (measured at Freeport) would be affected under the proposed new CVP water service contracts. Additionally, Table 5.9-3 showed the immeasurable extent to which X2 would also be affected. Table 5.9-4 shows the mean monthly changes in Delta outflow under Proposed Action – Scenario B, relative to the Base Condition, over the entire 72-year period of hydrologic record.

Consistent with the other CALSIM II modeling results, Table 5.9-4 confirms the inconsequential effect of the proposed new CVP water service contract on Delta outflow. Changes (i.e., decreases) in Delta outflow under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition are small (e.g., no individual mean monthly average, over the 72-year period, exceeded two-tenths of one percent of the corresponding Base Condition flows). Based on these hydrologic indices and, to the extent that Delta habitats for special-status species are influenced by water conditions, it is concluded that Delta habitats would not be significantly affected.

TABLE 5.9-4

**MEAN MONTHLY DELTA OUTFLOW
DIFFERENCE BETWEEN THE BASE CONDITION AND PROPOSED ACTION[1]**

Month	Absolute Difference (cfs)	Relative Percent (%)	Maximum Outflow Decrease[2] (cfs)	Notes[3]
Oct	-2.8	-0.1	-326.6	1963 (BN) -1.2% Base Flow 26,396
Nov	-23.2	-0.2	-647.7	1964 (D) -3.7% Base Flow 17,419
Dec	-40.5	0.1	-1021.7	1942 (WN) -1.7% Base Flow 59,762
Jan	13.2	0.0	-324.7	1948 (BN) -4.3% Base Flow 7,593
Feb	-5.9	0.1	-622.3	1938 (W) -0.4% Base Flow 145,553
Mar	-22.4	-0.1	-820.0	1981 (D) -3.9% Base Flow 21,131
Apr	12.1	0.0	-67.5	1935 (BN) -0.1% Base Flow 52,066
May	-4.9	0.0	-82.9	1935 (BN) -0.3% Base Flow 26,777
Jun	-3.7	0.0	-102.5	1940 (AN) -1.4% Base Flow 7,419
Jul	12.0	0.1	-77.5	1966 (BN) -1.1% Base Flow 7,052
Aug	-7.2	-0.1	-518.2	1980 (AN) -10.2% Base Flow 5,073
Sep	-5.4	-0.1	-116.5	1951 (AN) -3.6% Base Flow 3,269

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Maximum Outflow Decrease – refers to the largest decrease in mean Delta outflow computed for that month (largest decrease over 72-years).
3. Indicates the year where the maximum decrease (adverse change) in Delta outflow occurred for that month, identifying the water-year type, the decrease in outflow as a percent of the base condition in that year, and the base condition Delta outflow during that month.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

The CALSIM II modeling results for Alternatives 2A and 2C – Proposed Action – Scenarios A and C, along with Alternative 3 – Water Transfer Alternative, the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), and Alternative 1A – No Action Alternative revealed similar inconsequential changes in hydrology having potential influence and implications to Delta habitats (see Proposed Action – Scenarios A and C, Water Transfer Alternative, and No Action Alternative, Technical Appendix I, this Draft EIS/EIR).

Based on these modeling results and the previous discussions, there would be no anticipated significant effect on special-status species habitats within the Delta insofar as changing salinity, decreased inflows from the Sacramento River, and decreased Delta outflow are concerned. Accordingly, this would be considered a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.9-5 Effects on riparian vegetation of the lower American River.

Alternative 1B – No Project Alternative

Under the No Project Alternative, there would be no new diversions from the CVP system, relative to the Base Condition. Consequently, flow changes in the lower American River and any hydrologically-induced changes to riparian communities would not occur. Accordingly, there would be no impacts on riparian vegetation in the lower American River.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As noted previously, channel and bank geomorphology strongly influences the composition and vegetative structure of riparian zones at any particular location along the river. Willow scrub and alders tend to occupy areas within the active channel of the river. These areas are subject to repeated inundation during elevated winter and spring flows. Cottonwood-willow thickets and cottonwood forests occupy the narrow belts along the active river channel. These communities can be disturbed by the occasional large seasonal flows. Fremont cottonwood dominates these riparian forest zones.

Table 5.9-5 shows the number of months of the May through September growing season when mean monthly flows in the lower American River would be below the 1,750 cfs threshold considered the minimum necessary to support the continued radial growth of cottonwoods. A comparison was made between the Base Condition and Alternative 2B – Proposed Action – Scenario B, over the entire 360 month period of record (five months over each of the 72-years). These results were derived from the same CALSIM II modeling simulations used to generate other hydrological impact indices.

TABLE 5.9-5

NUMBER OF MONTHS WHEN LOWER AMERICAN RIVER FLOWS ARE BELOW 1,750 CFS (MAY THROUGH SEPTEMBER PERIOD) UNDER THE PROPOSED ACTION[1]

	Base Condition	Proposed Action[1]	Difference[2]
Nimbus			
	92	95	3
Watt Avenue			
	112	115	3
H Street			
	129	132	3
LAR Mouth			
	129	132	3

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Difference represents the numerical difference in number of months between Base Condition and Proposed Action; percent differences shown in parentheses.

Based on CALSIM II 72-year hydrologic period of record (1922-1993).
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

The results showed that from Nimbus downstream to the mouth of the lower American River, the frequency with which mean monthly flows would be below the 1,750 cfs threshold during the May through September growing season would increase. On average, between 25-36 percent of the time, under current conditions, mean monthly flows in the lower American River (depending on location) are already below 1,750 cfs during the growing season. The proposed new CVP water service contracts would increase this frequency by less than one percent (e.g. 0.8 percent) (see

Table 5.9-5). It should be noted that mean monthly flows are generally indicative of the overall flow conditions that occurred during that particular time period; however, operational fluctuations at Folsom Dam and Reservoir dictate that daily and even hourly flow changes occur (largely dictated by LAROPS Group ramping rate criteria; these conditions also have significant bearing on instream fisheries resources which have been previously discussed).

As noted previously, an average flow of 3,000 cfs is thought to provide "reasonable" growth and maintenance conditions for riparian vegetation (USFWS 1996). Higher flows earlier in the growing season (i.e., April through June) are often critical to the establishment of seedlings on riverine terraces. Table 5.9-6 tabulates the number of years, for each month, when mean monthly flows in the lower American River below Nimbus Dam would be within the flow range considered optimal (i.e., between 2,700 and 4,000 cfs).

TABLE 5.9-6

NUMBER OF YEARS WHEN LOWER AMERICAN RIVER FLOWS BELOW NIMBUS DAM IN OPTIMAL RANGE (2,700 TO 4,000 CFS) UNDER THE PROPOSED ACTION[1]

Month	Base Condition	Proposed Action[1]	Difference
Oct	16	17	1
Nov	10	8	-2
Dec	2	2	0
Jan	6	6	0
Feb	7	7	0
Mar	11	11	0
Apr	14	14	0
May	20	20	0
Jun	21	21	0
Jul	19	17	-2
Aug	12	12	0
Sep	0	0	0

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.

Based on CALSIM II 72-year hydrologic period of record (1922-1993).
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

The modeling results show that in only one month, July, would Alternative 2B – Proposed Action – Scenario B, result in a fewer number of years, relative to the Base Condition, when mean monthly flows would be outside of the optimal flow range. A close inspection of the 72-year CALSIM II modeling output revealed that these two years (for July) occurred in 1947 (a dry-year) and 1958 (a wet-year). Base Condition flows in both cases were slightly above 2,700 cfs, but were decreased with the new contract diversions to flow levels below this threshold. The reductions in mean monthly flows for these two years represented a 2.5 and 1.2 percent decrease, respectively, for the simulated 1947 and 1955 hydrology (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR). Despite the fact that, under Alternative 2B – Proposed Action – Scenario B, two less years would provide mean monthly flows in the optimal range, relative to the Base Condition, the simulated flow reductions for these two years were small and considered less than significant.

The CALSIM II modeling results for Alternatives 2A and 2C – Proposed Action – Scenarios A and C, along with Alternative 3 – Water Transfer Alternative, the Reduced Diversion Alternatives (Alternative 4A, 4B and 4C) and Alternative 1A – No Action Alternative revealed similar inconsequential changes in hydrology that would negate any significant effects on riparian vegetation growth along the lower American River (see Alternatives 2A and 2C – Proposed Action – Scenarios A and C, Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative, Technical Appendix I, this Draft EIS/EIR).

Based on these modeling results and the previous discussions, there would be no anticipated significant effect on the hydrology necessary to maintain riparian communities in good health in the lower American River. Accordingly, this would be considered a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.9-6 Effects on backwater pond hydrology in lower American River and its subsequent effect on pond vegetation.

Alternative 1B – No Project Alternative

Under the No Project Alternative, there would be no new diversions from the CVP system, relative to the Base Condition. Consequently, flow changes in the lower American River and its potential effects on backwater pond hydrology and associated vegetative communities would be identical to that under the existing condition. Accordingly, there would be no impacts on backwater ponds along the lower American River corridor.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As discussed previously, backwater ponds along the lower American River support a variety of important riparian vegetation communities and associated wildlife. It has been determined that flows of at least 2,700 cfs are required to adequately recharge the ponds closest to the river. At sustained flows of 1,300 cfs or less, many of the ponds become more shallow and smaller, hold very little water, and become choked with willows. A minimum of 1,300 cfs is considered essential. Overall, it is acknowledged that in order to provide continuous recharge of off-river ponds, flows in the range of 2,750 to 4,000 cfs are needed (Sands et al., 1985; Sands 1986).

Table 5.9-7 shows the number of years, for each month, when mean monthly flows in the lower American River below Nimbus Dam would be within the threshold criteria for minimum backwater pond sustenance and continuous recharge under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Flows were set from the minimum, 1,300 cfs to 4,000 cfs. Tabulated years from CALSIM II hydrology output for the lower American River at this location show the variation between current conditions (Base Condition) and the simulated hydrology under Alternative 2B – Proposed Action – Scenario B.

TABLE 5.9-7

NUMBER OF YEARS WHEN LOWER AMERICAN RIVER FLOWS BELOW NIMBUS DAM IN MIN/OPTIMAL RANGE (1,300 TO 4,000 CFS) UNDER THE PROPOSED ACTION[1]

Month	Base Condition	Proposed Action[1]	Difference[2]
Oct	60 (83.3)	61 (84.7)	1 (1.4)
Nov	42 (58.3)	41 (56.9)	-1 (-1.4)
Dec	46 (63.9)	46 (63.9)	0 (0)
Jan	39 (54.2)	39 (54.2)	0 (0)
Feb	30 (41.7)	29 (40.3)	-1 (-1.4)
Mar	33 (45.8)	33 (45.8)	0 (0)
Apr	40 (55.6)	40 (55.6)	0 (0)
May	41 (56.9)	41 (56.9)	0 (0)
Jun	41 (56.9)	41 (56.9)	0 (0)
Jul	28 (38.9)	28 (38.9)	0 (0)
Aug	49 (68.1)	48 (66.7)	-1 (-1.4)
Sep	49 (68.1)	46 (63.9)	-3 (-4.2)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Difference represents the numerical difference in number of months between Base Condition and Proposed Action; percent differences shown in parentheses.

Based on CALSIM II 72-year hydrologic period of record (1922-1993).
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

The results showed that, on average, over the period of record, Alternative 2B – Proposed Action – Scenario B would impart very little change to the number of years of similar months when the mean monthly flows below Nimbus Dam would be outside of the 1,300 to 4,000 cfs threshold. The months of August and September revealed changes. Again, a careful inspection of the CALSIM II modeling output was made to determine the conditions surrounding these occurrences. In all cases, the variations existed as flow decreases to a level below the 1,300 cfs threshold. Water-year types covered most all categories, so no relationship could be drawn with water-year type. Most importantly were the magnitude of flow changes modeled; changes were small (i.e., less than 2 percent; see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR). Table 5.9-8 shows similar results, but for the lower American River at H Street.

The CALSIM II modeling results for Alternatives 2A and 2C – Proposed Action – Scenarios A and C, along with Alternative 3 – Water Transfer Alternative, the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), and Alternative 1A – No Action Alternative revealed similar small and likely undetectable changes in hydrology. Such changes are unlikely to lead to significant effects on backwater pond recharging (see Proposed Action – Scenarios A and C, Water Transfer Alternative, and No Action Alternative, Technical Appendix I, this Draft EIS/EIR).

Based on these modeling results and the previous discussions, there would be no anticipated significant effect on backwater pond recharging and the associated benefits to riparian and pond vegetation communities in those off-river areas of the lower American River. Accordingly, this would be considered a less-than-significant impact.

TABLE 5.9-8

NUMBER OF YEARS WHEN LOWER AMERICAN RIVER FLOWS AT H STREET IN MIN/OPTIMAL RANGE (1,300 TO 4,000 CFS) UNDER THE PROPOSED ACTION[1]

Month	Base Condition	Proposed Action[1]	Difference[2]
Oct	61 (84.7)	61 (84.7)	0 (0)
Nov	43 (59.7)	43 (59.7)	0 (0)
Dec	45 (62.5)	45 (62.5)	0 (0)
Jan	36 (50.0)	35 (48.6)	-1 (-1.4)
Feb	29 (40.3)	30 (41.7)	1 (1.4)
Mar	31 (43.1)	31 (43.1)	0 (0)
Apr	40 (55.6)	41 (56.9)	1 (1.4)
May	44 (61.1)	43 (59.7)	-1 (-1.4)
Jun	43 (59.7)	44 (61.1)	1 (1.4)
Jul	31 (43.1)	32 (44.4)	1 (1.4)
Aug	44 (61.1)	40 (55.6)	-4 (-5.6)
Sep	40 (55.6)	39 (54.2)	-1 (-1.4)

Notes:
1 Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2 Difference represents the numerical difference in number of months between Base Condition and Proposed Action; percent differences shown in parentheses.
Based on CALSIM II 72-year hydrologic period of record (1922-1993).
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.9-7 Effects on special-status species dependent on lower American River riparian and open water habitats.

Alternative 1B – No Project Alternative

Diversions from the CVP system would not change under the No Project Alternative, relative to the existing condition. The flow regime of the lower American River would be identical under No Project Alternative and existing conditions, and riparian vegetation and open water habitats of the lower American River would be not change from the Base Condition. Consequently, there would be no impact on habitat of special-status species dependent on lower American River riparian and open water habitats.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Bank swallow, yellow warbler, yellow-breasted chat, river otter, and several other species are special status species known to occur, nest, or periodically forage in open water and cottonwood forest habitats along the lower American River. The recently de-listed bald eagle is also worth mention here. Thus, potential impacts on cottonwood forests are commonly used to determine whether special-status species dependent on this habitat would be affected by project alternatives.

As discussed in Impacts 5.6-5 and 5.6-6, there would be no significant impact on the maintenance, growth, and establishment of cottonwood communities along the lower American River under any of the alternatives, relative to the Base Condition. This was based on CALSIM II hydrological modeling output that revealed no detectable change in river flows. The potential impacts on cottonwood radial growth maintenance, maximum growth, and establishment are less than significant under any alternative. Moreover, modeling output also showed that off-river open water habitats such as backwater ponds would also remain unaffected, relative to the Base Condition. Therefore, impacts on special-status species associated with riparian and open water habitats also would be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.9-8 Effects on species dependent on Folsom Reservoir near shore and open water habitats.

Alternative 1B – No Project Alternative

Under the No Project Alternative, there would be no new diversions from the CVP system, relative to the Base Condition. Consequently, the water surface area for Folsom Reservoir and its potential to affect bald eagle and other raptor species foraging levels would be identical to that under the existing condition. Accordingly, there would be no impacts on their foraging activities.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As discussed previously, the bald eagle was de-listed from its federally Threatened status on June 28, 2007 in the lower 48 states. Its primary legal protection was transferred from the Endangered Species Act (ESA) to the Bald and Golden Eagle Protection Act (BGEPA). The bald eagle prefers habitats near seacoasts, rivers, large lakes, and other large bodies of open water with an abundance of fish. Along with other raptor species that depend wholly or in part on Folsom Reservoir's open water or nearshore habitats, CALSIM II modeling data was generated to look at the potential changes in reservoir water surface area.

Table 5.9-9 shows the end-of-month water surface area of Folsom Reservoir under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition, over the 72-year hydrologic period of record. With the new CVP water service contracts, water surface areas (in acres) were shown to decrease with the magnitude of area loss increasing into the summer months. The simulated acreage losses, however, are very small and likely undetectable. The maximum acreage loss, as a percent, is two-tenths of one percent of the total reservoir water surface area (and this would occur during July and August).

TABLE 5.9-9

END-OF-MONTH WATER SURFACE AREA IN FOLSOM RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (acres)	Proposed Action (acres)	Absolute Difference[2] (acres)	Relative Difference (%)	Maximum Water Surface Area Decrease[3] (acres and %)	Maximum Water Surface Area Increase[4] (acres and %)
Oct	7924.0	7917.4	-6.6	-0.1	-286.0 (-3.6)	739.5 (10.7)
Nov	7384.8	7377.0	-7.8	-0.1	-561.0 (-9.0)	686.3 (10.3)
Dec	7432.8	7438.4	5.6	0.1	-151.4 (-2.4)	624.5 (9.8)
Jan	7601.7	7611.1	9.4	0.1	-120.5 (-2.0)	512.2 (8.7)
Feb	7797.9	7796.3	-1.6	0.0	-59.8 (-1.1)	156.5 (2.4)
Mar	8875.4	8879.2	3.8	0.0	-72.5 (-1.5)	191.2 (2.4)
Apr	9718.9	9711.2	-7.7	-0.1	-82.4 (-1.7)	44.5 (0.4)
May	10238.5	10229.9	-8.5	-0.1	-84.5 (-1.9)	16.9 (0.2)
Jun	9907.0	9996.5	-10.5	-0.1	-241.6 (-2.6)	51.0 (0.5)
Jul	8919.1	8903.6	-15.4	-0.2	-427.1 (-4.9)	245.4 (3.5)
Aug	8508.7	8497.7	-11.0	-0.2	-207.0 (-5.6)	575.4 (7.1)
Sep	8446.5	8438.2	-8.3	-0.1	-276.5 (-6.6)	751..2 (10.7)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Project (in acres), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Water Surface Area Decrease – refers to the largest decrease in end-of-month water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Water Surface Area Increase – refers to the largest increase in end-of-month water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Based on these hydrologic modeling results, little change would occur in Folsom Reservoir's water surface area. While individual months, in certain years, showed large acreage losses, a corresponding number of equally large acreage gains were also shown for certain months. It is difficult to precisely ascribe an overall effect based on individual years when, there is such variability between years. Folsom Reservoir operations, as part of a coordinated CV/SWP system and, as captured in CALSIM II operational modeling, show years where individual months will either gain or lose water (i.e., water surface area), relative to the Base Condition.

The CALSIM II modeling results for Alternatives 2A and 2C – Proposed Action – Scenarios A and C, along with Alternative 3 – Water Transfer Alternative, the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), and Alternative 1A – No Action Alternative revealed similar small and likely undetectable changes in Folsom Reservoir water surface area over the long-term. Such changes are unlikely to lead to significant effects on foraging habitat or foraging behavior of the bald eagle and other raptor species dependent on open water and nearshore habitats (see Proposed Action – Scenarios A and C, Water Transfer Alternative, and No Action Alternative, Technical Appendix I, this Draft EIS/EIR).

Based on these modeling results and the previous discussions, there would be no anticipated significant effect on Folsom Reservoir's open water or nearshore habitats. Accordingly, this would be considered a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.9-9 Direct impacts on the California red-legged frog and Foothill yellow-legged frog.

Alternative 1B – No Project Alternative

Under the No Project Alternative, there would be no new diversions from the CVP system, relative to the Base Condition. Consequently, flows in the North Fork American River would be identical to that under the existing condition. Accordingly, there would be no impacts on California red-legged frog (CRLF) and Foothill yellow-legged frog or their sensitive habitats in this reach of the North Fork.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Under Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative, GDPUD is assumed to divert from the North Fork American River at the site of the current American River Pump Station. Downstream of this location, there is the potential for altered flow regimes to affect both the CRLF and Foothill yellow-legged frog, to the extent that these species are present. As noted previously, potential habitat exists for both species upstream of Folsom Reservoir along these riparian corridors.

Table 5.9-10 shows the mean monthly flows in the North Fork American River below the American River Pump Station under Alternative 2C – Proposed Action – Scenario C, relative to the Base Condition. This Alternative was initially addressed since it represents the allocation split between EID and GDPUD where the latter would hold the largest proportion of the new CVP water service contract, therefore, holding the highest potential for hydrological effects on that part of the North Fork American River downstream from their diversion point. The model run for Alternative 2C assumed a GDPUD diversion of 11,000 AFA.

Modeling results showed that simulated mean monthly flows in the North Fork American River downstream of the American River Pump Station would decrease, relative to the Base Condition, with the largest decreases occurring during the June through August period. Interestingly, the maximum flow decreases identified for individual years (over the 72-year period of record) were similar to the long-term modeled changes in mean monthly flows. This implies that the overall mean monthly flow decrease is representative of a nearly consistent inter-annual lowering of flows over the entire period of record and not just a few years, with extremely large variations (see Proposed Action – Scenario C, Technical Appendix I, this Draft EIS/EIR).

TABLE 5.9-10

MEAN MONTHLY NORTH FORK AMERICAN RIVER FLOWS BELOW THE AMERICAN RIVER PUMP STATION DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Notes[4]
Oct	675.6	662.6	-13.4	-2.8	-22.8 (-13.8)	1966 (BN)
Nov	936.5	929.4	-7.1	-1.5	-10.0 (-5.1)	1976 (C)
Dec	1788.8	1782.8	-6.0	-1.0	-8.6 (-4.7)	1971 (W)
Jan	2250.7	2244.4	-6.3	-0.8	-6.3 (-5.8)	Several
Feb	3061.5	3054.9	-6.5	-0.5	-7.8 (-4.7)	1991 (C)
Mar	3138.7	3132.0	-6.7	-0.4	-8.5 (-2.4)	1970 (W)
Apr	3272.7	3262.2	-10.5	-0.5	-11.1 (-3.2)	Several
May	3110.7	3099.3	-11.5	-0.7	-12.2 (-3.3)	Several
Jun	1829.4	1807.5	-21.9	-2.7	-24.0 (-20.4)	Several
Jul	913.1	891.3	-21.8	-3.4	-24.0 (-21.1)	Several
Aug	690.7	667.3	-23.4	-3.8	-28.2 (-23.6)	1966 (BN)
Sep	604.4	587.1	-17.3	-3.5	-29.4 (-21.9)	1981 (D)

Notes:
1. Proposed Action – Scenario C – modeled 11 TAF from PCWA Auburn Pump Station site on an August through October diversion pattern and 4 TAF diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flow releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in mean monthly flow releases occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

The modeling results indicate that during the summer months, the long-term average decrease in mean monthly flows, relative to the Base Condition would approximate 3-4 percent. Flow changes approaching 5 percent of the Base Condition begin to impart increasingly significant implications to sensitive-species dependent on flow-based habitat conditions. To the extent the CRLF and Foothill yellow-legged frog are present in and around the areas downstream of this diversion location, there could be adverse impacts on these species.

As noted previously, marginally suitable habitat for the CRLF occurs on the project site. Minimal riparian and herbaceous streamside cover and the presence of exotic predators reduce the habitat values for the CRLF and the likelihood for occurrence. While summer surveys (non protocol) did not reveal the presence of the CRLF, a final determination of presence or absence cannot be made until the completion of spring surveys for adults and egg masses. Should the CRLF occur on project sites, then direct impacts from reduced river flows could negatively affect the species and could lead to its decline in those areas downstream from the diversion point. Under the simulated hydrology of Alternative 2C – Proposed Action – Scenario C, this is considered as a potentially significant impact.

Table 5.9-11, alternatively, shows the same mean monthly flows in the North Fork American River at this same location but under Alternative 2A – Proposed Action – Scenario A. Under this alternative allocation scenario, both EID and GDPUD would share equally, the water made available by the new CVP water service contract with GDPUD taking an assumed 7,500 AFA instead of 11,000 AFA.

Modeling results showed that, under this diversion scenario, long-term changes in flows were less, than those simulated under Scenario C.

TABLE 5.9-11

MEAN MONTHLY NORTH FORK AMERICAN RIVER FLOWS BELOW AUBURN DAM SITE DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Notes[4]
Oct	675.6	667.4	-8.2	-1.7	-16.8 (-9.3)	1966 (BN)
Nov	936.5	932.3	-4.2	-0.9	-7.1 (-3.5)	1976 (C)
Dec	1788.8	1785.3	-3.5	-0.6	-6.1 (-3.2)	1971 (W)
Jan	2250.7	2246.4	-4.3	-0.5	-4.3 (-3.9)	Several
Feb	3061.5	3057.3	-4.1	-0.3	-5.6 (-3.4)	1991 (C)
Mar	3138.7	3134.3	-4.4	-0.2	-6.2 (-1.7)	1970 (W)
Apr	3272.7	3265.6	-7.1	-0.3	-7.6 (-2.2)	Several
May	3110.7	3102.9	-7.8	-0.4	-8.3 (-2.2)	Several
Jun	1829.4	1814.5	-14.9	-1.9	-16.4 (-13.9)	Several
Jul	913.1	898.3	-14.8	-2.3	-16.3 (-14.3)	Several
Aug	690.7	675.2	-15.4	-2.5	-19.4 (-16.1)	1966 (BN)
Sep	604.4	594.4	-10.0	-2.1	-21.5 (-14.9)	1981 (D)

Notes:
1. Proposed Action – Scenario A – modeled 7.5 TAF from PCWA Auburn Pump Station site and 7.5 TAF from Folsom Reservoir at EID's existing intake; on an August through October diversion pattern.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flow releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in mean monthly flow releases occurred for that month and identifying the water-year type.

Based on these hydrologic modeling results, mean monthly flows in the North Fork American River would not change significantly. While individual months, in certain years, showed flow decreases approximating 20 cfs, the over-all long-term decrease in mean monthly flows would be less than 3 percent.

The CALSIM II modeling results for Alternative 2B – Proposed Action – Scenarios B, along with Alternative 3 – Water Transfer Alternative, the Reduced Diversion Alternatives (Alternatives 4A, 4B and 4C), and Alternative 1A – No Action Alternative revealed similar small changes in North Fork American River flows over the long-term. Such changes would unlikely lead to significant effects on CRLF and Foothill yellow-legged frog or their sensitive habitats (see Proposed Action – Scenario B, Water Transfer Alternative, and No Action Alternative, Technical Appendix I, this Draft EIS/EIR). Accordingly, this would be considered a less-than-significant impact.

Mitigation Measures

Alternative 2C – Proposed Action – Scenario C

Potential impacts on the CRLF and Foothill yellow-legged frog could be significant in the portion of this reach of the North Fork American River. As shown by the hydrologic modeling output, Alternative 2C – Proposed Action – Scenario C, could impart flow-related effects on the sensitive habitats of these species. These effects, however, were shown to decrease under Alternative 2A. Potential mitigation measures for these hydrologic effects could include:

- Avoidance of Alternative 2C altogether (by selecting Alternatives 2A or 2B); or,
- Adjusting the summer diversion pattern assumed in the modeling to a more typical annual demand pattern (i.e., flatten the July – September peaks)

For the potential construction-related effects, which are not diversion-related, there is no legal authority requiring EDCWA to take action related to such speculative future projects that could be implemented by GDPUD. The obligation to adopt feasible mitigation measures only arises when an agency proposes to *approve a project* with significant environmental impacts.

Future and specific mitigation measures would be prepared at the time project-specific actions are initiated and would become a part of the project-level environmental documentation for that action. This current EIS/EIR does not provide the environmental analysis necessary to support all of the new facilities ultimately required by GDPUD, at the location of the American River Pump Station to divert water made available by the new CVP water service contract for GDPUD. At present, no details are available as to the nature of these required facilities that would lend themselves to a project-specific analysis.

Nevertheless, in the interests of full disclosure, it is prudent to identify the types of mitigation measures that would benefit and help offset the potential hydrological effects revealed by the simulation modeling, if Alternative 2C were chosen. In the future, when GDPUD actively proceeds with this new facility project, mitigation measures addressing the potential hydrological effects on either CRLF and Foothill yellow-legged frog could include:

- The EDCWA shall ensure that a spring survey in accordance with all applicable USFWS survey protocols is conducted by a qualified biologist during the appropriate spring survey window in areas with suitable habitat that will be affected.
- Should no CRLF adults or egg masses be observed during the spring survey, then no further mitigation shall be required. If CRLF are determined to be present, then the following mitigation measure could be implemented:
- Either a no jeopardy biological opinion or an incidental take permit shall be obtained from the USFWS for potential impacts on the CRLF. All the terms and conditions of the biological opinion or the incidental take permit from the USFWS shall be implemented. While at the discretion of the USFWS, the above-mentioned terms and conditions will likely include a requirement to avoid and minimize habitat impacts and measures to restore impacted areas and enhance other areas along the creeks or reservoirs to benefit the CRLF. Regardless of USFWS direction, however, GDPUD, at a minimum, commit to a no net loss [of CRLF habitat] performance standard, but shall defer to the USFWS to determine if a higher mitigation ratio is required, and to determine how the performance standard will be satisfied.
- Implementation of the above mitigation measure would reduce the potential impacts under Proposed Action – Scenario C, to less than significant.

5.10. WATER-RELATED RECREATIONAL RESOURCES (DIVERSION-RELATED IMPACTS)

This subchapter addresses existing recreational uses within the regional and local study areas that could potentially be directly affected by the Proposed Action and its Alternatives. It presents an analysis of the potential effects on water-related recreational resources. Mitigation measures for any impacts found to be significant are identified if feasible. Potential indirect effects of implementation of the Proposed Action and Alternatives on recreational resources within the Subcontractor service areas are addressed later in this chapter.

5.10.1. CEQA Standards of Significance

Impacts on water-related recreational activities or facilities were considered significant if they would:

- Result in a substantial conflict with established water-dependent or water-enhanced recreational uses of Folsom Reservoir, lower American River, as well as the upper and lower Sacramento River and Delta;
- Result in an inconsistent activity to the American River Parkway Plan;
- Result in a substantial change in river access or channel conditions that would decrease water-based recreational activities. For purposes of this analysis, the following thresholds are applicable;
- substantial decrease in the duration of Middle Fork American River flows below the 850 cfs threshold for whitewater boating;
- substantial change in lower American River flows above or below the 1,750 to 6,000 cfs minimum/maximum range of adequate recreational flows;
- substantial change in lower American River flows above or below the 3,000 to 6,000 cfs optimum range of adequate recreational flows;
- substantial decrease in upper or lower Sacramento River flows below 5,000 cfs;
- Shasta Reservoir boat launching criteria (reservoir elevation in msl; point at which boat launches must be closed);

  Sacramento Arm
  Antlers (995 ft)
  Sugarloaf #1 (955 ft)
  Sugarloaf #2 (918 ft)

  McLeod Arm
  Baily Cover (1,017 ft)
  Hirz Bay #1 (1,020 ft)
  Hirz Bay #2 (973 ft)
  Birz Bay #3 (941 ft)

Pit Arm
Packers Bay (951 ft)
Centimundi #1 (943 ft)
Centimundi #2 (876 ft)
Centimundi #3 (848 ft)
Jones Valley #1 (980 ft)
Jones Valley #2 (924 ft)
Jones Valley #3 (856 ft)

- Trinity Reservoir boat launching criteria (reservoir elevation in msl; point at which boat launches must be closed);
- Fairview – Trinity Dam area (2,310 ft);
- Main Arm – Trinity Center (2,295 ft);
- Stuart Fork Arm – Minersville (2,170 ft); and/or
- Folsom Reservoir recreational thresholds (reservoir elevation in msl) including:
  - When all boat ramps are usable (420 feet or higher);
  - When the marina wet slips are usable (412 feet or higher); and
- When the swimming beaches are usable (420 feet to 455 feet).

5.10.2. Impacts and Mitigation Measures

5.10-1 Result in a substantial conflict with established water-dependent or water-enhanced recreational uses in Folsom Reservoir, the lower American River, upper Sacramento River reservoirs, upper and lower Sacramento River, and the Delta or, result in activities inconsistent with the American River Parkway Plan.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in reservoir or river hydrology are anticipated since no new water diversions of any kind are assumed. Without changes in hydrology, no impacts on water-enhanced or water-dependent recreational activities or facilities would be expected under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Alternatives 2A, 2B and 2C under the Proposed Action as well as the other Alternatives, including Alternative 1A – No Action Alternative, except for Alternative 1B, would result in increased diversions from CVP reservoirs. This is the defining nature of the Proposed Action itself. These new diversions, however, would not necessarily conflict with any established water-dependent or water-enhanced recreational uses but would depend on the extent of hydrological changes in the reservoirs and watercourses associated with these actions. These changes are fully evaluated and discussed under Impact 5.7-2, below.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.10-2 Result in a substantial change in river access or channel conditions that would decrease water-based recreational activities. For purposes of this analysis, the following thresholds are applicable:

1. **Substantial decrease in the duration of Middle Fork American River flows below the 850 cfs threshold for boating.**
2. **Substantial change in lower American River flows above or below the 1,750 to 6,000 cfs minimum/maximum range of adequate recreational flows; substantial change in lower American River flows above or below the 3,000 to 6,000 cfs optimum range of adequate recreational flows.**

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in reservoir or river hydrology are anticipated since no new water diversions of any kind are assumed. Without changes in hydrology, no impacts on water-enhanced or water-dependent recreational activities or facilities would be expected under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

For the lower American River, the maximum and minimum monthly mean flows over the 72-year simulation were compared between the Base Condition and each of the alternatives. In order to estimate the magnitude and frequency of bank exposure and bank inundation along the lower American River, two locations were assessed: Nimbus Dam and the river mouth (confluence with the Sacramento River). A stage/discharge relationship has not been developed for the entire reach of the lower American River and such data have yet to be incorporated into CALSIM II modeling output. For this reason, it is difficult to quantify precisely the potential for exposure or inundation of recreation facilities along the banks of the lower American River. It is generally accepted, however, that higher water surface elevations occur under higher flows and lower water elevations occur under lower flows. A comparison of flows under the existing condition and each of the alternatives provides an estimate of the relative changes in river stage that could result. River flows, therefore, are used as surrogates for river stage (water surface elevations).

North Fork and Middle Fork American River Above and Below the American River Pump Station

Upper basin modeling showed that the long-term average mean monthly flows above the American River Pump Station would not change under any of the Alternatives, including the various Proposed

Action scenarios, relative to the Base Condition (see Proposed Action – Scenarios A, B and C, and All Alternatives, Technical Appendix I, this Draft EIS/EIR). Below the American River Pump Station, modeling results indicated that under Alternative 2A – Proposed Action – Scenario A, there would be slight, albeit undetectable changes in long-term mean monthly flows, relative to the Base Condition (see Table 5.10-1).

TABLE 5.10-1

MEAN MONTHLY FLOWS BELOW THE AMERICAN RIVER PUMP STATION DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)
Oct	675.6	667.4	-8.2	-1.7
Nov	936.5	932.3	-4.2	-0.9
Dec	1,788.8	1,785.3	-3.5	-0.6
Jan	2,250.7	2,246.4	-4.3	-0.5
Feb	3,061.5	3,057.3	-4.1	-0.3
Mar	3,138.7	3,134.3	-4.4	-0.2
Apr	3,272.7	3,265.6	-7.1	-0.3
May	3,110.7	3,102.9	-7.8	-0.4
Jun	1,829.4	1,814.5	-14.9	-1.9
Jul	913.1	898.3	-14.8	-2.3
Aug	690.7	675.2	-15.4	-2.5
Sep	604.4	594.4	-10.0	-2.1

Notes:
1. Proposed Action – Scenario A – modeled at 7.5 TAF diverted from Folsom Reservoir and 7.5 TAF diverted from the Auburn Dam site for GDPUD on an August through October diversion pattern.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Under Alternative 2B – Proposed Action – Scenario B, where the total diversions modeled are shifted completely to EID's intake on Folsom Reservoir, these changes in upper American River flows below the American River Pump Station are reduced to zero (see Proposed Action – Scenarios B, Technical Appendix I, this Draft EIS/EIR). As discussed previously, under Alternative 2C – Proposed Action – Scenario C, the modeled changes in long-term mean monthly flows would decrease more substantively than those under Scenario A (see Table 5.10-2). With a larger GDPUD diversion (i.e., 11,000 AF) under this particular modeling scenario, these results are not unexpected. Under Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, there were simulated decreases in long-term mean monthly flows; however, these changes were less than those reported under Alternative 2A – Proposed Action – Scenario A (see Table 5.10-1). Likewise, for Alternative 1A – No Action Alternative which assumed a corresponding water supply allocation (from a presumed water right acquisition or transfer), the modeled results were similar to those under Alternative 2A – Proposed Action – Scenario A (see Proposed Action – Scenarios A, Technical Appendix I, this Draft EIS/EIR).

TABLE 5.10-2

**MEAN MONTHLY FLOWS BELOW AUBURN DAM SITE
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)**

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)
Oct	675.6	662.2	-13.4	-2.8
Nov	936.5	929.4	-7.1	-1.5
Dec	1,788.8	1,782.8	-6.0	-1.0
Jan	2,250.7	2,244.4	-6.3	-0.8
Feb	3,061.5	3,054.9	-6.5	-0.5
Mar	3,138.7	3,132.0	-6.7	-0.4
Apr	3,272.7	3,262.2	-10.5	-0.5
May	3,110.7	3,099.3	-11.5	-0.7
Jun	1,829.4	1,807.5	-21.9	-2.7
Jul	913.1	891.3	-21.8	-3.4
Aug	690.7	667.3	-23.4	-3.8
Sep	604.4	587.1	-17.3	-3.4

Notes:
1. Proposed Action – Scenario C – modeled at 4 TAF diverted from Folsom Reservoir and 11 TAF diverted from the Auburn Dam site for GDPUD on an August through October diversion pattern.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

While changes in mean monthly flows, over the 72-year period of record were observed in the hydrologic modeling output, these changes were small. From a recreational use perspective, long-term changes in river flows of these magnitudes would unlikely be observable or affect, in any measurable way, the water-enhanced activities that occur within this reach of the river. Therefore, changes in the upper American River would be a less-than-significant impact on recreation resources downstream of the American River Pump Station.

Recognizing the importance of rafting above the American River Pump Station, long-term changes in mean monthly flows were shown to have no effect on river hydrology, upstream of this site. The hydrologic modeling incorporated diversions at the site, as a reflection of GDPUD's future diversions from the American River Pump Station at this location. No changes in upstream hydrology would occur. The frequency with which flows would be below, at, or above the 850 cfs threshold considered necessary for rafting would not change between the Base Condition and any of the Alternatives.

Lower American River

CALSIM II modeling results confirmed that for the 5-month recreation season (May through September), Alternative 2B – Proposed Action – Scenario B would result in virtually the identical number of months, relative to the Base Condition, where mean monthly flows in the lower American River (below Nimbus Dam) would be less than 1,750 cfs. A careful examination of the entire 72-year period of record for these months (360 months in total) revealed that this would apply to all dry and critically-dry periods as well (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR). At the mouth of the lower American River, modeling results showed that, under

Alternative 2B, 130 months of the 72-year recreational period would result in mean monthly flows below 1,750 cfs. This represents one additional month, relative to the 129 months simulated for the Base Condition. Such small changes in frequency would not constitute a significant impact on water-enhanced or water-dependent recreational activities.

Table 5.10-3 shows the mean monthly simulated CALSIM II flows for the lower American River below Nimbus Dam under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition. Long-term changes in mean monthly flows are small; flow changes, as a percent difference would be undetectable from a recreational water-enhanced and water-dependent activities perspective. Under Alternative 2A – Scenario A, with an equitable split of diversion between EID and GDPUD, the modeling results showed a similar variation in magnitude and frequency, relative to the Base Condition.

TABLE 5.10-3

MEAN MONTHLY FLOWS BELOW NIMBUS DAM
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
May	3683.2	3675.2	-7.9	-0.2	-58.9 (-2.5)	239.7 (7.3)
Jun	3933.9	3910.4	-23.6	-0.8	-150.6 (-8.7)	531.7 (18.0)
Jul	3846.4	3820.4	-26.0	-0.9	-467.6 (-14.2)	77.2 (1.6)
Aug	2138.4	2103.7	-34.7	-1.7	-1467.5 (-63.9)	405.1 (17.2)
Sep	1503.2	1475.9	-27.4	-2.0	-1156.2 (-67.3)	67.2 (9.4)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

A careful examination of the individual year model results over the 72-year hydrologic record for the months of April through September showed that the number of months, under the Base Condition where, mean monthly flows in the lower American River below Nimbus Dam would be above the 3,000 cfs minimum boundary (defining the optimum flow range for recreational flows) would remain virtually unchanged with Alternative 2B – Proposed Action – Scenario B. Under the Base Condition, 432 months of the recreational season maintained mean monthly flows at or above 3,000 cfs. Under Alternative 2B, 431 months maintained these flows (see Proposed Action – Scenarios B, Technical Appendix I, this Draft EIS/EIR). With such small changes in the frequency with which the lower American River below Nimbus Dam would meet optimal recreational flow requirements, relative to the Base Condition, such impacts were deemed to be less than significant.

Table 5.10-4 shows the comparable results for the Water Transfer Alternative, relative to the Base Condition. Under this alternative, mean monthly flows in the lower American River below Nimbus

Dam would be reduced, relative to the Base Condition. The magnitude of these mean monthly long-term changes; however, from a relative percent perspective, would not be considered significant to recreational uses and facilities.

TABLE 5.10-4

MEAN MONTHLY FLOWS BELOW NIMBUS DAM
DIFFERENCE BETWEEN BASE CONDITION AND WATER TRANSFER ALTERNATIVE[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Water Transfer Alt. (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
May	3683.2	3665.8	-17.4	-0.5	-150.1 (-3.3)	358.9 (10.9)
Jun	3933.9	3881.4	-52.6	-1.8	-173.8 (-11.0)	513.3 (17.4)
Jul	3846.4	3796.5	-49.9	-1.8	-488.1 (-14.8)	40.9 (0.9)
Aug	2138.4	2089.3	-49.1	-2.4	-1485.0 (-66.4	633.3 (26.5)
Sep	1503.2	1473.7	-29.5	-0.7	-1159.4 (-67.4)	993.9 (174.9)

Notes:
1. Water Transfer Alternative – modeled 15 TAF of non-CVP water from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Water Transfer Alternative (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Water Transfer Alternative, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Water Transfer Alternative, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.10-3 Result in a substantial decrease in upper or lower Sacramento River flows below 5,000 cfs.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in reservoir or river hydrology are anticipated since no new water diversions of any kind are assumed. Without changes in hydrology, no impacts on water-enhanced or water-dependent recreational activities or facilities would be expected under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Table 5.10-5 shows the modeled flows in the upper Sacramento River below Keswick Dam under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition for the recreational months of May through September. Changes in mean monthly flows over the 72-year period of hydrologic record are unchanged. Long-term mean monthly flows under the Base Condition are over 5,000 cfs. For upper Sacramento River flows, these immeasurable changes in hydrology as demonstrated by CALSIM II modeling results under Alternative 2B – Proposed Action – Scenario B, indicate that no potential impacts on recreational uses and activities, both water-enhanced and water-dependent would occur.

TABLE 5.10-5

MEAN MONTHLY SACRAMENTO RIVER FLOW RELEASES BELOW KESWICK DAM DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Notes[4]
May	8241.9	8251.5	9.7	0.1	-23.0 (-0.3)	1947 (D)
Jun	10365.3	10369.0	3.7	0.0	-292.3 (-2.4)	1961 (D)
Jul	12708.9	12721.4	12.5	0.1	-233.1 (-1.7)	1947 (D)
Aug	10505.2	10497.7	-7.5	-0.1	-229.2 (-2.4)	1965 (W)
Sep	7035.7	7035.0	-0.7	0.0	-250.5 (-3.7)	1948 (BN)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flow releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in mean monthly flow releases occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

CALSIM II modeling results confirm that for Alternatives 2A and 2C – Proposed Action – Scenarios A and C, similar, undetectable changes in mean monthly flows in the upper Sacramento River would occur. Simulated flows under Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative are similar to those of Alternatives 2A, 2B and 2C (see Water Transfer Alternative and No Action Alternative, Technical Appendix I, this Draft EIS/EIR).

For the lower Sacramento River, similar modeling results are evident. Table 5.10-6 presents the long-term mean monthly flows in the lower Sacramento River at Freeport under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition, again, for those recreational months (May through September).

Long-term simulated mean monthly river flow changes under Alternative 2B – Proposed Action – Scenario B, would be imperceptible, relative to the Base Condition. Flows in the lower Sacramento River during these months are typically in the 12,000 to 19,000 cfs range, well above the threshold for water-dependent and water-enhanced recreational impact significance.

Simulated flows under Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative are similar to those of Alternative 2B, and the other various alternative Proposed Action scenarios (see Water Transfer Alternative and No Action Alternative, Technical Appendix I, this Draft EIS/EIR).

TABLE 5.10-6

MEAN MONTHLY SACRAMENTO RIVER FLOWS AT FREEPORT DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]

Month	Absolute Difference (cfs)	Relative Difference (%)	Long-Term Mean Monthly Flows (cfs)	Maximum Flow Decrease[2] (cfs)	Maximum Flow Decrease (%)	Notes[3]
May	-19.1	-0.1	19604.6	-1565.2	-8.4	1940 (AN)
Jun	-42.9	-0.3	17304.7	-1536.8	-8.9	1936 (BN)
Jul	17.3	0.1	18337.9	-625.5	-5.0	1931 (C)
Aug	-26.4	-0.2	14513.8	-970.4	-6.1	1944 (D)
Sep	7.7	0.2	12393.8	-1173.8	-9.4	1947 (D)

Notes:
1. Proposed Action – Scenario B modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Maximum Flow Decrease – refers to the largest decrease in mean flow computed for that month (largest decrease over 72-years).
3. Indicates the year where the maximum decrease in Sacramento River flow (in cfs) occurred for that month, identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Accordingly, the potential impacts on water-dependent and water-enhanced recreational uses, activities and facilities in both the upper and lower Sacramento River reaches would be less than significant under any of the Alternatives.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.10-4 Shasta Reservoir boat launching criteria (reservoir elevation in msl; point at which boat launches must be closed):

1. **Sacramento Arm: Antlers (995 ft) Sugarloaf #1 (955 ft) Sugarloaf #2 (918 ft).**
2. **McLeod Arm: Baily Cover (1,017 ft) Hirz Bay #1 (1,020 ft) Hirz Bay #2 (973 ft) Birz Bay #3 (941 ft).**
3. **Pit Arm: Packers Bay (951 ft) Centimundi #1 (943 ft) Centimundi #2 (876 ft) Centimundi #3 (848 ft) Jones Valley #1 (980 ft) Jones Valley #2 (924 ft) Jones Valley #3 (856 ft).**

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in reservoir hydrology are anticipated since no new water diversions of any kind are assumed. Without changes in hydrology, no impacts on boat launching availability, frequency or usage would be expected under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Table 5.10-7 illustrates the long-term mean monthly water surface elevations at Shasta Reservoir under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition for the summer recreational months. Mean monthly reservoir water surface elevations are all over 1,000 ft msl, except for the months of August and September when the long-term averages are 989 and 982 ft msl, respectively. The modeling data indicate that no measurable change, relative to the Base Condition would occur in summer period water surface elevations under Alternative 2B. Boat launch availability, therefore, would remain unaffected at the reservoir. Current conditions do, however, show that some boat launches are unusable on a long-term average, based on mean water surface elevations over the 72-year modeling simulation period. Still, boaters would have other options, primarily moving to those launches on the Pit Arm of the reservoir where all boat launches would have increased access, based on long-term hydrologic modeling.

TABLE 5.10-7

MEAN MONTHLY WATER SURFACE ELEVATIONS IN SHASTA RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (ft msl)	Proposed Action (ft msl)	Absolute Difference[2] (ft msl)	Relative Difference (%)	Maximum Water Surface Elevation Decrease[3] (ft msl and %)	Notes[4]
May	1037.7	1037.6	-0.1	0.0	-1.5 (-0.1)	1965 (W)
Jun	1026.0	1025.9	-0.1	0.0	-1.6 (-0.2)	1965 (W)
Jul	1005.6	1005.5	-0.1	0.0	-3.4 (-0.3)	1965 (W)
Aug	989.0	988.9	-0.1	0.0	-2.8 (-0.3)	1965 (W)
Sep	982.4	982.3	-0.1	0.0	-2.7 (-0.3)	1965 (W)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in ft msl), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Water Surface Elevation Decrease – refers to the largest decrease in water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in end-of-month storage occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

CALSIM II modeling results confirm that for Alternatives 2A and 2C – Proposed Action – Scenarios A and C, similar, undetectable changes in mean monthly water surface elevations at Shasta Reservoir would occur. Simulated water surface elevations under Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative are similar to those of Alternatives 2A, 2B and 2C (see Water Transfer Alternative and No Action Alternative, Technical Appendix I, this Draft EIS/EIR). Accordingly, the potential impacts on boat launch availability at Shasta Reservoir would be less than significant under any of the Alternatives.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.10-5 Trinity Reservoir boat launching criteria (reservoir elevation in msl; point at which boat launches must be closed):

1. **Fairview – Trinity Dam area (2,310 ft)**
2. **Main Arm – Trinity Center (2,295 ft)**
3. **Stuart Fork Arm – Minersville (2,170 ft)**

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in reservoir hydrology are anticipated since no new water diversions of any kind are assumed. Without changes in hydrology, no impacts on boat launching availability, frequency or usage would be expected under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Table 5.10-8 illustrates the long-term simulated mean monthly water surface elevations at Trinity Reservoir under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition, for the summer period (May through September). Similar to Shasta Reservoir, Alternative 2B would impart no measurable or detectable change in water surface elevation at the reservoir, relative to current or Base Conditions. This is based on a 72-year period of record for simulated hydrologic modeling of the reservoir's mean monthly water surface elevations. Nevertheless, even under existing conditions today, not all boat launches remain operable during all months of all water years. Over the long-term, as depicted by the data in Table 5.10-8, the Trinity Center and Minersville boat launches would be operable over approximately the entire summer recreation period. The boat launch at Fairview in the Trinity Dam area, however, would typically only be available during the earlier portion of the summer (i.e., May and June).

Overall, boating access at Trinity Reservoir would not be measurably affected by any of Alternatives 2A, 2B and 2C. Water surface elevations in the reservoir, as modeled, would remain unaffected. Simulated water surface elevations under Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative are similar to those of Alternatives 2A, 2B and 2C (see Water Transfer Alternative and No Action Alternative, Technical Appendix I, this Draft EIS/EIR). Accordingly, the potential impacts on boat launch availability at Trinity Reservoir would be less than significant under any of the Alternatives.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

TABLE 5.10-8

MEAN MONTHLY WATER SURFACE ELEVATIONS IN TRINITY RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (ft msl)	Proposed Action (ft msl)	Absolute Difference[2] (ft msl)	Relative Difference (%)	Maximum Water Surface Elevation Decrease[3] (ft msl and %)	Notes[4]
May	2319.7	2319.7	-0.1	0.0	-0.6 (0.0)	1992 (C)
Jun	2315.5	2315.5	-0.1	0.0	-0.8 (0.0)	1992 (C)
Jul	2303.1	2303.1	0.0	0.0	-0.9 (0.0)	1992 (C)
Aug	2290.6	2290.6	0.0	0.0	-0.8 (0.0)	1991 (C)
Sep	2280.1	2280.0	-0.1	0.0	-2.7 (-0.1)	1963 (W)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in ft msl), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Water Surface Elevation Decrease – refers to the largest decrease in water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in end-of-month storage occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

5.10-6 Folsom Reservoir recreational thresholds (reservoir elevation in msl) including:

1. **When all boat ramps are usable (420 feet or higher).**
2. **When the marina wet slips are usable (412 feet or higher).**
3. **When the swimming beaches are usable (420 feet to 455 feet).**

Alternative 1B – No Project Alternative

Under the No Project Alternative, no changes in reservoir hydrology are anticipated since no new water diversions of any kind are assumed. Without changes in hydrology, no impacts on boat launching availability, frequency or usage would be expected under the No Project Alternative.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

CALSIM II modeling output showed that under Alternative 2B – Proposed Action – Scenario B, there would no change in the number of months, during the summer recreational period, when water surface elevations at Folsom Reservoir would be below 412 ft msl, relative to the Base Condition. Under both the Base Condition and Alternative 2B, there would be 75 months (out of 442 total months) or 17 percent of the time, when this condition would occur (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR). Over the five-month recreational season, reservoir elevations would be, on average, below 412 ft msl in one month.

Table 5.10-9 shows the simulated mean monthly water surface elevations in Folsom Reservoir under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition, for the summer recreation period (May through September). Over the long-term, there would be no measurable or detectable change in water surface elevations, based on modeled simulations. In some months, of some years, a more substantial change in water surface elevation would occur, but these occurrences would be infrequent and even when the maximum decreases are noted for any of the summer months, the relative percent changes are small (i.e., approximately 1 percent, relative to the Base Condition).

TABLE 5.10-9

MEAN MONTHLY WATER SURFACE ELEVATIONS IN FOLSOM RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (ft msl)	Proposed Action (ft msl)	Absolute Difference[2] (ft msl)	Relative Difference (%)	Maximum Water Surface Elevation Decrease[3] (ft msl and %)	Maximum Water Surface Elevation Increase[4] (ft msl and %)
May	451.2	451.1	-0.1	0.0	-1.0 (-0.3)	0.3 (0.1)
Jun	446.2	446.0	-0.2	0.0	-4.8 (-1.1)	0.8 (0.2)
Jul	430.9	430.7	-0.2	0.0	-3.2 (-0.8)	3.3 (0.8)
Aug	425.6	425.4	-0.2	-0.1	-3.5 (-1.0)	7.7 (1.8)
Sep	424.8	424.6	-0.1	0.0	-3.8 (-1.1)	10.1 (2.5)`

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in ft msl), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Water Surface Elevation Decrease – refers to the largest decrease in water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Water Surface Elevation Increase – refers to the largest increase in water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Folsom Reservoir, not unlike other CVP/SWP reservoirs which serve multiple functions, is typically at its highest storage volume at the end of the flood operating season (e.g., April/May). From this point forward, and depending on the demands placed on the reservoir for consumptive water demands, downstream flow release/thermal management, and weather conditions, reservoir volumes can diminish rapidly.

The data in Table 5.10-9 illustrate this clearly. Long-term mean monthly water surface elevations in Folsom Reservoir decline from over 451 ft msl in May, to about 425 ft msl in September; a 25 ft vertical drop in elevation over the course of the summer recreation season. The same data trends are true for Alternatives 2A and 2C. Based on these hydrologic data, recreational activities, facilities, and use of the reservoir for both water-dependent and water-enhanced activities would not be significantly affected by any of the scenarios under the Proposed Action.

Simulated water surface elevations under Alternative 3 – Water Transfer Alternative and Alternative 1A – No Action Alternative are similar to those of Alternatives 2A, 2B and 2C (see Water Transfer Alternative and No Action Alternative, Technical Appendix I, this Draft EIS/EIR). Accordingly, the potential impacts on boat launch availability, marina wet slips, and swimming activities at Folsom Reservoir would be less than significant under any of the Alternatives.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.11. WATER-RELATED CULTURAL RESOURCES (DIVERSION-RELATED IMPACTS)

This subchapter addresses existing cultural resources within the regional and local study areas and presents an analysis of potential effects of the proposed new CVP water service contract on water-related cultural resources.

5.11.1. CEQA Standards of Significance

Under 36 CFR 800.5, “An adverse effect [i.e., a significant impact] is found when an undertaking may alter, directly or indirectly, any of the characteristics of a historic property that qualify the property for inclusion in the National Register in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.” The National Historic Preservation Act defines an adverse effect on an eligible resource as any of the following (36 CFR 800.5):

- Physical destruction, damage, or alteration, including moving the property from its historic location.
- Isolation from or alteration of the setting.
- Introduction of intrusive elements.
- Neglect leading to deterioration or destruction.
- Transfer, sale, or lease from federal ownership.

CEQA equates a substantial adverse change in the significance of an historical resource with a significant effect on the environment (PRC Section 21084.1). Under the CEQA Guidelines, impacts on cultural resources may be considered significant if a project alternative would result in any of the following:

- Cause a substantial adverse change in the significance of an historical resource as defined in Guidelines Section 15064.5
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to Guidelines Section 15064.5
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature
- Disturb any human remains, including those interred outside of formal cemeteries.

Hydrologic modeling results from CALSIM II were used to determine whether the magnitude and frequency of changes in reservoir water surface elevations or river flows would adversely affect known or potential historical resources, or unique archaeological resources. The standards of impact significance, therefore, included the following:

- result in substantial elevation or lowering water level fluctuation zone, relative to the basis of comparison, which would result in increased inundation of previously exposed areas or exposure of previously inundated lands with sufficient frequency to adversely affect historic properties; or
- result in substantial increase in maximum monthly mean river flows or decrease in minimum monthly mean river flows, relative to the basis of comparison, which would result in increased inundation of previously exposed areas or exposure of previously inundated lands with sufficient frequency to adversely affect historic properties.

5.11.2. Impacts and Mitigation Measures

Fluctuations in surface water levels are considered an existing, and accepted, hydrological operation of reservoirs and river flows that could be affected by implementation of the new CVP water service contracts. A stage/discharge relationship, however, has not yet been developed for the entire reach of the lower American River as well as other rivers. For this reason, it is difficult to quantify precisely the potential for exposure or inundation of cultural resources along the banks of rivers. It is generally accepted that higher water surface elevations occur under higher flows and lower water elevations occur under lower flows. A comparison of flows under the current conditions and each of the Alternatives provides an estimate of the relative changes in river stage that could result. River flows, therefore, are used as surrogates for river stage (water surface elevations).

5.11-1 Effects of changes in water surface elevations in Folsom, Shasta, and Trinity reservoirs on cultural resources.

Alternative 1B – No Project Alternative

Under the No Project Alternative, there would no change in diversions from the CVP system, relative to the Base Condition. Consequently, Shasta, Trinity, and Folsom reservoir elevations would remain unchanged from existing conditions, and there would no impact on cultural resources resulting from erosion/scouring, deflation, hydrologic sorting, and artifact displacement, caused by waves and currents.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Prehistoric and historic sites within the zone of seasonal fluctuation or drawdown in reservoirs suffer the greatest affects under existing conditions, primarily in the form of erosion/scouring, deflation, hydrologic sorting, and artifact displacement, caused by waves and currents. Looting is also a problem. Studies at Folsom Reservoir have shown there are generally two kinds of potentially significant impacts/adverse effects on cultural resources that can occur from changes in water levels: *increased cycles of inundation and drawdown*, resulting in more erosion and scouring of sites, and more rapid breakdown of organic materials through more frequent wetting and drying; and *exposure of previously inundated resources*, subjecting these resources to increased weathering, vandalism, and other factors.

Folsom, Shasta, and Trinity reservoirs have water levels that fluctuate frequently on an annual basis. Tables 5.11-1 through 5.11-3 show the mean monthly simulated water surface elevations for Folsom, Shasta, and Trinity reservoirs under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition over the entire 72-year period of hydrologic simulation record.

TABLE 5.11-1

MEAN MONTHLY WATER SURFACE ELEVATIONS IN FOLSOM RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (ft msl)	Proposed Action (ft msl)	Absolute Difference[2] (ft msl)	Relative Difference (%)	Maximum Water Surface Elevation Decrease[3] (ft msl and %)	Maximum Water Surface Elevation Increase[4] (ft msl and %)
Oct	416.6	416.5	-0.2	0.0	-4.2 (1.0)	9.9 (2.5)
Nov	408.1	408.1	0.0	0.0	-7.7 (-2.0)	9.4 (2.3)
Dec	410.2	410.2	0.0	0.0	-2.3 (-0.6)	8.8 (2.2)
Jan	412.2	412.3	0.1	0.0	-1.6 (-0.4)	7.1 (1.7)
Feb	415.0	415.0	0.0	0.0	-0.8 (-0.2)	2.2 (0.6)
Mar	429.0	429.0	0.0	0.0	-0.8 (-0.2)	2.6 (0.6)
Apr	440.3	440.2	-0.1	0.0	-1.1 (-0.2)	1.5 (0.3)
May	451.2	451.1	-0.1	0.0	-1.0 (-0.3)	0.3 (0.1)
Jun	446.2	446.0	-0.2	0.0	-4.8 (-1.1)	0.8 (0.2)
Jul	430.9	430.7	-0.2	0.0	-3.2 (-0.8)	3.3 (0.8)
Aug	425.6	425.4	-0.2	-0.1	-3.5 (-1.0)	7.7 (1.8)
Sep	424.8	424.6	-0.1	0.0	-3.8 (-1.1)	10.1 (2.5)`

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in ft msl), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Water Surface Elevation Decrease – refers to the largest decrease in water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Water Surface Elevation Increase – refers to the largest increase in water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

TABLE 5.11-2

MEAN MONTHLY WATER SURFACE ELEVATIONS IN SHASTA RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (ft msl)	Proposed Action (ft msl)	Absolute Difference[2] (ft msl)	Relative Difference (%)	Maximum Water Surface Elevation Decrease[3] (ft msl and %)	Notes[4]
Oct	979.2	979.1	-0.1	0.0	-1.3 (-0.1)	1966 (BN)
Nov	981.5	981.4	-0.1	0.0	-0.9 (-0.1)	1947 (D)
Dec	988.6	988.6	-0.1	0.0	-0.9 (-0.1)	1947 (D)
Jan	1000.7	1000.7	0.0	0.0	-0.9 (-0.1)	1947 (D)
Feb	1012.8	1012.8	-0.1	0.0	-1.0 (-0.1)	1946 (BN)
Mar	1027.8	1027.8	0.0	0.0	-0.9 (-0.1)	1947 (D)
Apr	1038.6	1038.5	0.0	0.0	-0.8 (-0.1)	1946 (BN)
May	1037.7	1037.6	-0.1	0.0	-1.5 (-0.1)	1965 (W)
Jun	1026.0	1025.9	-0.1	0.0	-1.6 (-0.2)	1965 (W)
Jul	1005.6	1005.5	-0.1	0.0	-3.4 (-0.3)	1965 (W)
Aug	989.0	988.9	-0.1	0.0	-2.8 (-0.3)	1965 (W)
Sep	982.4	982.3	-0.1	0.0	-2.7 (-0.3)	1965 (W)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in ft msl), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Water Surface Elevation Decrease – refers to the largest decrease in water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in end-of-month storage occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

TABLE 5.11-3

MEAN MONTHLY WATER SURFACE ELEVATIONS IN TRINITY RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (ft msl)	Proposed Action (ft msl)	Absolute Difference[2] (ft msl)	Relative Difference (%)	Maximum Water Surface Elevation Decrease[3] (ft msl and %)	Notes[4]
Oct	2275.7	2275.6	-0.1	0.0	-2.7 (-0.1)	1964 (D)
Nov	2277.6	2277.5	-0.1	0.0	-1.1 (-0.1)	1992 (C)
Dec	2282.6	2282.5	-0.1	0.0	-1.1(-0.1)	1992 (C)
Jan	2288.0	2288.0	-0.1	0.0	-1.1 (-0.1)	1992 (C)
Feb	2299.8	2299.7	-0.1	0.0	-0.8 (0.0)	1992 (C)
Mar	2309.1	2309.0	-0.1	0.0	-0.8 (0.0)	1992 (C)
Apr	2321.2	2321.1	-0.1	0.0	-0.6 (0.0)	1947 (D)
May	2319.7	2319.7	-0.1	0.0	-0.6 (0.0)	1992 (C)
Jun	2315.5	2315.5	-0.1	0.0	-0.8 (0.0)	1992 (C)
Jul	2303.1	2303.1	0.0	0.0	-0.9 (0.0)	1992 (C)
Aug	2290.6	2290.6	0.0	0.0	-0.8 (0.0)	1991 (C)
Sep	2280.1	2280.0	-0.1	0.0	-2.7 (-0.1)	1963 (W)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in ft msl), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Water Surface Elevation Decrease – refers to the largest decrease in water surface elevation under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in end-of-month storage occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

The modeling results indicate that maximum mean monthly water surface elevations for any month over the 72-year simulation period would not change, relative to the Base Condition. Of the three reservoirs, Folsom Reservoir shows the largest inter-annual variation in maximum and minimum changes in water surface elevation, relative to the Base Condition. These changes, however, would not change by more than 5 feet (the maximum annual changes in Shasta and Trinity reservoirs are smaller). Such changes, at any of the reservoirs, are infrequent as confirmed by the 72-year modeling spread (see Proposed Action – Scenario B, Technical Appendix I, this Draft EIS/EIR).

For Folsom Reservoir, each of the mean monthly average water surface elevations under both the Base Condition and Alternative 2B – Proposed Action – Scenario B, are well within the 395 to 466 ft msl zone of historic maximum fluctuation as discussed earlier. Cultural sites at or above 395 ft msl already have suffered serious impacts that have greatly compromised their integrity and destroyed much of their data potential. These modeling results confirm that, long-term changes in water surface elevation, which could contribute to increased inundation or desiccation of cultural sites, would not occur at Folsom Reservoir; unchanging mean monthly water surface elevations are indicative of uniform operating conditions within those specific months. No additional increment of impact would result from the diversions contemplated under Alternative 2B – Proposed Action – Scenario B.

CALSIM II modeling results for Alternatives 2A and 2C – Proposed Action – Scenarios A and C, along with Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative revealed similar inconsequential changes in mean monthly simulated water surface elevations at all three reservoirs (see Proposed Action – Scenarios A and C, Water Transfer Alternative, and No Action Alternative, Technical Appendix I, this Draft EIS/EIR). Changes in water surface elevation under any of Alternatives 4A, 4B or 4C would be less than those of Alternative 2B.

Thus, there would be no increase in exposure or inundation of cultural resources within the drawdown zone, relative to the existing condition. Consequently, impacts on cultural resources at Folsom, Shasta, or Trinity reservoirs resulting from changes in maximum and minimum water levels would be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.11-2 Effects of changes in flows in the Sacramento River and Delta on cultural resources.

Alternative 1B – No Project Alternative

Under the No Project Alternative, diversions would be identical to those under the Base Condition. Consequently, there would be no change in the potential for exposure or inundation cultural resources that would result in significant adverse effects on an historic property within the upper and lower Sacramento River, including the Delta. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

CALSIM II modeling confirmed the insignificant changes in mean monthly flows under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition over the 72-year simulation period (see Tables 5.11-4 and 5.11-5). While some individual inter-annual fluctuations for specific months are large, these are infrequent occurrences as indicated by the virtually unchanging long-term mean monthly flows. Sacramento River flows in either the upper or lower reaches are substantive, given that this river represents the main northern California mainstem tributary to the Delta. Flows, by the time they reach Freeport are commonly in the 10,000 cfs range.

TABLE 5.11-4

MEAN MONTHLY SACRAMENTO RIVER FLOWS AT FREEPORT DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]

Month	Absolute Difference (cfs)	Relative Difference (%)	Long-Term Mean Monthly Flows (cfs)	Maximum Flow Decrease[2] (cfs)	Maximum Flow Decrease (%)	Notes[3]
Oct	-35.2	-0.3	12524.6	-871.0	-8.7	1931 (C)
Nov	-21.4	-0.1	15584.5	-647.7	-4.3	1964 (D)
Dec	-9.9	0.1	24725.7	-776.4	-1.1	1965 (W)
Jan	-9.7	-0.1	32503.3	-759.3	-6.3	1960 (D)
Feb	36.7	0.2	38815.3	-265.7	-0.4	1963 (W)
Mar	-26.1	-0.1	33667.2	-801.8	-2.5	1963 (W)
Apr	4.7	0.0	24349.2	-67.7	-0.2	1935 (BN)
May	-19.1	-0.1	19604.6	-1565.2	-8.4	1940 (AN)
Jun	-42.9	-0.3	17304.7	-1536.8	-8.9	1936 (BN)
Jul	17.3	0.1	18337.9	-625.5	-5.0	1931 (C)
Aug	-26.4	-0.2	14513.8	-970.4	-6.1	1944 (D)
Sep	7.7	0.2	12393.8	-1173.8	-9.4	1947 (D)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Maximum Flow Decrease – refers to the largest decrease in mean flow computed for that month (largest decrease over 72-years).
3. Indicates the year where the maximum decrease in Sacramento River flow (in cfs) occurred for that month, identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Unlike reservoirs, river channel flows are constrained within well defined channels. Their area of effect is much more limited than reservoirs, whose surface area is much more prone to changes in water elevation due to the more sloping bathymetry, relative to rivers. Changes in river flows, therefore, would have a much more limited effect on either inundating (through water elevation rise) or desiccating (through water level decline) cultural resource sites along the channel embankments.

More importantly, it is well known that over the 72-year hydrologic period of record, there have been episodes of extremely high flows within the Sacramento River and Delta. The mean monthly flow at Freeport in February 1986 for example, was over 78,000 cfs. At flows eight times higher than the long-term average for the month of February, any cultural resource sites along the channel would have historically been inundated through substantial river stage increases. Alternatively, in critically dry-years such as 1977 and 1991, mid-winter mean monthly flows in the Sacramento River at

TABLE 5.11-5

MEAN MONTHLY SACRAMENTO RIVER FLOW RELEASES BELOW KESWICK DAM DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Notes[4]
Oct	5651.8	5645.8	-6.0	-0.1	-538.5 (-10.7)	1966 (BN)
Nov	5290.3	5286.6	-3.7	0.0	-534.0 (-5.7)	1964 (D)
Dec	6877.8	6870.1	-7.7	-0.1	-369.6 (-3.0)	1967 (W)
Jan	8033.1	8033.1	0.1	0.0	-42.7 (-0.3)	1969 (W)
Feb	10164.0	10172.6	8.5	0.1	-116.7 (-3.3)	1961 (D)
Mar	8313.3	8300.9	-12.4	-0.2	-664.9 (-7.1)	1963 (W)
Apr	7203.6	7211.8	8.2	0.0	-211.6 (-2.6)	1931 (C)
May	8241.9	8251.5	9.7	0.1	-23.0 (-0.3)	1947 (D)
Jun	10365.3	10369.0	3.7	0.0	-292.3 (-2.4)	1961 (D)
Jul	12708.9	12721.4	12.5	0.1	-233.1 (-1.7)	1947 (D)
Aug	10505.2	10497.7	-7.5	-0.1	-229.2 (-2.4)	1965 (W)
Sep	7035.7	7035.0	-0.7	0.0	-250.5 (-3.7)	1948 (BN)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in TAF), representative of the mean difference over the 72-years (and subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flow releases under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Indicates the year where the largest decrease in mean monthly flow releases occurred for that month and identifying the water-year type.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Freeport were less than 8,000 cfs. Cultural resources sites along the channel during these times would have been at risk to exposure and the adverse effects of desiccation. While the Delta represents a much more dynamic water system and, to be sure, receives inflows from a number of additional tributaries, the data results from the Sacramento River at Freeport are noteworthy and applicable. For the Sacramento River side, flows at Freeport represent a good indicator of northern Delta inflows. The 72-year hydrologic record would impart similar effects on the Delta during these same corresponding periods of extreme wet-years and critically dry-years.

CALSIM II modeling results for Alternatives 2A and 2C – Proposed Action – Scenarios A and C, along with Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative revealed similar inconsequential changes in mean monthly simulated flows in the upper and lower Sacramento River (see Proposed Action – Scenarios A and C, Water Transfer Alternative, and No Action Alternative, Technical Appendix I, this Draft EIS/EIR). Changes in river flows under any of Alternatives 4A, 4B or 4C would be less than those of Alternative 2B.

Based on these modeling results and the discussions herein, there would be no anticipated increase in exposure or inundation of cultural resources resulting from changing river flows, relative to the Base Condition. Consequently, impacts on cultural resources within the channel confines of the upper and lower Sacramento River, including the Delta that could result from changes in maximum and minimum water levels would be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.11-3 Effects of changes in flows in the lower American River on cultural resources.

Alternative 1B – No Project Alternative

Under the No Project Alternative, diversions would be identical to those under the Base Condition. Consequently, there would be no change in the potential for exposure or inundation cultural resources that would result in significant adverse effects on historic properties within the lower American River. There would be *no impact.*

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

For the lower American River, the maximum and minimum monthly mean flows over the 72-year simulation were compared between the existing condition and each of the alternatives. In order to estimate the magnitude and frequency of bank exposure and bank inundation along the lower American River, two locations were assessed: Nimbus Dam and the river mouth (confluence with the Sacramento River).

As noted previously, a comparison of flows under the existing condition and each of the Alternatives provided an estimate of the relative changes in river stage that could result because of the new CVP water service contracts; river flows, therefore, were used as surrogates for river stage (water surface elevations). Table 5.11-6 shows the simulated mean monthly flows in the lower American River below Nimbus Dam under Alternative 2B – Proposed Action – Scenario B, relative to the Base Condition over the entire 72-year hydrologic period of record.

No significant sites are expected to have survived within the riverbed itself near Nimbus Dam because of the major impacts at this location from dam construction. Accordingly, lower flows would not expose previously submerged (and intact) cultural resources. It is possible that historic-era (post-1869) shipwrecks lie beneath the silty river bottom near the mouth, and that very low river flows could expose these resources; several nineteenth- and early twentieth-century shipwrecks have been documented immediately to the south in the Sacramento River channel (California State Lands Commission 1988). At least one wreck is documented in the lower American River: the *Pearl*, January 27, 1885.[210] However, the magnitude of the changes predicted is so small that this is highly unlikely. Also, known resources along the riverbank (two historic levees, a portion of the Natomas East Main Drainage Canal and prehistoric mound CA-SAC-26) lie outside the present river channel, and decreases in river flows would have no impact on these resources. Therefore, lower flows are not a concern with regard to cultural resources.

210 http://www.martimeheritage.org/ships/wrecks.html

TABLE 5.11-6

**MEAN MONTHLY FLOWS BELOW NIMBUS DAM
DIFFERENCE BETWEEN BASE CONDITION AND PROPOSED ACTION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)**

Month	Base Condition (cfs)	Proposed Action (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)	Maximum Flow Decrease[3] (cfs and %)	Maximum Flow Increase[4] (cfs and %)
Oct	2441.8	2427.7	-14.1	-0.7	-362.0 (-15.4)	440.8 (15.8)
Nov	3324.2	3299.2	-25.0	-0.3	-582.1 (-20.8)	704.4 (41.6)
Dec	3342.0	3322.9	-19.1	-0.1	-827.8 (-10.8)	446.1 (23.6)
Jan	4088.3	4073.4	-14.9	-0.8	-764.9 (-60.5)	334.6 (23.6)
Feb	5103.3	5115.7	12.4	0.9	-190.7 (-8.1)	720.7 (51.8)
Mar	3729.4	3715.3	-14.1	-0.5	-267.9 (-10.0)	24.8 (3.0)
Apr	3825.3	3829.0	3.7	0.4	-73.7 (-1.7)	339.5 (14.6)
May	3683.2	3675.2	-7.9	-0.2	-58.9 (-2.5)	239.7 (7.3)
Jun	3933.9	3910.4	-23.6	-0.8	-150.6 (-8.7)	531.7 (18.0)
Jul	3846.4	3820.4	-26.0	-0.9	-467.6 (-14.2)	77.2 (1.6)
Aug	2138.4	2103.7	-34.7	-1.7	-1467.5 (-63.9)	405.1 (17.2)
Sep	1503.2	1475.9	-27.4	-2.0	-1156.2 (-67.3)	67.2 (9.4)

Notes:
1. Proposed Action – Scenario B – modeled 15 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake.
2. Absolute Difference – difference between Base Condition and Proposed Action (in cfs), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Flow Decrease – refers to the largest decrease in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a negative value. Percent decrease shown in parentheses.
4. Maximum Flow Increase – refers to the largest increase in mean monthly flows under the Proposed Action, relative to the Base Condition, computed for that month (over 72 years). Shown as a positive value. Percent increase shown in parentheses.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Higher flows, using the same rationale previously described, would also be applicable for the lower American River. Again, using February 1986 as an example, mean monthly flow during that period was over 30,000 cfs below Nimbus Dam. The daily or hourly instantaneous peaks within that month, however, were significantly higher (approaching 115,000 cfs; the channel design capacity). At these extreme flows, any cultural resources along the river channel that would have normally been above the mean water surface elevation would have been at a severe risk of inundation. Other wet years (such as 1980, 1982, and 1983) also produced high flows, well above the mean monthly averages.

CALSIM II modeling results for Alternatives 2A and 2C – Proposed Action – Scenarios A and C, along with Alternative 3 – Water Transfer Alternative, and Alternative 1A – No Action Alternative revealed similar inconsequential changes in mean monthly simulated flows in the lower American River (see Proposed Action – Scenarios A and C, Water Transfer Alternative, and No Action Alternative, Technical Appendix I, this Draft EIS/EIR). Anticipated changes in lower American River flows under any of Alternatives 4A, 4B or 4C, with markedly reduced diversions, would be less than those of Alternative 2B.

Based on these modeling results and the discussions herein, there would be no anticipated increase in exposure or inundation of cultural resources within the riverine drawdown zone in the lower American River, relative to the Base Condition. Consequently, impacts on cultural resources within the channel confines of the lower American River that could result from changes in maximum and minimum water levels would be less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternative

5.12. LAND USE (SERVICE AREA INDIRECT IMPACTS)

The indirect or service area-related effects are a secondary impact resulting from the *implementation* of the P.L.101-514 water service contract. As defined, the Proposed Action is the execution of the P.L.101-514 water service contract, a new water allocation for El Dorado County. Detailed project-level analyses (including mass balance, reservoir routing modeling), as presented in the preceding subchapters, address the potential direct effects of any hydrological changes of this new CVP water service contract on the CVP/SWP.

For this action, however, no new facilities, improvements to existing infrastructure, or construction activities are proposed. To the extent that construction of certain facilities are required to fully implement the P.L.101-514 contract, appropriate project-level environmental documentation would be prepared by those agencies at such time in the future when those decisions would be made. Any construction related impacts and site specific facility impacts would be the responsibility of those agencies proposing such future projects; they are not part of this EIS/EIR evaluation. Accordingly, for this EIS/EIR, service area-related effects are discussed in limited detail and, only where relevant.

Typical construction-related impacts such as traffic/transportation, noise, air quality, hazardous materials, etc., are given cursory attention in this EIS/EIR as individual resource areas potentially affected by the Proposed Action. Moreover, this EIS/EIR does not attempt to *re-examine* the precise impacts of growth on the environment anticipated to occur as a result of future development. This is because the physical environmental effects of urban development have already been appropriately evaluated in the El Dorado County General Plan and accompanying EIR. Chapter 6.0 (Growth-Inducing Impacts), however, provides a concise discussion of the potential *implications* of this new water contract on approved growth within El Dorado County.

This subchapter addresses potential indirect, service area-related impacts on the existing land uses that could result from the implementation of the new CVP water service contracts authorized under P.L. 101-514. The analysis presented here was conducted at a general, programmatic level, consistent with the framework and rationale described previously in the Overview of Impacts Analysis. Relevant policies from the El Dorado General Plan are presented where appropriate.

The Proposed Action, as defined, does not include construction of any new facilities, and thus there are no direct land use impacts resulting from the action. Any facilities such as specific diversion intakes, pipelines, storage facilities, pumping plants, and water treatment plants, to the extent they are needed in the future will exist as separate and independent projects from this action. Land use impacts from the construction and operation of any future facilities will be examined at a project-specific level in later, more detailed environmental documentation.

This indirect service area-related analysis focuses on the potential effect of this new water allocation to accommodate planned, but new growth within the Subcontractor service areas of EID and GDPUD.

5.12.1. CEQA Standards of Significance

For purposes of this EIS/EIR, land use impacts may be deemed significant if implementation of the Proposed Action or any of the alternatives would:

- Result in land uses that are incompatible with existing land use practices or land use policies as governed by the El Dorado County General and EIR;
- Result in alteration of the region's planned capacity to accommodate projected future population growth;
- Result in a physical change to the environment from changes in employment patterns; or
- Result in substantial conversion of agricultural lands to non-agricultural uses.

5.12.2. Impacts and Mitigation Measures

As noted previously, potential impacts were evaluated at the program level, focusing on the potential for land use pressures within the two proposed Subcontractor service areas. To the extent applicable, a program-level evaluation of potential land use impacts from future facilities is also included. Since the Proposed Action, its various diversion scenarios, and each of the alternatives were developed based on a reasonable range of imposed hydrological variations that could be implemented (as project actions), the potential effects on service area activities, facilities, land uses, and planning initiatives would be identical across all action alternatives. The only variations would be in the diversion allocations between EID and GDPUD, the total quantities and, where applicable, diversion location. All alternatives, except the No Project Alternative, would face similar impact types, levels of intensity, and spatiality. Accordingly, the discussions are equally applicable to all action alternatives, as defined, and are, therefore, made together.

5.12-1 Result in land uses that are incompatible with existing land use practices or land use policies.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or activities within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Under all of the Alternatives as defined, except the Alternative 1B – No Project Alternative, water from the proposed CVP M&I water service contract would be restricted to deliveries within the proposed Subcontractor service areas only. Since these areas are already zoned for residential, commercial, and industrial uses, the delivery of M&I water in these areas would not necessitate any changes to current land-use zoning. Moreover, the new water supplies would be used only to supply areas where residential growth is already anticipated under the current General Plan. In and of itself, the proposed new CVP water service contracts, regardless of allocation and total quantities, will not affect current land uses. All future growth within these areas would occur in a planned manner, consistent with General Plan zoning and in full consideration of land use impacts already evaluated as part of the General Plan Update and associated EIR processes.

General Plan Policy 2.2.5.3 commits the County to evaluate any future rezoning based on the General Plan's general direction as to minimum parcel size or maximum allowable density; and whether changes in conditions support a higher density or intensity zoning district. The specific criteria to be considered include, but are not limited to, the following:

1. Availability of an adequate public water source or an approved Capital Improvement Project to increase service for existing land use demands;
2. Availability and capacity of public treated water system;
3. Availability and capacity of public waste water treatment system;
4. Distance to and capacity of the serving elementary and high school;
5. Response time from nearest fire station handling structure fires;
6. Distance to nearest Community Region or Rural Center;
7. Erosion hazard;
8. Septic and leach field capability;
9. Groundwater capability to support wells;
10. Critical flora and fauna habitat areas;
11. Important timber production areas;
12. Important agricultural areas;
13. Important mineral resource areas;
14. Capacity of the transportation system serving the area;
15. Existing land use pattern;
16. Proximity to perennial water course;
17. Important historical/archeological sites;
18. Seismic hazards and present of active faults; and
19. Consistency with existing Conditions, Covenants, and Restrictions.

El Dorado County has developed a work program that covers calendar year 2007 and fiscal year 2007-08. Below are the items from the Land Use Elements that are anticipated to be included in the work program.

- Review and Update the Zoning Ordinance (Title 17 of the El Dorado County Code) to identify revisions that provide consistency with General Plan land use designations and updated development standards. [Measures LU-A, LU-C, LU-D, LU-O, TC-P].
- Review and identify needed revisions to the County of El Dorado Design and Improvements Standards Manual. [Measure LU-E].
- Design Review Standards and Guidelines (Community and Historic). [Measures LU-F, LU-G].
- Preservation of Community Separation. As outlined in Policy 2.5.1.3. The program shall address provisions for a parcel analysis and parcel consolidation/transfer of development rights. [Measures LU-H].
- Potential Scenic Corridors. Inventory and prepare a Scenic Corridor Ordinance, which should include development standards, provisions for avoidance of ridgeline development, and off-premise sign amortization. This is to be included as part of the Zoning Ordinance Update. [Measure LU-I, LU-J].
- Develop and maintain an inventory of vacant lands within each Community Region and Rural Center. This would include working with community groups to identify appropriate uses for such parcels, including residential development and establishment of communities. Staff is looking into the possibility of linking the issuance of a building permit to an existing database of vacant parcels to maintain a current vacant lands inventory. [Measure LU-K].
- Monitor Development, Population, and Employment Trends. Develop a monitoring program and provide periodic updates to the Board of Supervisors. [Measure LU-L].
- Monitor General Plan Policies, Programs and General Plan Environmental Impact Report Mitigation Measures. Provide periodic updates to the Board of Supervisors and Planning Commission. [Measures LU-M].
- Request for Exemption from General Plan Policies Due To Economic Viability. Develop procedures to be used by applicants. [Measure LU-N].

No impacts on existing or planned land uses are anticipated to result from the Proposed Action and alternatives.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.12-2 Result in alteration of the region's planned capacity to accommodate projected future population growth.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or activities within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

El Dorado County has experienced rapid population growth since the 1970s. The County is projected to grow by an additional 30,000 households over the next 20 years. Future population growth is a reality that the General Plan acknowledges. Growth will continue but the County will attempt to retain the qualities of its natural resource base, both consumptive and environmental, in order to maintain its custom and culture and to assure its long-term economic stability. Moreover, the County General Plan recognizes the ecological and historic values of these lands while saving and conserving valuable lands for future economic benefits for all purposes. The rural character of the County has been called its most important asset. Careful planning and management can maintain this character while accommodating reasonable growth and achieving economic stability.

To ensure that projected housing needs can be accommodated, the County shall maintain an adequate supply of suitable sites that are properly located based on environmental constraints, community facilities, and adequate public services.

The General Plan provides an important requisite for planned growth with the County. The new long-term, firm water supply provided by this action is, however, only a part of the long-term water needs of the County. Based on the El Dorado County Water Agency's recent 2007 Water Resources Development and Management Plan, even without the P.L.101-514 CVP water service contracts, the County will require approximately an additional 34,000 AFA to meet its ultimate projected water supply needs by 2025 and over 100,000 AFA by buildout. The Proposed Action and alternatives would not affect the region's planned capacity.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.12-3 Result in a physical change to the environment from changes in employment patterns.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or activities within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Providing a water supply, regardless of source, location, or quantity, has no causal effect on employment patterns. Employment patterns are dictated by commercial, industrial, administrative and agrarian opportunities within the context of a stable and growing economic framework. Employment is further prompted by the intricate relationship between housing availability, transportation efficiency, reliable and cost effective public services, and a readily qualified employee base. A new reliable water supply, as a public service, is an important element in developing overall community structure, but it cannot influence or be affected by employment patterns.

Under Objective10.1.9 of the El Dorado General Plan Economic Development Element, the County has committed to monitoring the jobs-housing balance and emphasizing employment creation. Moreover, the County shall actively promote job generating land uses while de-emphasizing residential development unless it is tied to a strategy that is necessary to attract job generating land uses. There would be no impact associated with potential changes in employment patterns as a result of the Proposed Action or alternatives.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.12-4 Result in substantial conversion of agricultural lands to non-agricultural uses.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in risk to agricultural land conversions from current conditions.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As previously noted, water from the proposed CVP M&I water service contract would be delivered to the proposed Subcontractor service areas consistent with existing zoning entitlements for residential, commercial, and industrial land uses only. The water cannot be used for agricultural purposes.

El Dorado County is keenly aware of its rural and agricultural past and maintains a monitoring program as part of its planning process. As part of the February 2007, *General Plan Implementation Status Report for Elements of Agriculture and Forestry; Parks and Recreation; and Economic Development*, the following have been identified specific to agricultural practices:

- Measure AF-E: Develop and implement a method to identify and officially recognize rangelands currently used for grazing or suitable for sustained grazing of domestic livestock.

The identification methods of grazing lands are being developed in conjunction with the University of California Cooperative Extension (UCCE) and grazing land owners.

- Measure AF-G: Develop a procedure for the Agricultural Commission to review and provide recommendations regarding discretionary and capital improvement projects that may affect agricultural, grazing and forestry lands. This process has already been established with Development Services forwarding all discretionary and capital improvement projects to the Agricultural Commission for their review, recommendation and findings.
- Measure AF-J: Complete an inventory of agricultural lands in active production and/or lands determined by the Agricultural Commission to be suitable for agricultural production. Following inventory, perform suitability review and amend Agricultural District boundaries. Parcels were analyzed for soil type, slope (<50 percent), elevation (<3000'), parcel size (greater than 20 acres), current land use and their proximity to existing Agricultural District. Identified agricultural or potential agricultural parcels were ground verified using individuals knowledgeable in the specific areas. The final report will be forwarded to the Agricultural Commission for their review and recommendation.
- Measure AF-K: Develop Agricultural Best Management Practices (BMPs) for adoption by the Board of Supervisors and use by agricultural operations in complying with General Plan policies 7.1.2.1, 7.1.2.7, 7.3.3.4, and 7.4.2.2. This has been completed and adopted by the El Dorado Board of Supervisors with approximately 20 Best Management Practices.

The Proposed Action and alternatives would have no impact on agricultural land conversions.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.13. Transportation and Circulation (Service Area Indirect Impacts)

This subchapter addresses potential indirect, service area-related impacts on the existing traffic and circulation conditions that could result from the implementation of the P.L. 101-514 water service contract, and those that could occur under the various alternatives. The analysis presented here was conducted at a programmatic level, consistent with the Overview of Impacts Analysis.

5.13.1. CEQA Standards of Significance

For the purposes of this EIS/EIR, potential traffic and/or circulation impacts may be deemed significant if implementation of the Proposed Action or its alternatives would:

- Result in increased traffic that is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume to capacity ratio on roads, or congestion at intersections);

- Result in the exceedance of the level of service standard established by the county congestion management agency for designated roads or highways;
- Result in additional hazards due to a design feature resulting in inadequate emergency access; or
- Result in conflicts with adopted policies supporting alternative transportation (e.g., bus turnouts, bicycle racks).

5.13.2. Impacts and Mitigation Measures

Transportation and circulation impacts related to the proposed new CVP water service contracts and the water delivered to the EID and GDPUD service areas were evaluated qualitatively by reviewing land use, growth, and transportation/circulation information developed for the 2004 El Dorado County General Plan, relative to the location of the EID and GDPUD Subcontractor service areas.

5.13-1 Result in increased traffic that is substantial in relation to the existing traffic load and capacity of the street system.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated traffic/circulation levels within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The Proposed Action and alternatives include no changes to land uses or transportation and circulation policies in the El Dorado County General Plan.

El Dorado County has numerous policies that consider and address traffic and circulation within the county. Much of this is centered on new development. Coordinated planning and implementation of roadway improvements with new developments are considered essential in order to maintain adequate levels of service on County roadways.

Policy TC-Xa, for example, includes the following provisions:

1. Traffic from residential development projects of five or more units or parcels of land shall not result in, or worsen, Level of Service F (gridlock, stop-and-go) traffic congestion during weekday, peak-hour periods on any highway, road, interchange or intersection in the unincorporated areas of the county.
2. The County shall not add any additional segments of U.S. Highway 50, or any other highways and roads, to the County's list of roads (shown in Table TC-2) that are allowed to operate at Level of Service F without first obtaining the voters' approval.
3. Developer-paid traffic impact fees shall fully pay for building all necessary road capacity improvements to fully offset and mitigate all direct and cumulative traffic impacts from new

development upon any highways, arterial roads and their intersections during weekday, peak-hour periods in unincorporated areas of the county.

4. County tax revenues shall not be used in any way to pay for building road capacity improvements to offset traffic impacts from new development projects.

Before giving approval of any kind to a residential development project of five or more units or parcels of land, the County shall make a finding that the project complies with the policies above. If this finding cannot be made, then the County shall not approve the project in order to protect the public's health and safety as provided by State law to assure that safe and adequate roads and highways are in place as such development occurs.

Various Implementation Measures focus on specific areas within the County. For example, Implementation Measure TC-V(2) states that the County shall implement a mechanism for all new discretionary and ministerial development (which includes approved development that has not yet been built) that would access Latrobe Road or White Rock Road. This mechanism shall be designed to ensure that the 2025 p.m. peak hour volumes on El Dorado Hills Boulevard, Latrobe Road, and White Rock Road do not exceed the minimum acceptable LOS thresholds defined in specific Policies with the circulation diagram improvements assumed in place. As such, the measure should consider a variety of methods that control or limit traffic. The County shall monitor peak hour traffic volumes and LOS beyond 2025 and, if necessary, shall implement growth control mechanisms in any part of the county where the LOS thresholds defined in the General Plan policies listed above cannot be maintained.

The Proposed Action and alternatives would have no impact on traffic and circulation levels, patterns, or long-ranging planning initiatives. The County, through its various General Plan policies and Implementation Measures have adequately evaluated, planned, and incorporated mechanisms to continuously gauge the effects of traffic and circulation levels within the County.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.13-2 Result in the exceedance of the level of service standard established by the county congestion management agency for designated roads or highways.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated traffic/circulation levels within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Increasing traffic congestion is a concern within the County. With ongoing new development and population growth, exceedance in the level of service standards for designated roads and highways is carefully monitored. The County, through its General Plan has acknowledged the importance of ensuring that ongoing planned development in the County does not exceed available road capacities. General Plan Policy TC-Xb, for example, provides that the County shall:

a. Prepare an annual Capital Improvement Program (CIP) specifying roadway improvements to be completed within the next 10 years to ensure compliance with all applicable level of service and other standards in this plan, identifying improvements expected to be required within the next 20 years, and specifying funding sources sufficient to develop the improvements identified in the 10-year plan;

b. Annually monitor traffic volumes on the county's major roadway system depicted in the Circulation Diagram; and

c. Review development proposals to ensure that the development would not generate traffic in excess of that contemplated by the Capital Improvement Program for the next ten years or cause levels of service on any affected roadway segments to fall below levels specified in this plan.

With U.S. Highway 50 serving such a vital function for El Dorado County, proper coordination with other neighboring agencies is important to ensure that this thoroughfare remains efficient. General Plan Policy TC-Xi, for example, acknowledges the need for planned the widening of U.S. Highway 50. Such an effort must be consistent with the policies of this General Plan and shall be a priority of the County. Under this Policy, the County shall coordinate with other affected agencies, such as the City of Folsom, the County of Sacramento, and Sacramento Area Council of Governments (SACOG) to ensure that U.S. Highway 50 capacity enhancing projects are fully and properly coordinated with these agencies with the goal of delivering these projects on a schedule to meet the requirements of the policies of this General Plan.

As shown, El Dorado County has a relatively complex highway and road transportation system, serving cars, heavy trucks, agricultural and commercial vehicles, buses, transit, bicycles, and pedestrian traffic. Coordinating these many forms of transportation is critical to achieving maximum road efficiency and minimizing costly road expansion or construction. Accordingly, the County has adopted a Transportation Systems Management (TSM); where the use of techniques to manage traffic circulation to maximize existing facilities and provide for the effective planning of new facilities is sought.

In general, TSM techniques are intended to provide economical, short-term improvements to increase efficiency and reduce congestion. Techniques include increasing the number of buses and routes, improving transit shelters, improving traffic signals, installing exclusive turn lanes, installing acceleration/deceleration lanes, resurfacing and widening of roads, and adding or improving bike lanes on new or existing roads. TSM measures can also conserve energy and decrease vehicular emissions leading to cleaner air. Finally, TSM is intended to emphasize improved transportation system efficiencies rather than road expansion or construction.

The Proposed Action and alternatives would have no impact on traffic and circulation levels, patterns, and would not result in the exceedance of level of service standards. As discussed, the County, through its various General Plan policies have, and continue to provide, the necessary planning and coordination mechanisms to ensure proper levels of service on roadways within the County.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.13-3 Result in additional hazards due to a design feature resulting in inadequate emergency access.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated traffic/circulation levels within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Roadway hazards often result from improper design features or from the interim, although significant disruptions stemming from construction-related projects. The County recognizes the importance of operational safety. As part of the General Plan Implementation Program, the County is committed to preparing and adopting a priority list of road and highway improvements for the CIP on a horizon of five years. The Board of Supervisors shall update the CIP every two years, or more frequently as recommended by the responsible departments. The CIP shall prioritize capital maintenance and rehabilitation, reconstruction, capacity, and operational and safety improvements.

The Proposed Action and alternatives would have no impact on traffic and circulation levels, patterns, and would not result in increase hazards or affect, in any way, existing emergency access. As discussed, the County, through its various General Plan policies have, and continue to provide, the necessary planning and coordination mechanisms to ensure proper levels of safety and emergency access on roadways within the County.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.13-4 Result in conflicts with adopted policies supporting alternative transportation.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated traffic/circulation levels within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Alternative transportation is recognized and promoted in El Dorado County. General Plan Goal TC-2, for example, is stated as follows:

> "To promote a safe and efficient transit system that provides service to all residents, including senior citizens, youths, the disabled, and those without access to automobiles that also helps to reduce congestion, and improves the environment."

In fact, the County is committed to promoting transit services where population and employment densities are sufficient to support those services, particularly within the western portion of the County and along existing transit corridors in the rural areas. Additionally, the County shall implement a system of recreational, commuter, and inter-community bicycle routes in accordance with the County's *Bikeway Master Plan*. The plan is intended to designate bikeways connecting residential areas to retail, entertainment, and employment centers and near major traffic generators such as recreational areas, parks of regional significance, schools, and other major public facilities, and along recreational routes.

Finally, the County is committed, through General Plan Goal TC-5, to provide safe, continuous, and accessible sidewalks and pedestrian facilities as a viable alternative transportation mode. The policies under this Goal address the requirement for pedestrian sidewalks and curbs.

The Proposed Action and alternatives have no impact on traffic and circulation levels, patterns, and would not result in any impairment to alternative transportation modes. As noted above, the County, through its various General Plan goals and policies have, and continue to address, the need for alternative transportation as an integral part of the County's overall transportation framework.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.14. AIR QUALITY (SERVICE AREA INDIRECT IMPACTS)

This subchapter addresses the potential indirect service area-related impacts on the existing air quality conditions that could result from the implementation of the P.L.101-514 water service contract. The analysis presented herein was conducted at a programmatic level.

5.14.1. CEQA Standards of Significance

Air quality impacts may be deemed significant if implementation of the Proposed Action would:

- conflict with or obstruct implementation of the applicable air quality plan;
- Result in a cumulatively-considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors);
- violate any air quality standard or contribute substantially to an existing or projected air quality violation; and
- substantially increase exposure of sensitive receptors to toxic air pollutants, or expose people to substantial levels of hazardous substance air emissions or create objectionable odors affecting a substantial number of people.

Appendix G of the CEQA Guidelines states that where available, the significance criteria established by the applicable Air Quality Management District (AQMD) or APCD may be relied upon to make a determination of significance using the standards listed above. The following thresholds have been established by the El Dorado County Air Quality Management District (EDCAQMD) for determining the significance of construction and operational emissions: 82 pounds per day for NO_x and 82 pounds per day for Reactive Organic Gas (ROG).[211]

The EDCAQMD evaluates operational PM_{10} emissions on the likelihood such emissions would cause or contribute significantly to a violation of the applicable State or national ambient air quality standards.

5.14.2. Impacts and Mitigation Measures

Air quality impacts in the EID and GDPUD service areas resulting from the Proposed Action were evaluated qualitatively by reviewing the El Dorado County General Plan, goals, policies, and associated planning documents, relative to their relevance to the EID and GDPUD Subcontractor service areas.

211 El Dorado County APCD, Guide to Air Quality Assessment, Draft, January 2002.

5.14-1 Conflict with or obstruct implementation of the applicable air quality plan.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated activities that could affect air quality within the service areas of either EID or GDPUD as defined by this action. There would be no impact**.**

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The El Dorado County General Plan identifies within its Public Health, Safety and Noise Element, Goal 6.7: Air Quality Maintenance. This co-equal goal states:

A. Strive to achieve and maintain ambient air quality standards established by the U.S. Environmental Protection Agency and the California Air Resources Board.

B. Minimize public exposure to toxic or hazardous air pollutants and air pollutants that create unpleasant odors.

Objective 6.7.1, the El Dorado County Clean Air Plan, specifically provides the mandate to:

A. Adopt and enforce the El Dorado County Clean Air Act Plan in conjunction with the County Air Quality Management District.

Nothing associated with the Proposed Action and alternatives would conflict with or otherwise be inconsistent with the existing guidance, directives, and air quality planning documents relied upon by the County. A new water supply contract, providing the capability to meet and support existing General Plan growth objectives, is not, in itself, inconsistent with these planning documents. El Dorado County, through its General Plan (and specific Goals, Objectives, and Policies of its Public Health, Safety and Noise Element) provide ample consideration and protection of ambient air quality. This would be a less-than-significant impact.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.14-2 Result in a cumulatively-considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or State ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors).

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated activities that could affect air quality within the service areas of either EID or GDPUD as defined by this action. There would be no impact**.**

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Similar to Impact 5.14-1, the County's Clean Air Plan, implemented in cooperation with the County Air Quality Management District ensures that criteria pollutants and State ambient air quality standards are monitored and continuously addressed. For any new project-specific applications, County policies governing hazardous materials assessment, construction activities, and land uses that may affect air quality provide the necessary guidance and assurances that air quality standards are met. El Dorado County, through its General Plan (and specific Goals, Objectives, and Policies of its Public Health, Safety and Noise Element) provide ample consideration and protection of ambient air quality. This would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.14-3 Violate any air quality standard or contribute substantially to an existing or projected air quality violation.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated activities that could affect air quality within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Similar to Impact 5.14-1 and 5.14-2, the County's Clean Air Plan, implemented in cooperation with the County Air Quality Management District ensures that criteria pollutants and State ambient air quality standards are monitored and continuously addressed. For any new project-specific applications, County policies governing hazardous materials assessment, construction activities, and land uses that may affect air quality provide the necessary guidance and assurances that air quality standards are met. El Dorado County, through its General Plan (and specific Goals, Objectives, and Policies of its Public Health, Safety and Noise Element) provide ample consideration and protection of ambient air quality. This would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.14-4 Substantially increase exposure of sensitive receptors to toxic air pollutants, or expose people to substantial levels of hazardous substance air emissions or create objectionable odors affecting a substantial number of people.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated activities that could affect air quality within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Sensitive receptors are located throughout the Subcontractor service areas of both EID and GDPUD. At this time, the specific locations and details of any potential new facilities that would be required to divert, convey, treat, and distribute the P.L.101-514 contract water are not generally known for GDPUD. Much depends on pending infrastructure sharing agreements between GDPUD and PCWA. EID on the other hand, with its more developed infrastructure, has fewer uncertainties. It is possible that new facilities could be located near sensitive receptors. The construction of these facilities would generate construction-related dust and vehicle emissions, which could be experienced by sensitive receptors. However, any impacts related to on-site construction-related air emissions, including emissions from additional construction vehicular traffic would be temporary and would not continue once construction was completed. Moreover, any construction activities would be bound by existing County policies and ordinances governing air quality concerns and would be addressed in project specific environmental documentation.

Objective 6.7.6: AIR POLLUTION-SENSITIVE LAND USES of the Public Health, Safety and Noise Element of the General Plan indicates that it is the intent of the County to:

> Separate air pollution sensitive land uses from significant sources of air pollution.

Two policies under this objective are relevant. They are:

> <u>Policies</u>
>
> 6.7.6.1. Ensure that new facilities in which sensitive receptors are located (e.g., schools, child care centers, playgrounds, retirement homes, and hospitals) are sited away from significant sources of air pollution.
>
> 6.7.6.2. New facilities in which sensitive receptors are located (e.g. residential subdivisions, schools, childcare centers, playgrounds, retirement homes and hospitals) shall be sited away from significant sources of air pollution.

Objective 6.7.7: Construction Related, Short-Term Emissions, of the Public Health, Safety and Noise Element of the General Plan indicates that it is the intent of the County to:

> Reduce construction related, short-term emissions by adopting regulations which minimize their adverse effects.
>
> Policy
>
> 6.7.7.1, in fact, provides the following:
>
> The County shall consider air quality when planning the land uses and transportation systems to accommodate expected growth, and shall use the recommendations in the most recent version of the El Dorado County Air Quality Management (AQMD) *Guide to Air Quality Assessment: Determining Significance of Air Quality Impacts Under the California Environmental Quality Act*, to analyze potential air quality impacts (e.g., short-term construction, long-term operations, toxic and odor-related emissions) and to require feasible mitigation requirements for such impacts. The County shall also consider any new information or technology that becomes available prior to periodic updates of the Guide. The County shall encourage actions (e.g., use of light-colored roofs and retention of trees) to help mitigate heat island effects on air quality.

Nothing associated with the Proposed Project and alternatives would conflict with or otherwise be inconsistent with the existing guidance, directives, and air quality planning documents relied upon by the County. A new water supply contract, providing the capability to meet and support existing General Plan growth objectives, is not, in itself, inconsistent with these planning documents. El Dorado County, through its General Plan (and specific Goals, Objectives, and Policies of its Public Health, Safety and Noise Element) provide ample consideration and protection of ambient air quality. This would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.15. NOISE (SERVICE AREA INDIRECT IMPACTS)

This subchapter addresses the potential indirect service area-related impacts on the existing noise environment that could result from the implementation of the P.L.101-514 water service contract. Mitigation measures are presented where appropriate.

Neither the Proposed Action or alternatives include construction of any new facilities, and thus there are no direct noise impacts resulting from the Proposed Action. Any facilities such as specific diversion intakes, pipelines, storage facilities, pumping plants, and water treatment plants, to the extent they are needed in the future, will exist as separate and independent projects from this action. Noise impacts from the construction and operation of any future facilities will be examined at a project-specific level in later, more detailed environmental documentation.

5.15.1. CEQA Standards of Significance

The significance of noise impacts may be determined by comparison of overall noise levels (including contributions from the Proposed Action) to applicable federal, State, or local standards and by the expected change in ambient noise levels that would occur as a result of the project. An increase of at least 3 dB is usually required before most people will perceive a change in noise levels, and an increase of 5 dB is required before the change will be clearly noticeable.

5.15.2. Impacts and Mitigation Measures

Noise impacts related to the project in the EID and GDPUD service areas resulting from the Proposed Action were evaluated qualitatively by reviewing land use and growth information developed for the El Dorado County General Plan, relative to the location of the EID and GDPUD Subcontractor service areas.

5.15-1 Substantially increase exposure of sensitive receptors to noise levels above established federal, State or local standards.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated activities that could affect noise sources (temporary or permanent), stationary and mobile sources, and their effects on sensitive receptors, within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Growth resulting indirectly from the implementation of the new CVP water service contract would add sensitive receptors to the EID and GDPUD service areas, primarily in the form of new residences. Consistent with General Plan zoning and growth expectations, this new development is not unanticipated. Potential impacts from construction-related noise and increases in noise from construction-related vehicular traffic associated with new development would, however, be temporary. By design, an indirect result of the Proposed Action would be the accommodation of new residents within the EID and GDPUD service areas. With an increased population, all of the typical day-to-day activities (e.g., school travel, work commute, home maintenance, errands, etc.) associated with urban/rural life would increase the overall magnitude of ambient noise levels within these areas.

The County has adopted a comprehensive suite of policies and provisions governing noise control and abatement in keeping with these expected increases in population. Goal 6.5: Acceptable Noise Levels, as identified in the Public Health, Safety and Noise Element of the General Plan states that it is the goal of the County to:

> Ensure that County residents are not subjected to noise beyond acceptable levels.

Objective 6.5.1: Protection of Noise-Sensitive Development in the Public Health, Safety and Noise Element of the General Plan additionally provides that it is an objective of the County to:

> Protect existing noise-sensitive developments (e.g., hospitals, schools, churches and residential) from new uses that would generate noise levels incompatible with those uses and, conversely, discourage noise-sensitive uses from locating near sources of high noise levels.

To provide a comprehensive approach to noise control, the County has adopted three key provisions that integrate other planning/approval mechanisms and processes. These include:

A. Develop and employ procedures to ensure that noise mitigation measures required pursuant to an acoustical analysis are implemented in the project review process and, as may be determined necessary, through the building permit process.

B. Develop and employ procedures to monitor compliance with the standards of the Noise Element after completion of projects where noise mitigation measures were required.

C. The zoning ordinance shall be amended to provide that noise standards will be applied to ministerial projects with the exception of single-family residential building permits if not in areas governed by the Airports Comprehensive Land Use Plans.

Various policies under the Noise Element are particularly applicable to long-term noise identification, abatement, and management. Acoustical analyses are required as part of the approval process for noise-sensitive land uses, noise mitigation measures shall be placed upon site planning and design, and assurances made that noise barriers are not incompatible with the surroundings. Setbacks shall be the preferred method of noise abatement for residential projects located along U.S. Highway 50 with noise walls discouraged within the foreground viewshed of U.S. Highway 50 and shall be discouraged in favor of less intrusive noise mitigation (e.g., landscaped berms, setbacks) along other high volume roadways.

New noise-sensitive uses shall not be allowed where the noise level, due to non-transportation noise sources, exceed established noise level standards. Furthermore, new development of noise sensitive land uses will not be permitted in areas exposed to existing or projected levels of noise from transportation noise sources which exceed established noise levels unless the project design includes effective mitigation measures to reduce exterior noise and noise levels in interior spaces.

A program-level analysis of the Proposed Action and alternatives confirm that, with proper implementation of the numerous goals, objectives, policies and implementation measures provided for the El Dorado County General Plan, Public Health, Safety and Noise Element, no significant noise impacts would result as an indirect consequence of executing the P.L.101-514 contract. Subsequent project-level analyses for any future projects would include a more detailed analysis based on project-specific details and design features. Appropriate mitigation measures would be identified and implemented, as necessary, at that time.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.16. GEOLOGY, SOILS, MINERAL RESOURCES, AND PALEONTOLOGICAL RESOURCES (SERVICE AREA INDIRECT IMPACTS)

This subchapter addresses potential indirect, service area-related impacts on the existing geologic, seismic, mineral resources, soils, and paleontological conditions that could result from the implementation of the P.L. 101-514 water service contract. Potential impacts within the EID and GDPUD Subcontractor service areas that could result indirectly from the Proposed Action were evaluated qualitatively by reviewing geologic and land use information developed for the El Dorado County General Plan and its associated documents.

The Proposed Action and alternatives do not propose the construction of any new facilities. Accordingly, there are no direct impacts on geology, soils, or mineral or paleontological resources resulting from this action. Subsurface geology, surficial overburden and arable soils will not be affected. The construction and operation of any facilities such as specific diversion intakes, pipelines, storage facilities, pumping plants, and water treatment plants, to the extent they are required in the future, will be separate projects proceeding independently from this current action.

Consequently, this indirect service area-related analysis focuses on the potential effect of this new water allocation on accommodating planned, but new growth within the Subcontractor service areas of EID and GDPUD.

5.16.1. CEQA Standards of Significance

A significant impact on geologic, soil, or mineral or paleontological resources would occur if the implementation of the Proposed Action would:

- expose people or structures to major geologic hazards, such as rupture of a known earthquake fault, as defined on the most recent Alquist-Priolo Earthquake Fault Zoning Act Map, seismic ground shaking, liquefaction, slope failure, or landslides;
- place structures on soils that are likely to collapse or subside, or be located on expansive soils (defined in Table 18-01-B of the Uniform Building Code) that could damage foundations or structures;
- substantially increase erosion or loss of topsoil due to site disturbance;
- result in the loss of availability of a known mineral resource that would be of value to the region and residents of the State, or result in the loss of availability of a locally important mineral resource recovery site delineated in the El Dorado General Plan; or

- directly or indirectly destroy a unique paleontological resources or site or unique geologic feature.

5.16.2. Impacts and Mitigation Measures

Potential indirect impacts on geologic, soils, and mineral and paleontological resources within the EID and GDPUD Subcontractor service areas that could occur as a result of the implementation of P.L.101-514 water service contract were qualitatively evaluated based on various land use, growth, and planning information developed for the El Dorado County General Plan.

5.16-1 Expose people or structures to major geologic hazards, such as rupture of a known earthquake fault, as defined on the most recent Alquist-Priolo Earthquake Fault Zoning Act Map, seismic ground shaking, liquefaction, slope failure, or landslides.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed or would occur. Consequently, there would be no change in land uses, no physical disturbance of any kind, or associated activities that could affect geological or pedologic (soils) or paleontological resources within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As noted previously, while the distribution of known faults is concentrated in the western portion of the county, there are no active fault-rupture hazard zones within the proposed GDPUD and EID Subcontractor service areas. Moreover, it is acknowledged that El Dorado County has a low to moderate potential for strong seismic ground shaking and no portion of El Dorado County is located in a Seismic Hazard Zone (regulatory zones that encompass areas prone to liquefaction and earthquake-induced landslides) based on the Seismic Hazards Mapping Program administered by CGS.

Under its current General Plan, the County has committed to keeping up-to-date on geologic, seismic, and other hazards. Policy 6.3.2.1 of the Public Health, Safety and Noise Element states that:

> The County shall maintain updated geologic, seismic and avalanche hazard maps, and other hazard inventory information in cooperation with the State Office of Emergency Services, California Department of Conservation--Division of Mines and Geology, U.S. Forest Service, Caltrans, Tahoe Regional Planning Agency, and other agencies as this information is made available. This information shall be incorporated into the El Dorado County Operational Area Multi-Hazard Functional Emergency Operations Plans.

Furthermore, implementation measures such as the following provide operational commitments to enact processes to maintain the most up-to-date informational database to support all planning efforts within the County having regard to geological, seismic, and other geological hazards.

General Plan Implementation Measure HS-C requires the County to develop a program to collect, maintain, and update geological, seismic, avalanche, and other geological hazard information. [Policy 6.3.2.1]. Measure HS-D requires development and adoption of standards to protect against seismic and geologic hazards. [Objective 6.3.1].

The Proposed Action and alternatives would have no direct impact on increasing the risks associated with geologic and seismic hazards or catastrophic mass wasting events. El Dorado County has numerous safeguards already in place to help identify, plan and protect persons from these hazards. This would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.16-2 Place structures on soils that are likely to collapse or subside, or be located on expansive soils (defined in Table 18-01-B of the Uniform Building Code) that could damage foundations or structures.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated activities that could increase structural risks due to geologic and soil instability within the service areas of either EID or GDPUD as defined by this action. There would be no impact*.*

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The County's objective for building and site standards state that it is their intent to: Adopt and enforce development regulations, including building and site standards, to protect against seismic and geologic hazards.

Specifically, Policy 6.3.2.5 of the Public Health, Safety and Noise Element states that:

> Applications for development of habitable structures shall be reviewed for potential hazards associated with steep or unstable slopes, areas susceptible to high erosion, and avalanche risk. Geotechnical studies shall be required when development may be subject to geological hazards. If hazards are identified, applicants shall be required to mitigate or avoid identified hazards as a condition of approval. If no mitigation is feasible, the project will not be approved.

The Proposed Action and alternatives would have no direct impact on increasing the risks associated new structure development on unstable soils and subsurface geology. El Dorado County, through its General Plan, has numerous safeguards already in place to help identify, plan and protect persons from these hazards. This would be a less-than-significant impact.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.16-3 Substantially increase erosion or loss of topsoil due to site disturbance.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated activities that could increase soil erosion or sedimentation within the service areas of either EID or GDPUD as defined by this action. There would be no impact***.***

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The Agriculture and Forestry Element of the General Plan acknowledges that agricultural land conservation is a top priority in the County. Goal 8.1 is for the: Long-term conservation and use of existing and potential agricultural lands within the County and limiting the intrusion of incompatible uses into agricultural lands.

The Conservation and Open Space Element includes Objective 7.1.2 (Erosion and Sedimentation) which identifies the mandate to: minimize soil erosion and sedimentation. Various policies exist to meet that objective. As an example, Policy 7.1.2.1 states that development or disturbance shall be prohibited on slopes exceeding 30 percent unless necessary for access. Other relevant policies include the following:

<u>Policies</u>

7.1.2.2. Discretionary and ministerial projects that require earthwork and grading, including cut and fill for roads, shall be required to minimize erosion and sedimentation, conform to natural contours, maintain natural drainage patterns, minimize impervious surfaces, and maximize the retention of natural vegetation. Specific standards for minimizing erosion and sedimentation shall be incorporated into the Zoning Ordinance.

7.1.2.3. Enforce Grading Ordinance provisions for erosion control on all development projects and adopt provisions for ongoing, applicant-funded monitoring of project grading.

7.1.2.4. Cooperate with and encourage the activities of the three Resource Conservation Districts in identifying critical soil erosion problems and pursuing funding sources to resolve such problems.

7.1.2.5. The Department of Transportation, in conjunction with the Resource Conservation Districts and Soil Conservation District, shall develop a road-side maintenance program to manage roads in a manner that maintains drainage and protects surface waters while reducing road-side weed problems.

7.1.2.6. The County shall encourage the Soil Conservation Service to update the 1974 Soil Survey and to digitize all soils mapping units on the Geographic Information System (GIS).

7.1.2.7. The County shall require agricultural grading activities that convert one acre or more of undisturbed vegetation to agricultural cropland to obtain an agricultural permit through the Agricultural Commissioner's office which may require approval of the Agricultural Commission. All erosion control measures included in the agricultural permit would be implemented. All agricultural practices, including fuel reduction and fire protection, that do not change the natural contour of the land and that use "best management practices" as recommended by the County Agricultural Commission and adopted by the Board of Supervisors shall be exempt from this policy.

The Proposed Action and alternatives would have no direct impact on increasing the risks of soil erosion and sedimentation. As noted, El Dorado County, through its General Plan, has numerous safeguards already in place to help identify, avoid, or otherwise mitigate for soil erosion and sedimentation risks. This would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.16-4 Result in the loss of availability of a known mineral resource that would be of value to the region and residents of the State, or result in the loss of availability of a locally important mineral resource recovery site delineated in the El Dorado General Plan.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated activities that could affect mineral resources within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The El Dorado County General Plan recognizes the importance of in-county mineral resources. Goal 7.2, Mineral Resources, states that a goal of the County is for the conservation of the County's significant mineral resources. In accordance with California Code of Regulations, Sections 3675-3676, the County shall maintain all Mineral Land Classification reports produced by the State Department of Conservation, California Geological Survey, which pertain to El Dorado County. El Dorado County hereby recognizes, accepts, and adopts by reference those State Classification Reports as they currently exist and as may be amended, or supplemented, in the future.

Areas designated as Mineral Resource (-MR) overlay on the General Plan Land Use Map shall be identified by the -MR combining zone district on the zoning maps when the likely extraction of the resource through surface mining methods will be compatible with adjacent land uses. The County shall also request the State Department of Conservation to conduct a County-wide study to assess the location and value of non-metallic mineral materials. Once completed, the County may recognize them in the General Plan and zone them and the surroundings to allow for mineral resource management.

The County also recognizes the importance in protecting mineral resources from development. Policy 7.2.2.1 provides that:

> The minimum parcel size within, or adjacent to, areas subject to the -MR overlay shall be twenty (20) acres unless the applicant can demonstrate to the approving authority that there are no economically significant mineral deposits on or adjacent to the project site and that the proposed project will have no adverse effect on existing or potential mining operations. The minimum parcel size adjacent to active mining operations which are outside of the -MR overlay shall also be twenty (20) acres.

The Proposed Action and alternatives would have no direct impact on the mineral resources of the County. As noted above, El Dorado County, through its General Plan, utilizes numerous safeguards to help identify, avoid, or otherwise mitigate any potential adverse effects on mineral resources. This would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.16-5 Directly or indirectly destroy a unique paleontological resources or site or unique geologic feature.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land uses or associated activities that could affect mineral resources within the service areas of either EID or GDPUD as defined by this action. There would be no impact**.**

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The Conservation and Open Space Element of the El Dorado County General Plan identifies the preservation of cultural resources, including paleontological resources, as an important responsibility. As described in Impact 5.19-1, there are several relevant policies addressing preservation of the County's cultural resources, in general, and are not repeated here. However, more specifically for paleontological resources, relevant policies include:

Policies

7.5.1.1. The County shall establish a Cultural Resources Ordinance. This ordinance shall provide a broad regulatory framework for the mitigation of impacts on cultural resources (including historic, prehistoric and paleontological resources) by discretionary projects. This Ordinance should include (but not be limited to) and provide for the following:

B. A 100-foot development setback in sensitive areas as a study threshold when deemed appropriate.

C. Identification of appropriate buffers, given the nature of the resources within which ground-disturbing activities should be limited.

D. A definition of cultural resources that is significant to the County. This definition shall conform to (but not necessarily be limited to) the significance criteria used for the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR) and Society of Vertebrate Paleontology.

7.5.1.3. Cultural resource studies (historic, prehistoric, and paleontological resources) shall be conducted prior to approval of discretionary projects. Studies may include, but are not limited to, record searches through the North Central Information Center at California State University, Sacramento, the Museum of Paleontology, University of California, Berkeley, field surveys, subsurface testing, and/or salvage excavations. The avoidance and protection of sites shall be encouraged.

7.5.1.4. Promote the registration of historic districts, sites, buildings, structures, and objects in the National Register of Historic Places and inclusion in the California State Office of Historic Preservation's California Points of Historic Interest and California Inventory of Historic Resources.

7.5.1.5. A Cultural Resources Preservation Commission shall be formed to aid in the protection and preservation of the County's important cultural resources. The Commission's duties shall include, but are not limited to:

A. Assisting in the formulation of policies for the identification, treatment, and protection of cultural resources (including historic cemeteries) and the curation of any artifacts collected during field collection/excavation.

C. Reviewing all projects with identified cultural resources and making recommendations on appropriate forms of protection and mitigation.

7.5.1.6. The County shall treat any significant cultural resources (i.e., those determined California Register of Historical Resources/National Register of Historic Places eligible and unique paleontological resources), documented as a result of a conformity review for ministerial development, in accordance with CEQA standards.

As an indirect impact, El Dorado County, through its various policies and implementation measures identified in its Conservation and Open Space Element relevant to paleontological resources, there is guidance to help identify, avoid, or otherwise mitigate any potential future planned activities on these resources. The completion of the Cultural Resources Ordinance is intended to integrate all of these protective provisions into one overall guidance document. With the adherence to these policies within the context of the El Dorado County General Plan, the Proposed Action and alternatives would have no indirect impact on significant unique paleontological resources or unique geologic features within the County. Accordingly, with these measures in place, this would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives.

5.17. RECREATION (SERVICE AREA INDIRECT IMPACTS)

This subchapter addresses the potential indirect service area-related impacts on existing recreational uses in the project vicinity that could result from the implementation of the P.L.101-514 water service contract at a programmatic level.

5.17.1. CEQA Standards of Significance

For the purposes of this EIS/EIR, terrestrial recreation-related impacts may be deemed significant if implementation of the Proposed Action or Alternative would:

- result in permanent closure of recreation trails through the project area or result in a substantial increase in exposure to hazards for recreationists, for land-based activities due to project construction or operation; or
- increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

5.17.2. Impacts and Mitigation Measures

5.17-1 Result in permanent closure of recreation trails through the project area or result in a substantial increase in exposure to hazards for recreationists, for land-based activities due to project construction or operation.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in recreational trail use or the level of safety afforded existing recreationists within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Objective 9.1.2: County Trails of the Parks and Recreation Element of the El Dorado County General Plan states that the County will provide for a County-wide, non-motorized, multi-purpose trail system and trail linkages to existing and proposed local, State, and Federal trail systems. The County will, additionally, actively seek to establish trail linkages between schools, parks, residential, commercial, and industrial uses and to coordinate this non-motorized system with the vehicular circulation system. The County's vigilance in ensuring continued operation and maintenance of its recreational trails is provided in Measure PR-A which commits the County to prepare and implement a Parks Master Plan and Parks and Recreation Capital Improvement Program, focusing on, in relevant part: development of sufficient park and recreation land to serve the residents for neighborhood, community, and regional parkland.

Policy TC-4a of the Parks and Recreation Element provide that the County shall implement a system of recreational, commuter, and inter-community bicycle routes in accordance with the County's *Bikeway Master Plan*. The plan should designate bikeways connecting residential areas to retail, entertainment, and employment centers and near major traffic generators such as recreational areas, parks of regional significance, schools, and other major public facilities, and along recreational routes. Additionally, Policy TC-4i provides that, within Community Regions and Rural Centers, all development shall include pedestrian/bike paths connecting to adjacent development and to schools, parks, commercial areas and other facilities where feasible. In Rural Regions, pedestrian/bike paths shall be considered as appropriate.

In terms of safety considerations, the Parks and Recreation Element, Policy TC-4h states that, where hiking and equestrian trails abut public roads, they should be separated from the travel lanes whenever possible by curbs and barriers (such as fences or rails), landscape buffering, and spatial distance. Existing public corridors such as power transmission line easements, railroad rights-of-way, irrigation district easements, and roads should be put to multiple-use for trails, where possible.

California State Parks is collaborating with the Reclamation to prepare a joint General Plan/Resource Management Plan for the Auburn State Recreation Area (SRA). California State Parks manages Auburn SRA through a contract with Reclamation. Auburn SRA is comprised of forty miles of river canyon along the North and Middle Forks of the American River.

The General Plan/Resource Management Plan will define a long term vision for the park unit, will provide guidelines for the protection and management of natural and cultural resources, will determine the use and management of the many recreation activities which occur in the SRA and will identify any additional facility improvements. An Environmental Impact Report/Environmental Impact Statement will be prepared as part of this project.

The GP/RMP is a programmatic document that will outline broad goals and guidelines for management of Auburn SRA and will provide the basis for developing future focused management plans, specific project plans, and other proposals which implement the GP/RMP goals. However, the GP/RMP will not define detailed methods, plans or designs for fulfilling these goals

The Proposed Action and alternatives would have no direct impact on recreational trails, their use, or impart any increased risk to recreationists within the County. As noted, El Dorado County, through its Parks and Recreation Element of the General Plan, provide guidance to help identify, avoid, or otherwise mitigate the potential impacts of planned activities on these resources and activities. This, therefore, would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.17-2 Result in an increase in the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in recreational or park use within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The County, through its Parks and Recreation Element of its General Plan recognize its commitment to providing an adequate level of recreational parklands. Goal 9.1: Parks and Recreation Facilities state that it is the goal of the County to: provide adequate recreation opportunities and facilities including developed regional and community parks, trails, and resource-based recreation areas for the health and welfare of all residents and visitors of El Dorado County. In fact, the County shall assume primary responsibility for the acquisition and development of regional parks and assist in the acquisition and development of neighborhood and community parks to serve County residents and visitors. Proper oversight and planning will ensure that park usage is not exceeded concomitant with anticipated and approved growth. This principal has been firmly established in the El Dorado County General Plan, Parks and Recreation Element. Several policies are relevant in this context and include the following:

Policies

9.1.1.2. Neighborhood parks shall be primarily focused on serving walk-to or bike-to recreation needs. When possible, neighborhood parks should be adjacent to schools. Neighborhood parks are generally 2 to 10 acres in size and may include a playground, tot lot, turf areas, and picnic facilities.

9.1.1.3. Community parks and recreation facilities shall provide a focal point and gathering place for the larger community. Community parks are generally 10 to 44 acres in size, are for use by all sectors and age groups, and may include multi-purpose fields, ball fields, group picnic areas, playground, tot lot, multi-purpose hardcourts, swimming pool, tennis courts, and a community center.

9.1.1.4. Regional parks and recreation facilities shall incorporate natural resources such as lakes and creeks and serve a region involving more than one community. Regional parks generally range in size from 30 to 10,000 acres with the preferred size being several hundred acres. Facilities may include multi-purpose fields, ball fields, group picnic areas, playgrounds, swimming facilities, amphitheaters, tennis courts, multi-purpose hardcourts, shooting sports facilities, concessionaire facilities, trails, nature interpretive centers, campgrounds, natural or historic points of interest, and community multi-purpose centers.

The Proposed Project and alternatives would have no direct impact on recreational parks. The El Dorado County General Plan, through its Parks and Recreation Element, provide guidance to help identify, avoid, or otherwise mitigate the potential impacts of increased pressures placed on existing park/recreational facilities. This would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.18. VISUAL RESOURCES (SERVICE AREA INDIRECT IMPACTS)

This subchapter addresses the potential indirect service area-related impacts on existing visual and aesthetic resources within the project vicinity that could result from the implementation of the P.L.101-514 water service contract at a programmatic level. Potential impacts on aesthetics were evaluated qualitatively by reviewing visual resource information developed for the El Dorado County General Plan.

5.18.1. CEQA Standards of Significance

Any assessment of visual resources tends to be qualitative rather than quantitative. Aesthetics and visual resources are subjective in nature; what one person may identify as a visually-pleasing resource others may consider unattractive. Certain standards have been developed against which a project's effect on visual resources can be measured. These standards have been developed based on local general plan objectives and policies, CDPR guidelines, and the CEQA Guidelines Environmental Checklist (CEQA Appendix G). Therefore, for purposes of this EIS/EIR, impacts on visual resources may be deemed significant if implementation of the Proposed Action or its alternatives would:

- have a substantial adverse effect on a scenic vista or substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a State scenic highway;
- substantially degrade the existing visual character or quality of the site and its surroundings or create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area.

5.18.2. Impacts and Mitigation Measures

5.18-1 Result in a substantial adverse effect on a scenic vista or substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a State scenic highway.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in aesthetics or scenic vistas within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The Land Use Element of the El Dorado County General Plan recognizes the importance of visual integrity and maintenance of aesthetics within the County. Protection and improvement of scenic values along designated scenic road corridors is the stated purpose of Goal 2.6: Corridor Viewsheds. The identification of scenic and historical roads and corridors is provided through several policies within the Land Use Element. According to Policy 2.6.1.1, A Scenic Corridor Ordinance shall be prepared and adopted for the purpose of establishing standards for the protection of identified scenic local roads and State highways. The ordinance shall incorporate standards that address at a minimum the following:

- Mapped inventory of sensitive views and viewsheds within the entire County;
- Criteria for designation of scenic corridors;
- State Scenic Highway criteria;
- Limitations on incompatible land uses;
- Design guidelines for project site review, with the exception of single family residential and agricultural uses;
- Identification of foreground and background;
- Long distance viewsheds within the built environment;
- Placement of public utility distribution and transmission facilities and wireless communication structures;
- A program for visual resource management for various landscape types, including guidelines for and restrictions on ridgeline development;
- Residential setbacks established at the 60 CNEL noise contour line along State highways, the local County scenic roads, and along the roads within the Gold Rush Parkway and Action Program;
- Restrict sound walls within the foreground area of a scenic corridor; and
- Grading and earthmoving standards for the foreground area.

Until such time as the Scenic Corridor Ordinance is adopted, the County shall review all projects within designated State Scenic Highway corridors for compliance with State criteria.

The Proposed Action and alternatives would have no direct impact on visual acuity, aesthetics, or any scenic vista within the County. As noted, El Dorado County, through its Land Use Element of the General Plan, have policies and implementation measures in place to help identify, avoid, or otherwise mitigate planned activities that may impart adverse effects on visual resources. This would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.18-2 Result in a substantial degradation to the existing visual character or quality of the site and its surroundings or create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in aesthetics or new sources of substantial light or glare within the service areas of either EID or GDPUD as defined by this action. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As noted previously for Impact 5.9-1, the Land Use Element of the El Dorado County General Plan contain provisions addressing the protection of visual resources including scenic vistas and other aesthetic values along scenic, historic roadway corridors. The County is committed to maintaining the characteristic natural landscape features unique to each area within the County (Goal 2.3: Natural Landscape Features). This is combined with an effort to provide for the retention of distinct topographical features and conservation of the native vegetation of the County (see Objective 2.3.1: Topography and Native Vegetation).

Significant effort is placed on the visual and physical separation of existing communities from new development. Various policies are in place that addresses these concerns. These include:

Policies

2.5.1.1. Low intensity land uses shall be incorporated into new development projects to provide for the physical and visual separation of communities. Low intensity land uses may include any one or a combination of the following: parks and natural open space areas, special setbacks, parkways, landscaped roadway buffers, natural landscape features, and transitional development densities.

2.5.1.2. Greenbelts or other means of community separation shall be included within a specific plan and may include any of the following: preserved open space, parks, agricultural districts, wildlife habitat, rare plant preserves, riparian corridors, and designated Natural Resource areas.

2.5.1.3. The County shall develop a program that allows the maintenance of distinct separators between developed areas (Community Regions and Rural Centers).

2.6.1.5. All development on ridgelines shall be reviewed by the County for potential impacts on visual resources. Visual impacts will be assessed and may require methods such as setbacks, screening, low-glare or directed lighting, automatic light shutoffs, and external color schemes that blend with the surroundings in order to avoid visual breaks to the skyline.

The Proposed Actiona and alternatives would have no direct impact on the visual or aesthetic character of development sites within the County. As noted, El Dorado County, through its Land Use Element of the General Plan, have policies and implementation measures in place to help identify, avoid, or otherwise mitigate planned activities that may impart adverse effects on visual resources including any increase in nighttime glare. This would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.19. CULTURAL RESOURCES (SERVICE AREA INDIRECT IMPACTS)

This subchapter addresses the potential indirect service area-related impacts on existing cultural resources that could result from the implementation of the P.L.101-514 water service contract. As an indirect result of accommodating planned growth within the County, potential impacts on cultural resources are a concern.

The Proposed Action and alternatives, as defined, do not propose the construction of any new facilities or disturbance of any lands. Accordingly, there are no direct cultural resources impacts resulting from the action. The construction and operation of any future facilities such as specific diversion intakes, pipelines, storage facilities, pumping plants, and water treatment plants, to the extent that they are required in the future, will be separate projects proceeding independently from this current action. Cultural resources impacts resulting from their construction or long-term operation would be evaluated at a project-specific level in later, more detailed environmental documentation. Once the Record of Decision (ROD) for the current document has been signed, Reclamation will have no authority to perform Section 106 review for any projects resulting from its execution, except where such projects involve Reclamation facilities or permits. Other federal agencies may have Section 106 responsibilities, if future projects involve lands, facilities, or permits under their jurisdiction. For projects without federal agency jurisdiction, cultural resources should be managed as described below.

5.19.1. CEQA Standards of Significance

In general, significant impacts are those that diminish the integrity, research potential, or other characteristics that make a historical or cultural resource significant or important. For the purpose of this EIS/EIR, impacts on historical or unique archaeological resources may be deemed significant if implementation of the proposed project would:

- cause a substantial adverse change in the significance of an historical resource as defined in CEQA Guidelines Section 15064.5 and 36 CFR 60.4;
- cause a substantial adverse change in the significance of a unique archaeological resource pursuant to CEQA Guidelines Section 15064.5;
- disturb any human remains, including those interred outside formal cemeteries;

In addition to CEQA compliance, any project that involves federal undertakings, lands, funds, or permits must comply with Section 106 of the National Historic Preservation Act (NHPA). This Act defines important (significant) resources as those listed on, or eligible for listing on, the National Register of Historic Places. National Register criteria are very similar to those for the State Register, defining an important cultural resource as one that is associated with important persons or events, or that embodies high artistic or architectural values, or that has scientific value (36 CFR 60.6). State Historic Landmarks, and any cultural resource that has been determined eligible to the National Register, automatically qualify for the State Register. Where a cultural resource has not been evaluated for its importance, it is treated as potentially important until an evaluation can be done. For this project, Reclamation, as the federal lead agency, has responsibility for project compliance with the NHPA.

5.19.2. Impacts and Mitigation Measures

Cultural resources impacts related to the implementation of the proposed new CVP water service contracts in the EID and GDPUD service areas were qualitatively evaluated based on land use, growth, and environmental information developed for the El Dorado County General Plan, relative to the location of the EID and GDPUD Subcontractor service areas.

5.19-1 Result in a substantial adverse change in the significance of an historical or archaeological resource.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land use, development, and no ground disturbance activities. Accordingly, all cultural resources within the service areas of either EID or GDPUD would remain unaffected. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The Conservation and Open Space Element of the El Dorado County General Plan identifies the preservation of cultural resources as an important responsibility. Objective 7.5.3: Recognition of Prehistoric/Historic Resources notes that it is an objective of the County for: *Recognition of the value of the County's* prehistoric *and historic resources to residents, tourists, and the economy of the*

County, and promotion of public access and enjoyment of prehistoric and historic resources where appropriate. Goal 7.5: Cultural Resources, goes on to state that it is the goal of the County to: *Ensure the preservation of the County's important cultural resources*.

In the creation of an identification and preservation program for the County's cultural resources, several policies are relevant. They include and provide the following:

Policies

7.5.1.1. The County shall establish a Cultural Resources Ordinance. This ordinance shall provide a broad regulatory framework for the mitigation of impacts on cultural resources (including historic, prehistoric and paleontological resources) by discretionary projects. This Ordinance should include (but not be limited to) and provide for the following:

A. Appropriate (as per guidance from the Native American Heritage Commission) Native American monitors to be notified regarding projects involving significant ground-disturbing activities that could affect significant resources.

B. A 100-foot development setback in sensitive areas as a study threshold when deemed appropriate.

C. Identification of appropriate buffers, given the nature of the resources within which ground-disturbing activities should be limited.

D. A definition of cultural resources that is significant to the County. This definition shall conform to (but not necessarily be limited to) the significance criteria used for the National Register of Historic Places (NRHP) and the California Register of Historical Resources (CRHR) and Society of Vertebrate Paleontology.

E. Formulation of project review guidelines for all development projects.

F. Development of a cultural resources sensitivity map of the County.

Policies

7.5.1.2. Reports and/or maps identifying specific locations of archaeological or historical sites shall be kept confidential in the Planning Department but shall be disclosed where applicable.

7.5.1.3. Cultural resource studies (historic, prehistoric, and paleontological resources) shall be conducted prior to approval of discretionary projects. Studies may include, but are not limited to, record searches through the North Central Information Center at California State University, Sacramento, the Museum of Paleontology, University of California, Berkeley, field surveys, subsurface testing, and/or salvage excavations. The avoidance and protection of sites shall be encouraged.

7.5.1.4. Promote the registration of historic districts, sites, buildings, structures, and objects in the National Register of Historic Places and inclusion in the California State Office of Historic Preservation's California Points of Historic Interest and California Inventory of Historic Resources.

7.5.1.5. A Cultural Resources Preservation Commission shall be formed to aid in the protection and preservation of the County's important cultural resources. The Commission's duties shall include, but are not limited to:

A. Assisting in the formulation of policies for the identification, treatment, and protection of cultural resources (including historic cemeteries) and the curation of any artifacts collected during field collection/excavation;

B. Assisting in preparation of a cultural resources inventory (to include prehistoric sites and historic sites and structures of local importance);

C. Reviewing all projects with identified cultural resources and making recommendations on appropriate forms of protection and mitigation; and

D. Reviewing sites for possible inclusion in the National Register of Historic Places, California Register, and other State and local lists of cultural properties.

<u>Policy</u>

7.5.1.6. The County shall treat any significant cultural resources (i.e., those determined California Register of Historical Resources/National Register of Historic Places eligible and unique paleontological resources), documented as a result of a conformity review for ministerial development, in accordance with CEQA standards.

Maintaining the visual integrity of historic resources is amply guided by several policies and their associated provisions. These include:

<u>Policies</u>

7.5.2.1. Create Historic Design Control Districts for areas, places, sites, structures, or uses which have special historic significance.

7.5.2.2. The County shall define Historic Design Control Districts (HDCDs). HDCD inclusions and boundaries shall be determined in a manner consistent with National Historic Preservation Act (NHPA) Historic District standards:

A. The County shall develop design guidelines for each HDCD. These guidelines shall be compatible with NHPA standards.

B. New buildings and structures and reconstruction/restoration of historic (historic as per National Register of Historic Places [NRHP] and California Register of Historical Resources [CRHR] criteria) buildings and structures shall generally conform to styles of architecture prevalent during the latter half of the 19th century into the first decade of the 20th century.

C. Any historic building or structure located within a designated HDCD, or any building or structure located elsewhere in the county that is listed on the NRHP or CRHR, is designated a California Building of Historic Interest, or a California State Historic Landmark, or is designated as significant as per NRHP/CRHR criteria, shall not be destroyed, significantly altered, removed, or otherwise changed in exterior appearance without a design review.

D. In cases where the County permits the significant alteration of a historic building or structure exterior, such alteration shall be required to maintain the historic integrity and appearance of the building or structure and shall be subject to a design review.

E. In cases where new building construction is placed next to a historic building or structure in a designated HDCD or listed on the CRHR/NRHP, the architectural design of the new construction shall generally conform to the historic period of significance of the HDCD or listed property.

F. In cases where the County permits the destruction of a historic building or tearing down a structure, the building or structure shall first be recorded in a manner consistent with the standards of the NHPA Historic American Building Survey (HABS) by a qualified professional architectural historian.

G. The County shall mandate building and structure design controls within the viewshed of the Marshall Gold Discovery State Historic Park. These design controls shall be consistent with those mandated for designated Historic Design Control Districts.

As an indirect impact, El Dorado County, through its various policies and implementation measures identified in its Conservation and Open Space Element relevant to cultural and historic resources, there is guidance to help identify, avoid, or otherwise mitigate any potential future planned activities on these resources. The completion of the Cultural Resources Ordinance is intended to integrate all of these protective provisions into one overall guidance document. With the adherence to these policies within the context of the El Dorado County General Plan, the Alternatives would have no indirect impact on significant archaeological, cultural, or historic resources within the County. Accordingly, with these measures in place, this would be a less-than-significant impact.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.19-2 Result in the disturbance of any human remains, including those interred outside formal cemeteries.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land use, development, and no ground disturbance activities. Accordingly, any buried human remains within the service areas of either EID or GDPUD would remain unaffected. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As noted under Impact 5.16-1, the County possesses and adheres to numerous policies related to the protection of cultural resources. The Proposed Action and alternatives would have no direct impact on any human remains having archaeological importance within the County. As an indirect impact, El Dorado County, through its various policies and implementation measures identified in its Conservation and Open Space Element and, consistent with the provisions of the Cultural Resources Ordinance, guidance is provided to help identify, avoid, or otherwise mitigate any potential future planned activities on the possible discovery of past human remains. Accordingly, this would be a less-than-significant impact.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.20. TERRESTRIAL AND WILDLIFE RESOURCES (SERVICE AREA INDIRECT IMPACTS)

This subchapter addresses the potential indirect service area-related impacts on existing terrestrial and wildlife resources that could result from the implementation of the P.L.101-514 water service contract. As an indirect result of accommodating planned growth within the County, potential impacts on terrestrial and wildlife resources are a concern.

The Proposed Action and alternatives, as defined, do not propose the construction of any new facilities or disturbance of any lands. Accordingly, there are no direct impacts resulting from the action to any terrestrial or wildlife resources are anticipated. The construction and operation of any future facilities such as specific diversion intakes, pipelines, storage facilities, pumping plants, and water treatment plants, to the extent that they are required in the future, will be separate projects proceeding independently from this current action. Any terrestrial and/or wildlife resources impacts resulting from their construction or long-term operation would be evaluated at a project-specific level in later, more detailed environmental documentation.

5.20.1. CEQA Standards of Significance

For the purpose of this EIS/EIR, impacts on terrestrial and/or wildlife resources may be deemed significant if implementation of the proposed project would:

- Have a significant adverse effect, either directly through habitat modifications, on any species in local or regional plan, policies, or regulations, or by the California Department of Fish & Game or U.S. Fish & Wildlife Service; and
- Substantially affect a rare, threatened or endangered species of animal or plant or the habitat of those listed species.

5.20.2. Impacts and Mitigation Measures

Potential terrestrial and wildlife impacts related to the implementation of the proposed new CVP water service contracts in the EID and GDPUD service areas were qualitatively evaluated based on existing and foreseeable land use, growth, and environmental information developed for the El Dorado County General Plan, its EIR, and related documents, relative to the location of the EID and GDPUD Subcontractor service areas.

5.20-1 Have a significant adverse effect, either directly through habitat modifications, fragmentation, on any species in local or regional plan, policies, or regulations, or by the California Department of Fish & Game or U.S. Fish & Wildlife Service.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land use, development, and no ground disturbance activities. Accordingly, all terrestrial and wildlife resources within the service areas of either EID or GDPUD would remain unaffected. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The El Dorado County General Plan EIR noted that potentially significant secondary impacts on wildlife habitat associated with urbanization may include such effects as the reduction in water quality caused by urban runoff, erosion and siltation; increased noise and lighting that reduce habitat value for nocturnal wildlife; intrusion of humans and domestic animals and the resulting predation and disturbance of wildlife; increased uses of natural areas for recreational activities; impacts on tree canopy and understory from fire safety methods (defensible space); and introduction of non-native invasive species that would degrade existing habitats for native plant and wildlife species.

Impacts on these major habitat types would be considered significant because conversion for high- and medium-intensity land uses would remove and fragment a substantial amount of the existing wildlife habitat on the west slope. While low-density development reduces habitat quality much more than it reduces the amount of habitat, even low-density development, such as rural ranchettes, can have a substantial impact on habitat quality. One of the most significant impacts of low-density development and non-urban sprawl on wildlife is fragmentation of habitat patches by roads, structures, and fences. The negative consequences of habitat fragmentation are well known theoretically and have been documented in numerous studies. When habitat is fragmented from a few large patches to numerous small patches, wildlife diversity is expected to decrease even if the remaining parcels support similar vegetation and the decrease in the total amount of habitat is small.

The General Plan includes two policies that provide some degree of protection for wildlife habitat: (1) discourage development on slopes over 40 percent (Policy 7.1.2.1); and (2) oak canopy retention guidelines based on land use designation (Policy 7.4.4.4). Although these policies would provide some protection, they would be ineffective at reducing this impact to a less-than-significant level, because they do not include mandatory standards and apply only to discretionary projects.

Policy CO-12a addresses retention of native vegetation. Under this policy, development outside an approved building envelope on previously undisturbed sites shall retain existing, native vegetation to the greatest extent feasible. However, since this policy only requires preserving native vegetation if feasible, it is not expected to provide much guaranteed protection for wildlife habitat but it could reduce the overall amount of habitat loss and fragmentation. The effectiveness of the policy would be largely dependent upon the level of enforcement by the County.

Policy CO-11a requires that the County provide for Open Space lands through various mechanisms, including the designation of land as Open Space, Rural Lands, and Natural Resources. Policy CO-11b requires that Open Space, Natural Resources, and Rural land use designations on the General Plan Land Use Map be maintained in support of identification of natural-resource areas required for the conservation of important habitat resources, including habitat for special-status species; protection of streams, lakes, ponds, springs, wetlands, and adjacent riparian habitat; and protection of large and contiguous native habitats (including river canyons). Impacts on wildlife habitat can be reduced by applying less intensive land use designations to habitats that are important for plant and animal life, but this policy lacks sufficient specificity to ensure that impacts would be lessened, because the designations do not restrict timber harvesting, mining, or agricultural conversion.

Measure CO-I directs the County to develop an integrated natural resources management plan which it has initiated. The management plan would address a number of issues related to protection of wildlife habitat. Specific elements of the management plan would include:

- coordination among, local, state, and federal agencies having jurisdiction over natural resources within the county;
- public involvement in natural resource management planning and implementation;
- conservation and restoration of large and contiguous native habitats;
- thresholds of significance for the loss of various habitats and/or resources;
- connectivity of large and contiguous native plant communities, native habitats, and other
- important habitat features;
- permanent protection of important habitat features through means such as use of Open Space and Natural Resource land use designations or zoning, clustering, large lot design, setbacks, or other appropriate techniques;
- incentive programs;
- monitoring of the plan's goals and objectives; and
- adaptive management.

The integrated natural resources management plan would be developed within 5 years of General Plan adoption.

As an indirect impact of the proposed action and alternatives, El Dorado County, through its various policies and implementation measures identified in its Conservation and Open Space Element relevant to terrestrial and wildlife resources, offers guidance to help identify, avoid, or otherwise mitigate any potential future planned activities on these resources. By buildout, however, much of the existing habitat at lower elevations could be fragmented or removed by urban and agricultural development. More habitat in the central part of the county could be removed or fragmented than at 2025, because development is expected to continue to spread east up the west slope as western El Dorado County becomes increasingly urbanized. This impact was considered a significant impact in the El Dorado County General Plan EIR. For the Proposed Action, however, the increment of indirect impact is considered less than significant.

<u>Mitigation Measures</u>

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.20-2 Substantially affect a rare, threatened or endangered species of animal or plant or the habitat of those listed species.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed. Consequently, there would be no change in land use, development, and no ground disturbance activities. Accordingly, any rare, threatened or endangered species within the service areas of either EID or GDPUD would remain unaffected. There would be no impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The Proposed Action and alternatives would have no direct impact on any rare, threatened or endangered species within the service areas of either EID or GDPUD. However, the El Dorado County General Plan EIR concluded that development of and projected increases in urban, agricultural, and mined areas under the General Plan would lead to loss of habitat and loss of individuals of both special-status plants and animals. This impact was considered significant for all of the four equal-weight alternatives assessed under the General Plan Update CEQA review process.

A thorough discussion, under Section 7 consultation of the ESA, is provided in the Draft Biological Assessment (Appendix G of this Draft EIS/EIR) regarding listed species within the EID and GDPUD service areas. Considerable focus was directed towards special-status plants within these areas.

The USFWS, EDCWA, EID, Reclamation, and other parties have been involved in ongoing efforts to preserve gabbro plants and their habitat. These efforts have been focused on regional planning for the protection of gabbro plants. Efforts to preserve these plants begain in 1979 when, under recommendation from the California Native Plant Society (CNPS), the California Department of

Forestry and Fire Protection (CDF) transferred 320 acres of habitat at Pine Hill to CDFG for ecosystem management. In 1992, the El Dorado Board of Supervisors formed a Rare Plant Technical Advisory Committee (RPTAC) with business, non-profit, and state and federal agency participation to advise the County on a rare plant policy. Also in 1992, Reclamation, CDFG, and the Bureau of Land Management signed a Memorandum of Understanding that acknowledged the importance of preservation of habitat for gabbro species. In 1995, USFWS conducted a critical needs analysis as part of its Biological Opinion for the67 interim CVP water service contracts (as part of the proposed action to renew these CVP contracts) and identified the need to establish a preserve for gabbro species.

Five gabbro plants were listed by the USFWS on October 18, 1996. In 2001, eight local, state, and federal agencies signed a Cooperative Management Agreement that formalized each participant's role in the management and protection of the gabbro plants.

The USFWS issued its Recovery Plan for Gabbro Soil Plants for the Central Sierra Nevada Foothills in 2002. The Recovery Plan provides a recommendation for a 5,000-acre preserve that would provide the best achievable protection for gabbro species in western El Dorado County. The location and prioritization for areas in the preserve was developed in conjunction with the RPTAC. The USFWS considered the following criteria in developing the preserve:

- Priority was given to areas occupied by several of the target species;
- Principles of preserve design (linkages, size of preserve) were considered;
- Developed lands were eliminated to the extent possible; and
- Proportion of private to public lands was considered

El Dorado County, state, and federal agencies have provided funding since the 1990s for the acquisition of properties for a gabbro plants preserve, called the Pine Hill Preserve. A draft Pine Hill Preserve Management Plan (PHPMP) was issued in December 2006 and has undergone public review and comment. The Preserve currently includes 4,042 acres in western El Dorado County, of which 3,114 acres lie within the 5,000 acres designated for the recovery of the gabbro species in the Recovery Plan. Ownership of the land is divided among the Bureau of Land Management, Reclamation, USFWS, CDFG, CDF, EDCWA, EID, El Dorado County, and the private non-profit, American River Conservancy (ARC). The Agreement is in effect until July 2011. The PHPMP will be formally reviewed and updated every 5 years.

The purpose of the PHPMP is to coordinate management activities at the Preserve with actions undertaken by federal, state and local agencies, conservation organizations, and private landowners to fulfill the objectives of the Preserve. The PHPMP outlines strategies for achieving the following objectives:

- Protect and manage gabbro soil rare plant habitat areas in western El Dorado County to ensure their conservation and recovery;

- Promote and conduct research to find the best management techniques to aid in the conservation and recovery of the gabbro soil rate plants;
- Treat vegetation to reduce fuel loads, maintain functional habitat for the rare gabbro soil plant species, and reduce the risks of wildfire damage to human life and property in areas adjacent to the Preserve;
- Provide the community with recreational, educational, and outreach opportunities concerning rare plants and their habitats; and
- Establish a solid mechanism for funding management activities at the Preserve.

To preserve and provide additional protection for special-status gabbro soil plants, the County, USFWS, and other state and federal agencies are currently attempting to conserve much of the remaining habitat for gabbro soil plants. Expansion of the Pine Hill Ecological Preserve is one of the goals of the USFWS recovery plan for gabbro soil plants. Implementation of the recovery plan is expected to reduce the possibility that gabbro soil plants would become extinct or extirpated from El Dorado County, but because USFWS has no specific legislative mandate to require federal and state agencies or private entities to comply with the goals of the recovery plan, some of the goals may not be reached.

Impacts on special-status plants and their habitat are expected to be most severe in the gabbro soil region outside of the protected Pine Hill Ecological Preserve, but direct and secondary impacts are also expected within designated preserve areas. There is already substantial development in the preserve area, and more development is anticipated. By 2025 the preserve would likely be substantially more isolated because it is almost entirely surrounded by high- and medium-intensity land designations.

As noted previously, El Dorado County and EDCWA have worked with federal and State agencies in the continued development towards a long-term protection and preservation strategy for gabbro soil special status species. These have included the following:

- Contribution to development of the Pine Hill Preserve

  Funding

  - $2.1M toward purchase of 525 acres
  - $2.9M toward purchase of land
  - $5.7M toward purchase of 236 acres and a preserve manager salary

  Long-Term Management

  - Cooperative Management Agreement
  - Fulfilling roles as part of the agreement

- Cooperation with USFWS
  - Development of MOA between USFWS, EDCWA, and El Dorado County regarding long-term protection of gabbro soils plants

As an indirect impact, El Dorado County, through its various policies and implementation measures identified in its Conservation and Open Space Element and, consistent with the provisions of the Cultural Resources Ordinance, guidance is provided to help identify, avoid, or otherwise mitigate any potential future planned activities on existing rare, threatened or endangered species within the service areas of either EID or GDPUD. Several General Policies address protection of special-status species; each with varying degrees of anticipated effectiveness.

Policy 7.4.1.1 states that the gabbro soil plants will be protected in perpetuity through the establishment of five preserve sites and that these preserve site shall be integrated into the overall open-space plan.

Policy 7.4.1.3 limits land uses within established preserve areas to activities that are compatible with rare plant protection and requires the County to develop an educational and interpretive program on rare plants. This policy would also reduce impacts on gabbro soil plant populations, particularly secondary impacts, such as degradation of existing habitat caused by inappropriate recreational uses.

Policy 7.4.1.4 requires that approved preserves be designated as Ecological Preserve on the General Plan land use map. The effectiveness of this policy would be dependent upon the degree to which land use restrictions associated with the Ecological Preserve land use designation would protect special-status species.

Policy 7.4.1.5 addresses preparation of natural community preservation/conservation strategies. In most cases, however, Policy 7.4.1.5 would do little to reduce the potential for significant impacts on special-status species since under this policy, mitigation would be required only for special-status species restricted to areas where discretionary development is proposed; mitigation would not be required as long as the species was found and protected elsewhere on public land or private Natural Resources land.

Policy 7.4.1.6 directs the County to, under certain circumstances, require comprehensive habitat restoration and/or offsite mitigation plans. This policy also does not require impacts to be reduced to less-than-significant levels and applies only to discretionary projects; therefore, the policy would not be applicable to projects on nearly a third of the land open to ministerial development approvals in the county.

Policy 7.4.2.1 requires the County to protect, to the extent feasible, special-status species by developing biological conservation plans. This would also be mostly ineffective in mitigating impacts on special-status species. This policy is applicable only when federal or state plans do not provide adequate protection on lands outside County control. This policy could be effective in avoiding or delaying extirpation of a particular special-status species, but because few species have approved conservation plans, many special-status species would receive no consideration.

These policies, however, combined with the current and anticipated future level of participation by EDCWA and El Dorado County in funding various preservation actions, would render this impact less than significant.

Mitigation Measures

Proposed Action – All Scenarios, All Reduced Diversion Alternatives, Water Transfer Alternative, No Action Alternative, and No Project Alternative

No mitigation would be required for any of the Proposed Action – Scenarios or Alternatives

5.21. CUMULATIVE IMPACT FRAMEWORK AND ASSUMPTIONS

Cumulative impacts are defined in federal CEQ Regulations pertaining to NEPA (40 CFR 1508.7) as follows:

> "Cumulative impact" is the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonable foreseeable future actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.

Under CEQA, an EIR must discuss the "cumulative impacts" of a project when its incremental effect will be cumulatively considerable. This means that the incremental effects of the individual project would be considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. Similar in intent with the CEQ, *CEQA Guidelines* Section 15355 defines cumulative impacts as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." This Section states further that:

> "[I]individual effects may be changes resulting from a single project or a number of separate projects." "The cumulative impact from several projects is [defined as] the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative impacts can result from individually minor but collectively significant projects taking place over a period of time."

Section 15130(a)(3) states also that an EIR may determine that a project's contribution to a significant cumulative impact will be rendered less than cumulatively considerable, and thus not significant, if a project is required to implement or fund its fair share of a mitigation measure or measures designed to alleviate the cumulative impact.

Section 15130(b) indicates that the level of detail of the cumulative analysis need not be as great as for the project impact analyses, that it should reflect the severity of the impacts and their likelihood of occurrence, and that it should be focused, practical, and reasonable.

To be adequate, a discussion of cumulative effects must include the following elements:

> Either (a) a list of past, present and probable future projects, including, if necessary, those outside the agency's control (Section 15130[b][1][A], or (b) a summary of projections contained in an adopted general plan or related planning document, or in a prior adopted or certified environmental document, which described or evaluated regional or area-wide conditions contributing to the cumulative impact, provided that such documents are referenced and made available for public inspection at a specified location (Section 15130[b][1][B];
>
> A summary of the individual projects' expected environmental effects, with specific reference to additional information stating where such information is available (Section 15130[b][2]); and
>
> A reasonable analysis of all of the relevant projects' cumulative impacts, with an examination of reasonable, feasible options for mitigating or avoiding the project's contribution to such effects (Section 15130[b][3]).

For some projects, the only feasible mitigation measures will involve the adoption of ordinances or regulations, rather than the imposition of conditions on a project-by-project basis (Section 15130[c]).

5.21.1. Past and Present Actions

Significant actions (and projects) have shaped the physical, natural, and socioeconomic environment of the Central Valley to date. Hydrologically, the range of actions that have covered CVP/SWP water supply, Delta conveyance, flood control, water quality protection, refuge supply, and coordinated federal/State operations, to but name a few, has been significant over the years. From an infrastructure perspective, new dams and reservoirs, water treatment facilities, canals, water intakes, fish screens, and other water purveyor facilities have also strongly influenced water resources management throughout the various localities and regions of the State. Finally, environmentally, the range of past actions is equally large, with BiOps, joint watershed agreements, river restoration projects, SWRCB minimum flow standards along with a whole suite of other environmental improvement efforts.

To fully describe all of the past and present actions defining the hydrologic and environmental conditions that make up the CVP/SWP, its operations, as well as Sierra Nevada source area hydrology is far beyond the scope of this EIS/EIR. Analytical simulations, through system-wide hydrologic modeling, attempt to capture the primary aspects of these operations as a means of providing an assessment platform to evaluate potential changes to the system. This modeling, through the use of the Reclamation planning and operation model CALSIM II has been described previously and, its context within the cumulative impact assessment is discussed later in this subchapter.

For the purposes of this EIS/EIR, a discussion of the salient State-wide actions that govern operational control of the CVP/SWP, Folsom Reservoir, and the lower American River are provided.

Central Valley Project Improvement Act (CVPIA)

The implementation of the CVPIA has significantly changed the operations of the CVP. It directs Reclamation to give fish and wildlife protection, restoration, and mitigation equal priority with irrigation and municipal water uses and power generation. Through its various programs, as noted in other parts of this EIS/EIR, it is intended to enhance fish, wildlife, and associated habitats throughout the Central Valley and Trinity River basins. It is also directed to increase the water-related benefits provided by the CVP by expanding the use of voluntary water transfers and increased water conservation practices. Key among its various provisions is Section 3406(b)(2) which calls for the dedication of up to 800,000 AFA of CVP yield on CVP-controlled streams to meet the Bay-Delta Plan and also meet Section 3406(b)(1) Anadromous Fish Restoration Program (AFRP) target flow goals. The goal of the AFRP is to "…develop within three years of enactment and implement a program which makes all reasonable efforts to ensure that, by the year 2002, natural production of anadromous fish in Central Valley rivers and streams will be sustainable, on a long-term basis, at levels not less than twice the average levels attained during the period of 1967-1991." Since 1995, the AFRP has helped implement over 195 projects to restore natural production of anadromous fish.

In 2003, the Department of the Interior issued its Final Decision Accounting of CVPIA 3406(b)(2). This guidance defined the metrics to be used in accounting for CVPIA operations under 3406(b)(2).

Coordinated Operations Agreement (COA) and CVP-OCAP

In 1986, Reclamation and the Department of Water Resources signed the Coordinated Operations Agreement (COA). This Agreement defined the rights and responsibilities of each agency in operating the CVP and SWP facilities. Adherence to the COA ensures that each CVP/SWP project obtains its share of water from the Delta and bears its share of the obligations necessary to provide for system-wide beneficial use. A CVP/SWP apportionment of 75/25 is implemented to meet in-basin demands when the Delta is under balanced conditions and when the projects are using storage withdrawals to meet the in-basin demands. When the unstored flow is available for export under balanced conditions, the apportionment ratio is 55/45. There is no apportionment when the Delta is under excess flow conditions. The COA contains considerable flexibility in the manner with which Delta conditions in the form of flow standards, water quality standards, and export restrictions are met. Since that time, these coordinated operations have evolved to reflect, among other things, changing facilities, delivery requirements, and regulatory restrictions. The most recent and applicable document addressing how the COA is implemented in light of these continually evolving circumstances is the CVP-OCAP. First prepared in 1992, it has been recently revised and updated as of June 30, 2004.

Bay-Delta Plan

In December, 1994, a Principles of Agreement (Delta Accord) was formulated between several agencies including CALFED and representatives from various urban, agricultural, and environmental interests. The groups represented the key interests in the SWRCB Hearings to develop a new Bay-Delta Water Quality Control Plan (Bay Delta Plan). The Bay-Delta Plan contains a number of flow objectives for the Bay-Delta, based on water-year type as well as non-flow measures to be undertaken. The Bay-Delta Plan was adopted in May 1995 and established a number of new Bay-Delta water quality objectives, including flow objectives. The 1995 Bay-Delta Plan recommended habitat enhancement projects, modifications of fishing regulations, and plans to control the further introduction and proliferation of exotic species. This plan and effort was ratified through SWRCB Order WR 95-06.

CALFED Bay-Delta Program

The CALFED Bay-Delta Program began in May 1995 to address the complex issues that surround the Bay-Delta. The CALFED Bay-Delta Program is a cooperative, interagency effort of 18 State and Federal agencies with management or regulatory responsibilities for the Bay- Delta. Several program elements represents the cornerstone of the CALFED Bay-Delta Program; these include, Water Supply Reliability Program; Ecosystem Restoration and Watershed Program Elements; Levee System Integrity Program; and a Water Quality Program. These program components were recently described in the document entitled *California's Water Future: A Framework for Action*, issued on June 9, 2000. The California Bay-Delta Authority was created to oversee the program's implementation and Congress adopted the plan in 2004.

Monterey Agreement

In January 20, 1960, when the Contracting Principles for Water Service Contracts was published, Article 18 of the ensuing water supply contracts was intended to address the question of how to allocate water during periods of supply deficiencies. While Article 18 provisions covered several situations in which SWP water supply shortages might occur, Article 18(a) eventually became the most significant provision for allocating SWP water in times of insufficient water supply. During water shortages, Article 18(a) reduces water supply for agricultural contractors by a percentage not to exceed fifty percent (50 percent) in any one year or a total of one hundred percent (100 percent) in a series of seven consecutive years before any cut is made in municipal and industrial water supplies.

In 1994, DWR and some of the contractors, meeting in Monterey, executed the Monterey Agreement to modify the long-term water supply contracts. These modifications were incorporated into the long-term water supply contracts in what became known as the Monterey Amendment. The Monterey Agreement originated in Monterey, California, among DWR and the SWP contractors to address fundamental contract issues by amending the long-term water supply contracts. This understanding produced a set of guidelines, known as the Monterey Principles, to amend the contracts to resolve some long-standing concerns of SWP contractors and provide more flexibility in administering those contracts. Despite careful crafting, the contracts could not easily accommodate the shifts in water policy and management that occurred since their execution.

Lower Yuba River Accord

The Yuba County Water Agency (YCWA) has developed an innovative set of agreements that together form a framework – the proposed Lower Yuba River Accord (Yuba Accord) – that will resolve nearly 15 years of controversy and litigation over instream flow requirements for the lower Yuba River. Working with a broad coalition of 17 agricultural, environmental, and fisheries interests, including State and federal agencies, YCWA facilitated a science-based, consensus-oriented process that proposes new instream flow requirements for the lower Yuba River that will significantly increase protection for the river's fisheries resources over the long-term. These requirements will range from 260,000 AF in a dry year to over 574,000 AF in a wet year, and are intended to improve habitat conditions for the lower Yuba River Chinook salmon and steelhead – among the last remaining wild populations in California's Central Valley.

SWRCB Revised Water Right Decision 1641

The State Water Resources Control Board adopted Decision 1641 on December 29, 1999. The Decision, intended to provide for operations of the CVP/SWP to protect Bay-Delta water quality, implemented flow objectives for the Bay-Delta, approved a petition to change points of diversion of the CVP and SWP in the Southern Delta, and approved a petition to change places of use and purposes of use of the CVP. The SWRCB received 21 timely petitions for reconsideration of D-1641, and on March 15, 2000 the Board adopted Order WR 2000-02. Order WR 2000-02 denies the petitions for reconsideration of D-1641, clarifies findings made in D-1641, and amends several conditions of the order in D-1641.

Trinity River Record of Decision

The Trinity River Record of Decision (Trinity ROD) was signed on December 19, 2000. It was the result of at least 20 years of studies of the Trinity River and its fisheries. The Trinity River Mainstem Fishery Restoration EIS/EIR (Trinity EIS/EIR) was the NEPA/CEQA document upon which the Trinity ROD was based. The Trinity ROD included the following items: a variable flow regime between 369,000 AFA and 815,000 AFA of water from Lewiston Dam based on 5 water-year types, providing a weighted average annual flow of 594,500 AFA.

Sacramento Area Water Forum

In the early 1990s, the City-County Office of Metropolitan Water Planning formally initiated the Sacramento Area Water Forum process. Bringing together a diverse array of business, water industry, government agency, environmental, and public stakeholder interests, an agreement was developed based on two co-equal objectives for the long-term maintenance and protection of the lower American River and its valued resources. Long-term water supply reliability and managed ecosystem protection and restoration were the two co-equal goals. The Agreement was developed around seven elements. Of particular importance to new water allocations from the American River basin was the dry-year "wedge"; purveyor-specific voluntarily imposed cutbacks based on unimpaired inflow forecasts to Folsom Reservoir defined into three water-year types.

The Water Forum Agreement included purveyor-specific agreements (PSAs) for numerous water purveyors signatory to the Agreement. While participating in the Water Forum process, neither EID nor GDPUD executed purveyor-specific agreements. Additionally, as a non-purveyor, EDCWA could not enter into a purveyor-specific agreement since, as designed, the PSAs were intended to permit water purveyors to divert specific quantities under existing rights/entitlements to meet demands based on water year type. EDCWA currently holds no water entitlements, nor is it authorized under its founding legislation to provide water service. A PSA for EDCWA would serve no useful purpose.

The dry-year "wedge" of the Water Forum Agreement was, and still is, a significant element of the Agreement. Purveyors have met their obligations under the dry-year "wedge" provisions of their individual PSAs. Currently, Reclamation and the Water Forum are negotiating inclusion of the PSAs into the modeling assumptions for the pending new revised CVP-OCAP.

Folsom Dam and Reservoir Interim Re-Operation

In 1996, the Interim Flood Control Plan Diagram for Folsom Reservoir (a.k.a. Interim Flood Operations) was developed cooperatively between Reclamation and the Sacramento Area Flood Control Agency (SAFCA). A significant component of the Interim Flood Operations is the variable 400,000 to 670,000 AF empty space storage requirements for Folsom Reservoir which changed the then authorized storage space which was fixed at 400,000 AF. As a 5-year Interim Agreement, this was intended to increase the available flood storage space in Folsom Reservoir to a maximum of 670,000 AF depending on upstream storage conditions providing ostensibly, greater flood storage relief during times of high runoff or reservoir inflow. Upon expiration in 2000, this Interim Agreement was extended for 2-years. From 2002 to 2004, however, no agreement was in place.

In 2004, a new agreement was negotiated between Reclamation and SAFCA to continue with the 400,000-670,000 AF *variable flood storage* operation unless and until such time as the Corps implemented a new water control manual and associated new flood control diagram. Under this current agreement, the operational criteria (e.g., 400,000-670,000 AF variable flood storage) will expire in 2018.

New Shutter Re-Configurations at the Folsom Power Penstock Intakes

Reclamation's operational strategies at Folsom Dam are, in part, directed toward water temperature preservation (i.e., Folsom Reservoir coldwater pool). Virtually all water released into the lower American River passes through Folsom Dam's three hydropower penstock intake shutters, of which there are nine. Reclamation has the ability to preferentially access various levels of the reservoir at these three hydropower penstock intake shutters. These were originally designed in a 1-1-7 configuration; where the top shutter could be opened independent of the others, as could the second shutter, while the remaining 7 shutters could only be opened as one unit. Reconfigured in 1994 under a 3-2-4 ganging configuration, these shutters now provide greater control over the depth of intake, and thus, the temperature of the water being released from the dam. Reclamation also has the ability to "blend" water between the three hydropower penstock intakes, adding yet more operational flexibility towards optimizing coldwater pool management and resultant downstream temperatures.

PCWA Middle Fork Project

In the mid-1960s, the Placer County Water Agency (PCWA) developed the Middle Fork Project (MFP), a multi-purpose water development project designed to use water from the Middle Fork American River and Rubicon River for domestic and commercial water supplies and hydroelectric generation. The MFP is operated first to meet required fish flows, then to meet PCWA's water demands, and finally to maximize hydroelectric generation. Most of PCWA's water is diverted from Folsom Reservoir, and upstream flows are controlled by power production operations. The construction of the MFP has altered the natural flow cycles of the Middle Fork American River, the Rubicon River, and the North Fork American River.

To realize benefits from this new CVP contract, it is necessary for GDPUD to enter into an exchange agreement with another purveyor. This is because, without a direct diversion from Folsom Reservoir, GDPUD is constrained in its ability to gain access to the new water supply source. An exchange, however, would provide that ability. In considering and pursuing an exchange of this sort, several factors are important. These typically include: an available and reliable exchange supply that meets one's objectives, the necessary infrastructure (or shared capacity) to divert and convey any exchanged water, acceptable terms within an exchange agreement (e.g., diversion rate, seasonal timing, etc.), and the identification and willingness of a water purveyor (or purveyors) to enter into an exchange agreement.

Under such an exchange, GDPUD would acquire a water supply capable of being diverted at a location more conducive to its needs in *exchange* for water made available under this current project (i.e., new water rights) at a location or locations defined by the project (i.e., Folsom Reservoir).

While it is not the intent of this EIS/EIR to presuppose a consummated agreement between GDPUD and PCWA, several factors make it at least a reasonable assumption given the history of such an agreement and the best available information today.

The American River Pump Station on the North Fork American River near the old Auburn coffer dam in Knickerbocker Canyon was completed by PCWA in 2007. It now provides PCWA with a permanent diversion and pumping structure from which to pump water out of the North Fork. This project was completed after many years of relying on seasonal temporary pumps under Reclamation oversight. With the American River Pump Station, GDPUD already has the benefit of a completed diversion (intake) and pumping infrastructure. The overall American River Pump Station project included closing the by-pass tunnel, restoring the channel in the area of the old coffer dam to its original condition, and constructing a new permanent pump station.

Design of the pump station included the assumption that GDPUD would share, in part, in its capacity needs; in fact, a vacant pumping bay currently is being reserved for GDPUD just for that purpose. Moreover, as part of the design and construction of the project, PCWA constructed an under-river caisson which is stubbed at the eastern bank of the river (the location where GDPUD would take control of any water diverted at the intake to the pump station). All environmental reviews and permitting associated with the American River Pump Station including CEQA, NEPA, and ESA compliance were completed by PCWA in 2003. From both a feasibility and plausibility perspective, providing GDPUD with a new water supply via the American River Pump Station appears reasonable. For these reasons, the MFP will serve as the most likely supply for which GDPUD can exchange for its CVP entitlement at Folsom Reservoir.

PCWA American River Permanent Pump Station

The completion of the environmental review and approval for the Reclamation/PCWA American River Pump Station Project which were based on the desire to discard the temporary pumps in favor of a permanent pumping plant on the North Fork American River was a significant accomplishment for Reclamation and PCWA. PCWA will now have permanent access to their North Fork American River diversion location. This project, currently under construction, will pave the way for GDPUD to also gain access to the American River at the location of the American River Pump Station; the site of a potential exchange with PCWA for GDPUD's portion of the new CVP water service contract. As noted previously, there are several agreements and regulatory provisions that GDPUD and PCWA would have to negotiate and initiate in order for GDPUD to begin planning their own infrastructure at this location. A detailed discussion of the rationale behind the GDPUD/PCWA potential exchange for this new CVP water supply (with MFP water rights water) has been provided in the previous paragraph.

American River Basin Cumulative Report

The American River Basin Cumulative Report (Cumulative Report) was prepared by Reclamation in August 2001, as part of the PCWA American River Permanent Pump Station Project Draft EIS/EIR (State Clearinghouse No. 1999062089).

The Cumulative Report was prepared to supplement the analysis provided in environmental impact statements (EIS), environmental assessments (EA), environmental impact reports (EIR), and biological assessments for Reclamation's identified reasonably foreseeable actions within the American River Watershed, which includes the EDCWA P.L. 101-514 CVP water service contract. Reasonably foreseeable actions defined in this Report were defined as federal or other projects/agreements that are likely to take place within the same timeframe as the project under consideration. These actions were evaluated collectively for their potential cumulative impacts on environmental resources. Reclamation and U.S. Fish and Wildlife Service (USFWS) participated in several coordination meetings to discuss and determine the scope of the cumulative impact analysis for the PCWA project and other Reclamation actions in the American River Basin.[212]

The stated purpose of the Cumulative Report is to serve as an integral component of NEPA, CEQA, and ESA compliance documentation for Reclamation's CVP American River Division actions identified as reasonably foreseeable. The evaluation includes an assessment of the diversion-related and service area impacts of past and future water diversions, CVP facility operations affecting those diversions, and land-based resources of the American River Watershed. The Cumulative Report provides a broad assessment of potential environmental consequences that may occur under future (2030) conditions based on the best available information at the time the analysis was prepared. The analyses performed and presented in the Cumulative Report go beyond the environmental analyses requirements of both CEQA and NEPA.[213] The Cumulative Report is incorporated by reference in its entirety; a summary is provided in this EIS/EIR.

212 Placer County Water Agency, PCWA American River Pump Station Final EIS/EIR (SCH #1999062089), June 2002, Appendix C, Responses to Comments on the Draft EIS/EIR, Section 3.0, Master Responses, Subsection 3.1.14, Cumulative Impact Analysis, p. C1-107.

213 Placer County Water Agency, PCWA American River Pump Station Final EIS/EIR (SCH #1999062089), June 2002, Appendix C, Responses to Comments on the Draft EIS/EIR, Section 3.0, Master Responses, Subsection 3.1.14, Cumulative Impact Analysis, p. C1-106.

This EIS/EIR relies, in part, on the analyses and conclusions of the Cumulative Report, recognizing its collaboratively based acceptance and recent updates to include all known Reclamation American River Division actions, including the EDCWA P.L. 101-514 CVP water service contract.

The past and present actions included in the Cumulative Report include all those incorporated into the CALSIM II modeling for this EIS/EIR and included CVP water service contracts (new, amended and renewal contracts), Warren Act contracts, CVP assignments, Folsom Dam re-operation for flood control, and Water Forum "dry year" actions that could affect aquatic and terrestrial resources of the American River Watershed and places of water (POU) use.

Other past actions include the following:

- Reclamation – Auburn Dam Construction
- SWRCB – San Francisco Bay-Sacramento-San Joaquin Delta Estuary Pollutant Policy Statement
- SWRCB – California Inland Surface Water Plan
- USFWS – Biological Opinion for Delta Smelt – Los Vaqueros
- NMFS – Biological Opinion for Winter-run Chinook Salmon – pursuant to the Bay-Delta Accord
- NMFS – Conference/Biological Opinion for Sacramento Splittail – Long-term OCAP
- NMFS – Listing for Spring-run Chinook Salmon and Steelhead
- NMFS – Biological Opinion for Steelhead
- City of Roseville – Pumping Plant Expansion, Water Treatment Plant Expansion
- City of Sacramento – Water Treatment Facilities Expansion, Fish Screen Replacement Project
- SJWD – Water Facilities Plan and Water Master Plan
- SCWA – Application to Appropriate Water from the American and Sacramento Rivers

Reasonably Foreseeable Future Actions

Future actions that could effect CVP/SWP operations, local area hydrology in Folsom Reservoir, the lower American River, or the upper American River basin include a range of initiatives and projects that are either ongoing, in the developmental stages, or committed to but not yet initiated. These are described below.

Revised CVP-OCAP

The most recent CVP-OCAP, completed in 2004 was opposed by several intervenors who challenged the 2005 BiOps that were prepared in support of this newly updated OCAP (see, *NRDC et al., v. Dirk Kempthorne, Secretary of the Interior, California Department of Water Resources, et al.,* Case 1:05-CV-01207-OWW-GSA; and *Pacific Coast Federation of Fisherman's Association/*

Institute for Fisheries Resources et al., v. Carlos Gutierrez, Secretary of Commerce, William Hogarth, National Marine Fisheries Service, NOAA, San Luis & Delta Mendota Water Authority et al., Case 1:06-CV-00245-OWW-GSA).

As part of its response, Reclamation has voluntarily reinitiated consultation on the CVP-OCAP, submitting its final Biological Assessment in August, 2008. Since then, the USFWS has released its final BiOp (on December 15, 2008) and NOAA Fisheries released its draft BiOp on December 11, 2008 with a final Opinion expected in June, 2009. A complete description of the consultative history and applicability to this action is provided in Chapter 10.0 (Consultation/Coordination and Applicable Laws).

The revised BiOps for the CVP-OCAP represent a significant undertaking having the potential to influence the entire State's water management and operational framework. It is involving a comprehensive analysis of system operations and the modeling relied upon to support those decisions. The final outcome of the collaborative discussions with which Reclamation, the Department of Water Resources and the various resource agencies are working on the implementation of the Reasonable and Prudent Alternatives, provisions of the Incidental Take Statements, associated terms and conditions, and conservation measures will determine the long-term viability of these affected listed species and may change existing operations of the CVP/SWP.

CALSIM III

At the same time that the CVP-OCAP and its support modeling are being refined, work is also underway at Reclamation and the Department of Water Resources on the next version of CALSIM (i.e., CALSIM III). Currently, this effort remains in the developmental stage, but will likely continue to gain interest over the next year. A thorough documented analysis of the differences between it and the current CALSIM II model is not yet publicly available. No means of incorporating a vested and approved CALSIM III modeling platform currently exists.

Lower American River Flow Management Standard

A notable new action for the American River is the proposed Lower American River – Flow Management Standard (or LAR FMS). Resulting from one of the seven elements of the Water Forum Agreement, the LAR FMS is the culmination of several years of continued work on developing a fish-friendly flow pattern for the lower American River; its predecessors included several iterations during the development of the Water Forum Agreement (e.g., F-Pattern).

As background, in 1990, the SWRCB stated its conclusions that, "*the existing flow requirements do not provide an adequate level of protection to the uses in the lower American River*," and set forth a work plan to modify relevant water right permits (SWRCB Work Plan – Review of Water Rights on the American River, August, 1990). The existing flow requirements are embedded in Reclamation's water right permit(s) for the lower American River and were prescribed in 1958 by SWRCB Decision 893 (D-893).

The Water Forum Agreement, executed in January 2000, includes the signatories' commitment to "*actively endorse permanent implementation of an Improved Pattern of Fishery Flow Releases from Folsom Reservoir*." (Water Forum Agreement, pg. 75).

Following execution of the Water Forum Agreement, the Water Forum embarked on the process of developing the LAR FMS jointly with Reclamation, and with participation of the USFWS, NOAA Fisheries, and CDFG. The intent of the process was to reach consensus on the substance of the LAR FMS to be included in a joint petition to the SWRCB to amend Reclamation's water right permit(s) as they are embodied in D-893.

In October, 2004, Reclamation, the Water Forum and the USFWS entered into a Memorandum of Understanding (MOU) documenting the parties intent to work together to reach agreement on a new LAR FMS that would be the subject of a petition to be filed with the SWRCB. A schedule in the MOU provided that Reclamation would file a petition with the SWRCB on September 15, 2005. The discussion among the participants resulted in consensus on the LAR FMS, described in a technical report titled, *Lower American River Flow Management Standard*, dated July 31, 2006.

In the ensuing years, the Water Forum and Reclamation were working on draft language to the petition; by spring 2008, Reclamation and the Water Forum agreed to pursue the approach of entering into a contract for implementation of the LAR FMS. An updated version of the July 2006 technical report was made available at the same time. Subsequent to meetings and discussions between Reclamation and the Water Forum, including publicly-noticed contract negotiation sessions, Reclamation stated that, because of the uncertainty regarding the pending CVP-OCAP BiOps, Reclamation considered substantive work on the LAR FMS to be impractical. Discussions to reach agreement on a contract and/or petition to the SWRCB embodying the LAR FMS was not considered possible to resume until the final NOAA Fisheries BiOp on the CVP-OCAP would be released, expected sometime in June, 2009.

The Water Forum has initiated the environmental studies necessary to support implementation of the LAR FMS. This work is consistent with the LAR FMS as agreed to by Reclamation in 2006, with appropriate modifications that have been discussed with, but not yet agreed to by Reclamation. The Water Forum has completed its definition of the LAR FMS program, which includes various studies, alternatives, modeling scenarios, and environmental impact review, including an EIR expected to get underway in 2009.

Delta Vision

Pelagic Organism Decline (POD) in the Delta issues rank as one of the top issues facing California water resources management today. There is overwhelming consensus that the Delta is now critically challenged regarding how best to manage the system among these competing interests. The Governor's *Delta Vision* Blue Ribbon Task Force is a testament to the importance being placed on collaboratively working to resolve this long-standing challenge.

Established by Governor Schwarzenegger's Executive Order S-17-06, the Delta Vision Blue Ribbon Task Force was to "*develop a durable vision for the sustainable development of the Delta with the* *goal of ...managing the Delta over the long term to restore and maintain identified functions and values that are determined to be important to the environmental quality of the Delta and the economic and social wellbeing of the people of the state*." The Delta Vision's 12 Integrated and Linked Recommendations include efforts to significantly increase conservation and water system efficiency, new facilities to move and store water, and likely reductions in the amount of water taken out of the Delta watershed. The Task Force also recommends a new governing structure for the Delta that would have secure funding and the ability to approve spending, planning and water export levels. In addition, the Task Force recommends several near-term actions. These focus on preparing for disasters in or around the Delta, including emergency flood protection and disaster planning, protecting the Delta ecosystem and water supply system from urban encroachment, and making immediate improvements to protect the environment and the system that moves water through the Delta.

Bay-Delta Conservation Plan

Bay Delta Conservation Plan (BDCP) is being prepared as a habitat conservation plan and a natural community conservation plan for the Delta pursuant to the ESA and the Natural Community Conservation Planning Act (NCCPA). The long-term approach to achieving the goals and objectives of the BDCP is under the direction of the Steering Committee. The Committee agrees that a phased implementation of key elements of the long-term approach will be necessary. Key elements of the Framework include: Habitat Restoration and Enhancement; Water Conveyance Facilities; Water Operations; Other Conservation Actions; Adaptive Management and Monitoring; Scientific Input; Cost and Funding; and Implementation Structure and Decision Making.

Folsom Dam and Reservoir Joint Federal Project – Water Control Manual Update

As part of the joint federal effort between Reclamation and the Corps of Engineers to implement long-term flood damage safety and flood damage reduction for Folsom Reservoir and its operations, the Corps will be developing an Updated Flood Management Plan and Flood Control Manual (e.g., a new flood control diagram) for the reservoir. As noted previously, the current interim operating agreement regarding Folsom Reservoir encroachment space is 400,000-670,000 AF. The Updated Flood Management Plan and Flood Control Manual will re-assess long-term operational flood protection in Folsom Reservoir, given the new auxiliary spillway and ongoing downstream levee improvements.

El Dorado Water & Power Authority Supplemental Water Supply Project

The El Dorado Water & Power Authority (EDWAPA), including the El Dorado Irrigation District, Georgetown Divide Public Utility District, El Dorado County, and the El Dorado County Water Agency (EDCWA) have filed an application with the SWRCB for partial assignment of an existing State filed water right from the upper American River Watershed. The application has been recently accepted by the SWRCB, with a notice pending sometime over the next 6 months. A cooperation agreement is in place between EDWAPA and the Sacramento Municipal Utility District (SMUD) for storage utilization of the latter's Upper American River Project (UARP). Water allocations under this action would be 30,000 AF to EID and 10,000 to GDPUD for a total filed application of 40,000 AFA. Diversions by EID would occur at the Whiterock Penstock or Folsom Reservoir while GDPUD would need to negotiate and implement a water exchange in order to take new water from the American River Pump Station on the North Fork. This 40,000 AFA diversion has not been assessed in previous Reclamation documentation or in the Water Forum Agreement. The CEQA environmental review is underway; an NOP/Initial Study was released on October 24, 2008 with the comment period closing on December 5, 2008. Two public scoping meetings and workshops were held during the month of November in Placerville and in Sacramento. A Draft EIR is anticipated to be released by October 2009.

El Dorado Irrigation District – Long-Term Warren Act Contract for Project 184

The El Dorado Irrigation District holds a 17,000 AFA water right from FERC Project 184. On October 18, 2006, FERC issued a new 40-year license for Project 184. The new license, which expires October 1, 2046, contains conditions for operating the 21-megawatt El Dorado hydroelectric power generation project, that are estimated to cost EID approximately $40 million over the 40 years. They include provisions for maintaining year-round minimum flows and existing recreation, regulating lake levels, monitoring of aquatic conditions, enhancing fish habitat, adding a boat launch facility at Caples Lake, and other actions. EID has yet to secure a long-term Warren Act contract from Reclamation that would permit diversions of Project 184 water from Folsom Reservoir; though it has been negotiated in public sessions and drafted, and is awaiting completion of the OCAP re-consultation.

In-Delta Improvements and Related Actions

Several actions are pending related to operations affecting the Delta including, but not limited to, maximum allowable diversions at the Banks Pumping Plant, South Delta Improvement Program (SDIP), Delta-Mendota Canal/California Aquaduct Intertie, Long-Term Environmental Water Account (EWA), and new and renewed long-term CVP water service contracts. These actions are pending final rulings by the U.S. District Court, Eastern District of California in the matters of *NRDC et al., v. Dirk Kempthorne, Secretary of the Interior, California Department of Water Resources, et al.,* Case 1:05-CV-01207-OWW-GSA; and *Pacific Coast Federation of Fisherman's Association/Institute for Fisheries Resources et al., v. Carlos Gutierrez, Secretary of Commerce, William Hogarth, National Marine Fisheries Service, NOAA, San Luis & Delta Mendota Water Authority et al*., Case 1:06-CV-00245-OWW-GSA. Other large, State-wide water actions have an entirely different level of potential future impact and, while not definitively known at this time, are receiving considerable debate and public exposure. These include a new Peripheral Canal (or some version of it) and new off-site storage reservoirs at Sites and Temperance Flat.

El Dorado Irrigation District TCD

The El Dorado Irrigation District has committed to installing a new temperature control device (TCD) on its current water supply intake at Folsom Reservoir. Several design concepts have been reviewed and are still under development. When completed, EID will be able to selectively withdraw water from any one of a range of elevations within the reservoir corresponding to specifically targeted thermal layers. As one of the two primary diversion points within the reservoir (the other being Folsom Dan's urban water supply intake and the inlets to the power penstocks), this ability will significantly improve coldwater pool management with Folsom Reservoir.

Climate Change

Numerous actions are ongoing at the local, region, and State-wide levels regarding climate change and its potential effects on hydrology. These are discussed thoroughly later in this document. At present, all efforts have been and continue to be investigative in nature, meaning that they have addressed (or are addressing), to varying degrees, the potential effects of variable climate forcings on specific attributes of California's water resources. These have included the Sierra Nevada snowpack, Delta and San Francisco Bay water levels, CVP/SWP operations, flooding frequency, purveyor water supplies, and some of the important socioeconomic considerations with each of these. While there is general consensus over the likely broad-scale and long-term trends, significant temporal and spatial refinements are still necessary. Improved techniques for GCM downscaling to managed watershed scales are urgently needed. The manner with which climate change ultimately is incorporated into operational planning at the CVP/SWP level is, at this time, still uncertain.

Other future actions, some of which are pending, while others are more distant, are not influenced by the present Proposed Action. Some are already captured hydrologically by current modeling of the future cumulative condition, while others do not influence system-wide hydrology above what has already been assessed. These various actions under the latter category include the following:

- Sacramento River Water Reliability Study (SRWRS)
- Freeport Regional Water Project
- City of Folsom Joint Conveyance Project

Future Modeling and Cumulative Impact Framework

Currently proposed or future anticipated diversion projects along with various environmental initiatives compete and will continue to do so for the limited water supplies in the American and Sacramento river basins. These include, but are not necessarily limited to the past, present, and reasonably foreseeable actions that were previously described. These actions and projects collectively could result in cumulatively considerable environmental impacts within the American and Sacramento river basins.

In considering the development of the future cumulative impact framework, it was acknowledged that the array of past, present, and reasonably foreseeable actions could have the following types of effects:

- Increased demands to serve environmental purposes;
- Increased demands for municipal and industrial water;
- More restrictive operation requirements for the CVP (e.g., minimum stream flow releases, reservoir storage requirements); and
- Changes in CVP or SWP system resulting from changes in water demand, changes in operational requirements, and new or modified CVP or SWP facilities.

Consistent with the hydrologic modeling framework and impact assessment approach discussed previously, the future cumulative analysis followed a similar methodology. Hydrologic modeling relied upon Reclamation's CALSIM II and its associated environmental models. A comparative framework was set up to contrast relative differences between modeling scenarios. The modeling scenarios represented two distinct time horizons; a Base Condition (the same Base Condition used for the current-level studies) and a Future Cumulative Condition. Again, for the same reasons discussed previously (in Subchapter 5.3.3, CALSIM II Simulations), while the base models used in this analysis were taken from the latest CVP-OCAP published versions with their nomenclature retained, little or no reliance should be placed on the precise year identifier (i.e., the 2020 *label* does not represent exact 2020 conditions). The Future Cumulative Condition was developed and based on the best information available as to the likely future actions that, consistent with NEPA and CEQA, are reasonably foreseeable. A third simulation was used, the Future No Action, which represented the Future Cumulative Condition, without the Proposed Action. The three simulations used for the future cumulative analysis, therefore, were as follows:

- Future Cumulative Condition
- Future No Action
- Base Condition

The Future No Action simulation is based on the OCAP_2020D09D_FutureEWA5a simulation. These two simulations (i.e., Future No Action and OCAP_2020D09D_FutureEWA5a) were modified to include updated inputs for lower Yuba River outflow to the Feather River, lower Yuba River diversions at Daguerre Point Dam, Trinity River instream flow requirements downstream of Lewiston Dam (by use of OCAP 3a), and EID diversion at Folsom Reservoir (assuming existing federal and non-federal entitlements planned for diversion at the reservoir) as required and run to produce the Base Condition and Future Condition *baseline* simulations. These simulations were then modified as required to implement the Proposed Action to produce the modeling scenarios (i.e., Future Cumulative Condition, Future No Action, and Base Condition).

The final CALSIM II simulations were then used as the basis for the temperature, salmon mortality, and hydropower modeling. The required outputs for each comparison were created by an automated process that creates a Microsoft Excel file with all desired output tables for each comparison.

A number of assumptions in the foundation simulations not directly related to the Proposed Action required modification or updating based on changes since the OCAP foundation simulations were performed. Table 5.21-1 summarizes these assumptions.

TABLE 5.21-1

MAJOR DIFFERENCES IN ASSUMPTIONS BETWEEN FOUNDATION AND BASELINE SIMULATIONS

Assumption	OCAP5a	Future Level Baseline
Level of Demand	Future	Future
Trinity ROD	Yes	Yes
Yuba River Operation	HEC-3	Yuba Accord
Water Forum Agreement Cuts (Pl 101 Water)	Yes	No
Lower American River Flow Management Study	No	Yes
Banks Pumping Capacity	6,680 cfs	6,680 cfs
Supplemental Water Rights Project	No	Yes
EID Temperature Control Device [1]	No	Yes
Non EID American River Demands	Same	SRWRS
UARM		SRWRS

Four updates were made to the OCAP 5a simulation for use as the Future Condition *baseline*.

- Yuba River Operation – The Yuba River inflow to and diversion from Daguerre Point Dam in the OCAP 5a simulation were based on a HEC-III model of the Upper Yuba River Basin. The inflow and diversion at Daguerre Point Dam were updated with values based on D-1644 standards on the river and Future Level demands on the diversion developed in support of the Proposed Yuba Accord EIS/EIR.
- Water Forum Agreement Cuts – OCAP 5a included P.L. 101-514 water diversions for EID and GDPUD that were assumed subject to cuts based on the Water Forum Agreement. Neither EID nor GDPUD are signatory to the Water Forum Agreement at this time. For this analysis, the assumption was made that they would not become signatories and their total entitlements would not be subject to the cuts. Any CVP water would still be subject to the CVP North of Delta system cuts computed by CALSIM II. This assumptions means that simulation of slightly higher diversions in the driest years (FUI <=400 TAF) could occur, which could slightly overestimate impacts in those years.
- Lower American River Flow Management Standard – The Lower American River Flow Management Standard (FMS) was not included in the OCAP 5a simulation. This standard is intended to benefit fall-run Chinook salmon, steelhead and other fish species in the lower American River. The new recommended minimum flow requirements in the lower American River below Nimbus Dam vary throughout the year in response to the hydrology of the Sacramento and American River basins and based on various indices within those watersheds. The October 1 through December 31 minimum flow requirements range between 800 and 2,000 cubic feet per second (cfs), the January 1 through Labor Day minimum flow requirements range between 800 and 1,750 cfs and the post-Labor Day through September 30 minimum flow requirements range between 800 and 1,500 cfs. Nimbus Dam releases may drop below 800 cfs to avoid depletion of water storage in Folsom Reservoir when extreme dry or critical hydrologic conditions are forecasted.
- Banks Pumping Capacity – When the OCAP modeling was performed the South Delta Improvement Program (SDIP) was well underway but not finalized. One of the major

components of the SDIP was to increase the allowable Banks Pumping Plant pumping limit to 8,500 cfs instead of the 6,680 cfs limit at that time. Since this would have a major impact on the CVP/SWP Delta operations, the OCAP modeling included the 8,500 cfs capacity in the future level OCAP 5 simulation to allow evaluation of the potential impacts of the project. However, since the project was not finalized and implemented at the time, a second simulation, with Banks Pumping Plant limited to 6,680 cfs was also performed (OCAP 5a).

- Currently the SDIP project has not been implemented and is now under a legal challenge that could prevent it from ever being implemented. For this analysis the assumption was made that the SDIP will not be in place in the future and Banks pumping capacity is limited to 6,680 cfs.
- EDWAPA Supplemental Water Supply Project – The Supplemental Water Supply Project is assumed to be in place for all future level simulations. This diversion was not included in the OCAP 5a simulation. This new consumptive demand was allocated at 30,000 AFA to EID from Folsom Reservoir and 10,000 AFA to GDPUD, assumed exchanged at the American River Pump Station, therefore, resulting in a corresponding depletion of 10,000 AFA from Folsom Reservoir via the exchange. The net depletion is 40,000 AFA.
- American River Demands – As in the Base Condition, the American River Demands were taken from the SRWRS modeling. The demands from the SRWRS Study 6, the SRWRS No Action alternative, were selected for use in this simulation. Figure 5.21-1 compares the American River demands between the OCAP 5a foundation study and the SRWRS Study 6.
- The same shift of the City of Sacramento demands from the Sacramento River to the American River is present as in the Base condition simulation. The Placer County Water Agency (PCWA) diversion has also been split from all at Node 300, the American River Pump Station upstream of Folsom Reservoir, to about half there and half from Folsom Reservoir.
- UARM Simulations – Similar to the Non-EID American River Demands, these have been updated in the CVP-OCAP Common Assumptions modeling development process. The result of the updates is very small and probably has little or no effect on the impacts of the alternatives, but is included for consistency within the American River Basin.
- EID Temperature Control Device – EID plans to construct a TCD on the Folsom Reservoir Intake to allow them to make withdrawals from the reservoir at different elevations to preserve the coldwater pool in Folsom Reservoir. CALSIM II only models water operations, not temperature, so this assumption does not impact the CALSIM II simulations.

The future cumulative impact analysis addressed the "action" alternatives in a collective fashion; that is, they were looked at as a single action involving a new 15,000 AFA diversion from the CVP/SWP. No separate modeling was conducted for each alternative, under the future cumulative condition evaluation.

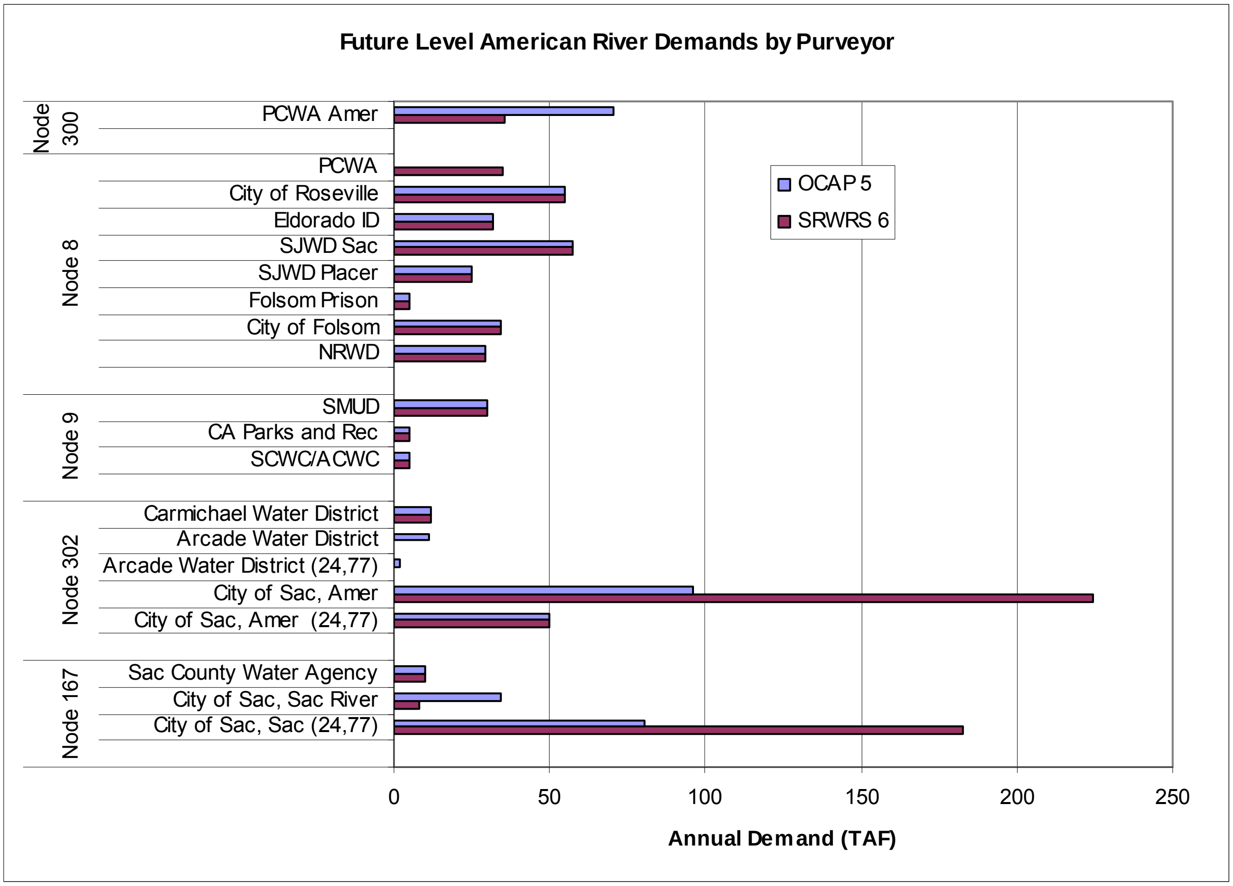

FIGURE 5.21-1 COMPARISON OF OCAP 5 AND SRWRS 6 AMERICAN RIVER DEMANDS

This is because, in the future (under a future cumulative condition modeling analysis), there is no distinction between the alternatives hydrologically. Unlike large operational projects such as the OCAP, Yuba River Accord, South Delta Improvement Program (SDIP) or, even the Sacramento River Water Reliability Study (SRWRS), the various alternatives for this new contracting action are indistinguishable from one another. A 15,000 AFA new diversion, regardless of how it is allocated between EID and GDPUD is simply not large enough to show measurable changes in hydrology in the various river reaches and reservoirs simulated by CALSIM II. This is especially true in the future (under the future cumulative condition) where, increased demands across the system tend to mask smaller diversion projects. In the future, under a cumulative impact analysis, this difficulty is accentuated by the numerous assumptions that are made regarding various operational, new programs, and anticipated legislative changes that might govern CVP/SWP coordinated operations in the future. If any of these assumptions are incorrect, the resultant hydrological changes that any modeling exercise might generate may easily significantly overwhelm the volumes considered under this new contracting action.

As discussed in detail earlier in this chapter, the model is limited in its ability to show small changes in system hydrology accurately; accepting the fact; however, that it is highly precise. It is accepted that CALSIM II, the most advanced modeling tool currently available, cannot distinguish between increments of this magnitude (i.e., 15,000 AFA), relative to a large operational pool (CVP/SWP) under the future condition. This future condition is the basis for the cumulative impact evaluation.

5.22. WATER SUPPLY – CUMULATIVE IMPACTS

5.22-1 Effects on CVP Allocations.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in long-term hydrology resulting from this action anywhere in the CVP/SWP including the Delta. As shown in the following discussion, while there would likely be potential impacts on CVP Ag contractors (South of Delta) in terms of expected long-term delivery shortfalls, this new contract would not have a measurable effect on that impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Tables 5.22-1A through 5.22-1D illustrate the 72-year mean differences in simulated annual deliveries to CVP contractors between the Base Condition and the Future Cumulative Condition for CVP M&I (North of Delta), Ag (North of Delta), M&I (South of Delta), and Ag (South of Delta) contractors. Based on the CALSIM II modeling results, of these CVP contractor categories, CVP M&I (North of Delta) would increase their expected long-term allocations, relative to the Base Condition, while CVP Ag contractors (South of Delta) would experience a long-term average decrease in annual allocations. This would be a potentially significant future cumulative impact on south of Delta CVP Ag contractors. The Alternatives defined by the various scenarios under the Proposed Action would not, by virtue of their immeasurable effects illustrated by CALSIM II modeling output, incrementally contribute to this potentially significant future cumulative impact.

Little change from the Base Condition would occur to CVP Ag contractors (North of Delta) or CVP M&I contractors (South of Delta).

TABLE 5.22-1A

ALLOCATIONS TO CVP M&I CONTRACTORS (NORTH OF DELTA) (TAF)

	Base Condition	Future Cumulative Condition[1]	Absolute Difference	Relative Difference (%)
Mean	30.6	56.6	26.0	97.2
Median	25.3	56.7	24.9	73.6
Min.	8.0	18.2	5.7	38.0
Max.	59.4	112.0	68.2	845.9

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

TABLE 5.22-1B

ALLOCATIONS TO CVP AG CONTRACTORS (NORTH OF DELTA) (TAF)

	Base Condition	Future Cumulative Condition[1]	Absolute Difference	Relative Difference (%)
Mean	235.4	238.7	3.3	-2.2
Median	295.2	293.5	9.6	4.2
Min.	0.0	0.0	-64.3	-99.9
Max.	359.0	367.1	31.7	51.0

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

TABLE 5.22-1C

ALLOCATIONS TO CVP M&I CONTRACTORS (SOUTH OF DELTA) (TAF)

	Base Condition	Future Cumulative Condition[1]	Absolute Difference	Relative Difference (%)
Mean	123.2	123.0	-0.2	-0.3
Median	134.0	135.8	0.0	0.0
Min.	72.1	72.1	-19.7	-19.8
Max.	144.1	144.1	18.3	14.9

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

TABLE 5.22-1D

ALLOCATIONS TO CVP AG CONTRACTORS (SOUTH OF DELTA) (TAF)

	Base Condition	Future Cumulative Condition[1]	Absolute Difference	Relative Difference (%)
Mean	1090.5	1067.2	-23.4	-4.8
Median	1267.2	1276.4	0.0	0.0
Min.	0.0	0.0	-322.2	-100.0
Max.	1840.6	1840.7	228.8	47.5

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

CALSIM II modeling presumed a level of future demand by the various water purveyors and interests and, as part of the analytical process, implemented known or reasonably foreseeable future environmental and preservation actions that might occur. In fact, in the future, several actions or conditions pertaining to more aggressive shortage provisions, new instream flow constraints, refuge or wildlife allocations, new river management agreements, or changing long-term hydrology (due to climate change or other natural or man-induced climate forcings) might all contribute to affect how mass balance hydrological simulations determine water availability. Today, many of these remain unknown and cannot be reasonably implementable in any reliable forecasting procedure.

5.22-2 Effects on SWP Allocations.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in long-term hydrology resulting from this action anywhere in the CVP/SWP including the Delta. As shown in the following discussion, while there would likely be potential benefits to SWP contractors in terms of expected long-term delivery shortfalls.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Table 5.22-2 reveals the CALSIM II simulated delivery allocations to SWP contractors under the Future Cumulative Condition and the differences, relative to the Base Condition. Over the 72-year period of record, the mean expected future delivery allocations to SWP customers would be approximately 145,000 AF higher than that under the Base Condition. An overall percent increase of 4.3 percent, relative to the Base Condition, would be expected in delivery allocations in the future. This would be a *benefit* as opposed to an adverse future cumulative impact.

TABLE 5.22-2

ALLOCATIONS TO SWP CONTRACTORS (TAF)

	Base Condition	Future Cumulative Condition[1]	Absolute Difference	Relative Difference (%)
Mean	2858.9	3003.8	144.9	4.3
Median	3232.1	3360.0	143.2	7.6
Min.	173.8	197.5	-859.7	-31.0
Max.	3729.5	4041.7	768.8	25.4

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

5.22-3 Effects of delivery allocations to purveyors of the Sacramento Water Forum Agreement as provided under their Purveyor-Specific Agreements (PSAs).

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in long-term American River hydrology resulting from this action. As shown in the following discussion, while there would likely be no adverse effect in terms of anticipated shortfalls to Water Forum purveyors.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Table 5.22-3 shows the modeled future anticipated delivery allocations for each of the diversion nodes (as characterized by CALSIM II) applicable to the various water purveyors under the Water

Forum Agreement, relative to the Base Condition. At each of the nodes, anticipated future delivery allocations are greater than current conditions. This is not surprising given the nature of the primary element of the Water Forum Agreement; Increased Surface Water Diversions. Clearly, Folsom Reservoir (D8) represents the waterbody where most of the anticipated future water diversions, relative to current conditions, will be diverted from by the various purveyors of the Water Forum Agreement. From a water supply perspective, there is no future cumulative impact associated with the expected allocations to Water Forum purveyors.

TABLE 5.22-3

ALLOCATIONS TO WATER FORUM PURVEYORS IDENTIFIED BY CALSIM NODE 72-YEAR MEAN ANNUAL SIMULATED DIVERSIONS (DELIVERY YEAR MARCH – FEBRUARY) (TAF)

CALSIM Node	Base Condition	Future Cumulative Condition[1]	Absolute Difference	Relative Difference (%)
D300	35.1	67.1	32.0	91.0
D8	123.7	240.4	116.7	94.5
D302	124.4	166.8	42.4	31.6
D167	28.4	85.0	56.7	237.7

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

5.23. HYDROPOWER – CUMULATIVE IMPACTS

5.23-1 Effects on CVP hydropower generation and capacity.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in long-term CVP hydropower generation and capacity resulting from this action. As shown in the following discussion, however, while there would likely be indefinable environmental effects, reductions in projected CVP hydropower generation would translate into *economic* costs.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Under the Future Cumulative Condition, CVP system hydropower generation at load center would on average, over the 72-year period of record, be reduced by approximately 52 GWH (or 1.2 percent), relative to the Base Condition. Long-Term Gen modeling results showed that in 25 out of the 72-years (35 percent of the time), a reduction in CVP hydropower generation would occur, relative to the Base Condition (see Future Cumulative Condition, Technical Appendix I, this Draft EIS/EIR). These reductions, in most years, are less than 2 percent. Table 5.23-1A illustrates the anticipated future mean change in CVP hydropower generation under the Future Cumulative Condition.

TABLE 5.23-1A

CVP SYSTEM GENERATION AT LOAD CENTER
DIFFERENCE BETWEEN THE BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]

	Base Condition (GWH)	Future Cumulative Condition[1] (GWH)	Absolute Difference	Relative Difference (%)
Mean	4545.1	4493.3	-51.8	-1.2
Median	4421.1	4413.3	-52.4	-1.2
Min.	2256.9	2208.5	-304.7	-11.4
Max.	9672.0	9627.1	123.5	5.0

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

Source: June 2007, Long-Term Gen Modeling Output – 72-year hydrologic record, unpublished data.

As noted previously, with any reduction in energy production, WAPA could be compelled to reduce surplus energy sales or increase purchases to meet its commitments. Such conditions would represent a definable *economic cost* but an unidentifiable future cumulative environmental impact. Table 5.23-1B shows the anticipated long-term change in CVP system Project Use at Load Center under the Future Cumulative Condition, relative to the Base Condition. Overall, CVP system Project Use changes little, if at all, over the long-term. Without any new CVP facilities contemplated in the near or mid-term, this is not unexpected.

TABLE 5.23-1B

CVP SYSTEM PROJECT USE AT LOAD CENTER
DIFFERENCE BETWEEN THE BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]

Month	Base Condition (GWH)	Future Cumulative Condition[1] (GWH)	Absolute Difference	Relative Difference (%)
Mean	1265.7	1266.4	0.7	0.0
Median	1326.1	1324.8	0.3	0.0
Min.	519.2	520.7	-42.2	-3.6
Max.	1778.5	1778.0	38.2	2.3

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

Source: June 2007, Long-Term Gen Modeling Output – 72-year hydrologic record, unpublished data.

5.24. FLOOD CONTROL – CUMULATIVE IMPACTS

5.24-1 Substantial change in the ability to adhere to the flood control diagrams for Folsom Reservoir under current operation or to its long-term re-operation.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in long-term American River basin hydrology or inflows to Folsom Reservoir resulting from this action. As shown in the following discussion, ongoing actions would likely result in no adverse future cumulative impact on flood control operations.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As noted previously, Folsom Reservoir, under the purview of the Corps of Engineers and Reclamation are initiating the Flood Damage Reduction portion of the Joint Federal Project. This portion of the project is intended to update the current Water Control Manual which has, as one of its primary objectives, the redesign of the current flood encroachment curve (i.e., flood control diagram) for the reservoir. It is likely that the current 400,000 AF to 670,000 AF "variable" space flood control diagram will be revised under this ongoing effort.

Increased future diversions from the American River Watershed are planned and anticipated. In fact, CALSIM II modeling as part of the Water Supply evaluation for this EIS/EIR confirms the quantities with which increased allocations would occur from Folsom Reservoir. On a monthly mean basis during the flood control period, the storage in Folsom Reservoir would be expected to be lower in the future, all other considerations being equal. Any additional diversions would provide a flood control *benefit* to the region by assisting in the ability to maintain existing flood control reservation space. Accordingly, no significant adverse future cumulative impact on Folsom Reservoir's ability to meet or adhere to its flood encroachment curve is expected. The Alternatives would provide an incremental, albeit small, *benefit* towards this goal.

5.24-2 Substantial change in floodplain characteristics that would increase the exposure of persons or property to flood hazards including a substantial change in the hydraulic stress imparted to lower American River levees or lower Sacramento River levees.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in long-term American River basin hydrology, Folsom Reservoir flood control risk or alterations to downstream floodplain characteristics resulting from this action. As discussed, ongoing actions between Reclamation and the Corps would likely result in no adverse future cumulative impact on existing floodplain characteristics.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Long-term changes in floodplain characteristics typically result from natural fluvial processes associated with a river's hydraulic energy gradient as it maintains its longitudinal profile and adjusts laterally, as reflected in its channel sinuosity. Changes in the long-term flow regime will alter the kinetic energy available, spatially, throughout a river reach, thus, affecting the magnitude of erosional and depositional processes. The degree to which a river adjusts will affect its floodplain characteristics. Table 5.24-1 shows the modeled future mean monthly flows in the lower American River below Nimbus Dam, relative to the Base Condition.

TABLE 5.24-1

**MEAN MONTHLY FLOWS BELOW NIMBUS DAM
DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]
DURING THE NOVEMBER THROUGH APRIL FLOOD CONTROL PERIOD**

Month	Base Condition (cfs)	Future Cumulative Condition[1] (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)
Nov	3324.2	2541.6	-782.6	-14.9
Dec	3342.0	3335.2	-6.8	-3.5
Jan	4088.3	4026.8	-61.5	-2.6
Feb	5103.3	4919.7	-183.6	-9.8
Mar	3729.6	3632.1	-97.3	-1.3
Apr	3825.3	3302.4	-522.9	-13.8

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Modeled results of the Future Cumulative Condition show that, relative to the Base Condition, mean monthly flows in the lower American River below Nimbus Dam during the flood control season (November through April) would be significantly less in most months during this period. Reduced flows during this period over the long-term would not increase hydraulic conditions within the river, relative to current conditions. No future cumulative impacts on floodplain characteristics are anticipated. Similarly, under reduced future flow conditions, relative to the Base Condition, the future cumulative impacts associated with increased levee stress would be less than those experienced today.

Unaccounted for in this assessment, however, is the magnitude of individual storm events that, while masked by overall mean monthly flow values, could impart flows under extreme events much greater than that currently experienced. Recent studies on the potential effects of climate induced changes in winter and early-spring runoff hydrology point to this possibility. CALSIM II, as a monthly time-step model has no ability under its current format to address this issue.

5.25. WATER QUALITY – CUMULATIVE IMPACTS

5.25-1 Effects of increased diversions and changes in CVP operations on water quality in reservoirs and rivers.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in CVP withdrawals (diversions) resulting from this action. As discussed in the following paragraphs, however, under the anticipated future cumulative condition, because of reduced reservoir storage and resulting releases to maintain river flows, combined with the expected increases in various forms of direct and non-point source discharges, water quality is expected to be significantly affected.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Water quality in reservoirs and rivers are influenced by a large number of factors. Long-term assessment of water quality, given this range of factors is a highly complex endeavor and not something any one particular model can easily or accurately undertake. Nevertheless, at least from a hydrological perspective, storage and instream flows can provide a measure of dilution capacity.

Table 5.25-1 shows the simulated future mean end-of-month storage in Folsom Reservoir, relative to the Base Condition, using the past 72 years as the hydrologic period record. Mean end-of-month storage decline in all months with the largest decreases observed in late summer and early fall.

TABLE 5.25-1

MEAN END-OF-MONTH STORAGE IN FOLSOM RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (TAF)	Future Cumulative Condition[1] (TAF)	Absolute Difference[2] (TAF)	Relative Difference (%)
Oct	525.8	472.2	-53.6	-10.7
Nov	453.2	443.2	-10.0	-3.7
Dec	464.9	452.0	-12.9	-3.7
Jan	481.6	468.1	-13.5	-3.3
Feb	503.2	487.1	-16.0	-3.4
Mar	614.1	587.6	-26.4	-4.7
Apr	722.7	710.4	-12.3	-2.1
May	834.2	829.9	-4.3	-0.7
Jun	788.4	779.9	-8.6	-0.9
Jul	650.7	635.4	-15.3	-1.8
Aug	601.9	559.1	-42.8	-7.4
Sep	594.4	501.4	-93.1	-15.2

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Water quality in Folsom Reservoir is generally acceptable for the beneficial uses currently defined for the facility. Surface water quality in Lake Natoma and the lower American River depends primarily on the mass balance of various water quality constituents from groundwater inputs, tributary inflow, permitted discharges from municipal and industrial sources, indirect watershed runoff (unchannelized flow), urban runoff, and stormwater discharges. Water quality varies somewhat among years and seasonally within a year based primarily on these and related factors.

Modeling output, as shown in Table 5.25-1 reveal that long-term end-of-month storage in Folsom Reservoir would be less, relative to the Base Condition, in all months, with the greatest decrease in late summer or early fall (i.e., September and October). This implies a reduced ability or flexibility to maintain downstream flows that, as noted, could affect dilution capabilities in Lake Natoma and the lower American River. Further discussion of the modeling output for the lower American River is provided below.

Table 5.25-2 shows the same data for Shasta Reservoir. A more uniform yearly decline in mean end-of-month storage is observed with slightly higher reductions noted again, for the late summer and early fall.

TABLE 5.25-2

**MEAN END-OF-MONTH STORAGE IN SHASTA RESERVOIR
DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)**

Month	Base Condition (TAF)	Future Cumulative Condition[1] (TAF)	Absolute Difference[2] (TAF)	Relative Difference (%)
Oct	2544.8	2503.0	-41.6	-2.5
Nov	2593.2	2552.0	-41.0	-2.4
Dec	2727.4	2689.9	-37.3	-2.3
Jan	2959.1	2926.2	-32.7	-1.9
Feb	3208.2	3179.2	-28.9	-1.5
Mar	3552.6	3520.2	-32.7	-1.3
Apr	3829.4	3794.1	-35.3	-1.3
May	3816.2	3779.7	-36.5	-1.4
Jun	3536.6	3492.9	-43.4	-1.9
Jul	3079.4	3034.2	-45.1	-2.6
Aug	2736.8	2686.0	-50.9	-3.0
Sep	2605.4	2557.4	-48.1	-2.9

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Table 5.25-3 shows the simulated mean monthly future flows in the lower American River below Nimbus Dam, relative to the Base Condition for the entire year. Substantial declines in modeled river flows are noted for the late spring and early- to mid-summer, although the declines are reversed in August and September; two critical months for instream aquatic resources.

TABLE 5.25-3

**MEAN MONTHLY FLOWS BELOW NIMBUS DAM
DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)**

Month	Base Condition (cfs)	Future Cumulative Condition[1] (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)
Oct	2441.8	1571.3	-870.5	-29.1
Nov	3324.2	2541.6	-782.6	-14.9
Dec	3342.0	3335.2	-6.8	3.5
Jan	4088.3	4026.8	-61.5	2.6
Feb	5103.3	4919.7	-183.6	9.8
Mar	3729.4	3632.1	-97.3	1.3
Apr	3825.3	3302.4	-522.9	-13.8
May	3683.2	3321.4	-361.8	-13.1
Jun	3933.9	3704.7	-229.2	-7.8
Jul	3846.4	3620.5	-225.9	-6.7
Aug	2138.4	2254.3	115.9	15.4
Sep	1503.2	2031.6	528.3	45.0

Note:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

As noted in earlier discussions, the principal water quality parameters of concern for the lower American River (e.g., pathogens, nutrients, total dissolved solids (TDS), total organic carbon (TOC), priority pollutants, and turbidity) are primarily affected by urban land use practices and associated runoff and stormwater discharges. The stormwater discharges to the river temporarily elevate levels of turbidity and pathogens during and immediately after storm events.

Although urban land use practices, urban runoff and stormwater discharges all contribute priority pollutants to the river, recent monitoring has not identified any priority pollutant at concentrations consistently above State water quality objectives. However, water quality objectives for dissolved oxygen, temperature, and pH are not always met in the lower American River even today.

The lower American River is included on the federal Clean Water Act Section 303(d) list of waters that do not meet the Clean Water Act national goal of "fishable, swimmable." For listed water bodies, such as the lower American River, total maximum daily loads (TMDLs) must be developed by the State Water Resources Control Board to achieve water quality standards. Group A pesticides (e.g., aldrin, chlordane, lindane, and others), mercury, and pollutants/stressors of unknown toxicity are listed as the pollutants of concern in the lower American River.[214] A 2001 RWQCB staff report is recommending, however, that the Group A pesticides be deleted from the list.[215]

As areas contributing stormwater flows to the American River continue to be developed, the increase in the rate and amount of stormwater runoff from new impervious surfaces is assumed to carry increased concentrations of urban pollutants that could affect water quality. Runoff from construction sites can also affect water quality by increasing sediment loads. These two types of non-point source discharges are regulated under the federal NPDES program, administered at the State level by the RWQCB and SWRCB.

Based on modeling of the future cumulative condition, increased reductions in flows, acting indirectly to lower dilution of the concentrations or levels of water quality parameters, could have a noticeable affect on long-term water quality.

In the future, since flows in the Sacramento and American rivers could, on average, be reduced substantially in certain months of certain years, concentrations of the water quality parameters of interest such as nutrients, pathogens, TDS, TOC, turbidity, and priority pollutants (e.g., metals, organics) could be expected to be altered substantially, relative to the Base Condition. This would be a significant future cumulative impact. As illustrated in earlier analyses into the specific effects of the various Alternatives, this new contracting action would not contribute significantly to this overall effect on future water quality.

214 California Environmental Protection Agency, Central Valley Regional Water Quality Control Board, 1998 California 303(d) List.

215 California Environmental Protection Agency, Central Valley Regional Water Quality Control Board, Final Staff Report on Recommended Changes to California's Clean Water Act Section 303(d) List, December 14, 2001.

5.25-2 Effects on Delta water quality.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in CVP hydrology resulting from this action that would affect Delta water quality. As discussed in the following paragraph, under the future cumulative condition, despite ongoing efforts at aggressively addressing Delta ecosystem function, health, and long-term sustainability, it is likely that Delta water quality will represent a significant cumulative impact in the future.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As one hydrologic indicator of Delta water quality, X2 position provides a useful gauge for assessing Delta outflow and, hence, water quality effects related to saltwater intrusion. Table 5.25-4 shows the modeled future mean monthly position of X2 as a difference from the Base Condition, as well as the maximum yearly increase (i.e., upstream X2 migration) over the 72-year period of hydrologic record.

TABLE 5.25-4

MEAN MONTHLY DELTA X2
DIFFERENCE BETWEEN THE BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]

Month	Absolute Difference (km)	Relative Percent (%)	Maximum[2] (km)
Oct	-0.6	-0.8	1.4
Nov	0.6	0.8	3.1
Dec	0.4	0.5	3.6
Jan	0.1	0.2	2.1
Feb	0.1	0.1	2.6
Mar	0.0	0.0	1.2
Apr	-0.1	-0.1	0.9
May	0.1	0.1	1.5
Jun	0.2	0.3	2.5
Jul	0.0	0.0	1.6
Aug	0.0	-0.1	-0.1
Sep	0.0	0.0	1.3

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Maximum – refers to the largest increase in distance from Golden Gate Bridge (in km) computed for that month (largest increase over 72-years).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

CALSIM II modeling results showed that the long-term mean monthly position of X2 in the future would generally migrate further upstream (i.e., worsen), relative to the Base Condition. Of particular concern are the monthly and yearly maximums, which are significantly larger than those simulated for the various Alternatives. This implies that, based on the modeling assumptions relied upon, the Future Cumulative Condition would impart larger extreme events where X2 upstream migration would be more noticeable and significant on an individual month basis. It is acknowledged that current State-wide efforts at addressing long-term Delta water quality sustainability and improvement will continue to be aggressively pursued; the Governor's Delta Vision Blue Ribbon Task Force Recommendations, the ongoing Bay Delta Conservation Plan, the pending CVP-OCAP, and the current SWRCB Water Quality Objectives are a few examples of ongoing initiative to address this important issue. Given the extreme sensitivity of the Delta, such shifts in modeled X2 position would be of significant magnitude to result in potentially significant future cumulative impacts on Delta water quality. The various Alternatives, including the scenarios under the Proposed Action would contribute incrementally to this future cumulative impact; however, not significantly.

5.26. FISHERIES AND AQUATIC RESOURCES – CUMULATIVE IMPACTS

5.26-1 Effects on CVP reservoir warmwater fisheries.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in CVP reservoir hydrology resulting from this action that would affect reservoir warmwater fisheries. As noted in the following discussions, while the larger reservoirs such as Shasta, while likely to experience loss of littoral habitat, maintain an active littoral shoreline that would still provide suitable habitat to warmwater fish species. No significant future cumulative impact is expected. For Folsom Reservoir, however, potential nest-dewatering events could occur in the months of the March through July warmwater fish-spawning period; this could represent a significant long-term cumulative impact on the reservoir's warmwater fisheries.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Warmwater fisheries throughout CVP reservoirs are dependent on water temperature and shallow water littoral habitat, among other factors. Simulated long-term future changes in reservoir water surface area in Shasta and Folsom reservoirs, and water surface elevations in Trinity Reservoir, relative to the Base Condition are provided in Tables 5.26-1A through 5.26-1C.

In the future, under the modeling simulations performed, mean end-of-month water surface area and water surface elevations are reduced in each of Shasta, Trinity, and Folsom reservoirs, relative to current conditions. Shasta Reservoir would lose, on average, a minimum of 160 acres for every month of the year, relative to its Base Condition, approximating a 2 percent reduction. The maximum reduction would occur in late summer or early fall. Shasta Reservoir's large water surface area; however, would still provide ample nearshore littoral habitat for warmwater fish species and their prey base. Similarly, for Trinity Reservoir, anticipated future reductions in water surface elevation are small, relative to the Base Condition (e.g., no more then a two-tenths of one percent change) for any month over the long-term. For both Shasta and Trinity reservoirs, no significant future cumulative impacts on warmwater fisheries are anticipated based on hydrology.

TABLE 5.26-1A

END-OF-MONTH WATER SURFACE AREA IN SHASTA RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (acres)	Future Cumulative Condition[1] (acres)	Absolute Difference[2] (acres)	Relative Difference (%)
Oct	19899.1	19646.2	-252.8	-1.7
Nov	20171.8	19921.8	-250.0	-1.7
Dec	20949.8	20715.1	-234.6	-1.6
Jan	22336.5	22121.7	-214.7	-1.4
Feb	23676.8	23516.8	-160.0	-1.0
Mar	25454.4	25267.5	-186.9	-0.9
Apr	26674.0	26485.8	-188.2	-0.9
May	26525.2	26325.5	-199.6	-1.0
Jun	25171.8	24936.2	-235.6	-1.3
Jul	22931.7	22656.8	-274.9	-1.8
Aug	21021.4	20713.2	-308.2	-2.1
Sep	20278.0	19977.7	-300.3	-2.0

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in acres), representative of the mean difference over the 72-years (and subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.26-1B

MEAN MONTHLY WATER SURFACE ELEVATIONS IN TRINITY RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (ft msl)	Future Cumulative Condition[1] (ft msl)	Absolute Difference[2] (ft msl)	Relative Difference (%)
Oct	2275.7	2270.4	-5.2	-0.2
Nov	2277.6	2273.2	-4.3	-0.2
Dec	2282.6	2278.6	-4.0	-0.2
Jan	2288.0	2284.5	-3.6	-0.2
Feb	2299.8	2296.5	-3.3	-0.2
Mar	2309.1	2306.3	-2.8	-0.1
Apr	2321.2	2318.8	-2.3	-0.1
May	2319.7	2317.4	-2.3	-0.1
Jun	2315.5	2313.0	-2.6	-0.1
Jul	2303.1	2300.4	-2.7	-0.1
Aug	2290.6	2287.4	-3.2	-0.1
Sep	2280.1	2275.9	-4.2	-0.2

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in feet msl), representative of the mean difference over the 72-years (and subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.26-1C

END-OF-MONTH WATER SURFACE AREA IN FOLSOM RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (acres)	Future Cumulative Condition[1] (acres)	Absolute Difference[2] (acres)	Relative Difference (%)
Oct	7924.0	7372.3	-551.7	-7.4
Nov	7384.8	7143.5	-241.3	-4.0
Dec	7432.8	7266.2	-166.5	-2.7
Jan	7601.7	7474.9	-126.8	-2.0
Feb	7797.9	7656.0	-141.9	-2.1
Mar	8875.4	8612.2	-263.2	-3.1
Apr	9718.9	9644.5	-74.5	-0.9
May	10238.5	10182.8	-55.7	-0.6
Jun	9907.0	9848.9	-58.1	-0.4
Jul	8919.1	8805.0	-114.1	-1.0
Aug	8508.7	8168.6	-340.1	-4.3
Sep	8446.5	7708.7	-737.8	-9.0

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in acres), representative of the mean difference over the 72-years (and subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

For Folsom Reservoir, mean monthly reductions in water surface area would occur in every month under the Future Cumulative Condition. Late summer and early fall reductions in water surface area are particularly significant with over 735 acres lost in September, representing a 9 percent reduction, relative to the Base Condition. The frequency with which potential nest-dewatering events could occur in Folsom Reservoir would also increase in the remaining months of the March through July warmwater fish-spawning period, and consequently, impacts on warmwater fish nesting success may be cumulatively significant. Such reductions in habitat availability could, in turn, lead to increased predation on young-of the year warmwater fish, thereby reducing the long-term initial year-class strength of the population. Unless willows and other near-shore vegetation, in response to long-term seasonal reductions in water levels, become established at lower reservoir elevations in the future, future year-class production of warmwater fisheries could be reduced. Consequently, seasonal reductions in littoral habitat availability represent a potentially significant cumulative impact on Folsom Reservoir warmwater fisheries. Such losses are considered to represent a significant future cumulative impact. The Alternatives, including the various scenarios under the Proposed Action would contribute incrementally to this future cumulative impact; however, not significantly.

5.26-2 Impacts on Folsom Reservoir's coldwater fisheries.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in Folsom Reservoir hydrology or its coldwater pool reservoirs resulting from this action that could affect the reservoir coldwater fisheries. As noted in the following discussions, while reservoir storage in the future is expected to be significantly lower than that under the current Base Condition, this condition would be most prevalent during the late summer to early periods. While this period is important to downstream fisheries lifestages, the reservoir coldwater pool would already have been established at this point and coldwater habitat would remain available within the reservoir during most months of most years.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As shown previously in Table 5.25-1, simulated future mean end-of-month storage in Folsom Reservoir, relative to the Base Condition, declined in all months with the largest decreases observed in late summer and early fall. Coldwater pool resources are particularly important during the latter part of each summer. By this time, development of the reservoir coldwater pool has already been established with thermal stratification between the epilimnion and hypolimnion occurring well before; during the spring. Total reservoir storage decreases of these magnitudes (i.e., 7, 15, and 11 percent, respectively, for August, September, and October) represent considerable depletions in reservoir storage. However, as noted, the reservoir coldwater pool is already established by this time and coldwater habitat would remain available within the reservoir during most months of most years. Future reductions in seasonal storage would not be expected to adversely affect the primary prey species utilized by coldwater fish. Finally, future operation of the Folsom TCD, ongoing shutter manipulation and optimal temperature target release procedures, planned improvements to the Folsom outlet works, continued reliance on the Folsom Coldwater Pool Management Model (CPMM) for predictive planning, Reclamation and Water Forum's proposed new Lower American River Flow Management Standard, and EID's pending new TCD will all contribute to preserving the reservoir's coldwater pool into the future. Future cumulative impacts on Folsom Reservoir's coldwater fisheries are not anticipated to be significant.

5.26-3 Flow- and Temperature-related effects on upper Sacramento River fisheries.

Alternative 1B - No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in river flows or water temperatures in the upper Sacramento River resulting from this action that could affect those fisheries using those waterbodies. As noted in the following discussions, future anticipated reductions in upper Sacramento flows would not likely result in a significant cumulative impact, however, water temperature increases, even though slight, would likely constitute a significant cumulative impact on spawning and rearing success of Chinook salmon.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Table 5.26-3A shows the modeled future mean monthly Sacramento River flow releases below Keswick Dam, relative to the Base Condition. Flow reductions are observed for fall and winter months, although these reductions are approximately 1 to 2 percent. Mean monthly flow increases, however, resulted for the remaining months of the year. The reductions observed are considered

TABLE 5.26-3A

MEAN MONTHLY SACRAMENTO RIVER FLOW RELEASES BELOW KESWICK DAM DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Future Cumulative Condition[1] (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)
Oct	5651.8	5683.5	-68.3	-0.8
Nov	5290.3	5271.9	-18.4	0.4
Dec	6877.8	6796.6	-81.2	-0.7
Jan	8033.1	7944.9	-88.1	-1.4
Feb	10164.0	10095.4	-68.6	-1.5
Mar	8313.3	8385.5	72.2	1.6
Apr	7203.6	7218.6	15.0	0.3
May	8241.9	8253.6	11.7	0.2
Jun	10365.3	10532.9	167.6	1.7
Jul	12708.9	12728.3	19.4	0.4
Aug	10505.2	10676.4	171.2	1.7
Sep	7035.7	6998.2	-37.5	-0.3

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in cfs), representative of the mean difference over the 72-years (and subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

small, relative to the Base Condition flows and are not expected to significantly affect habitat conditions for fisheries. Accordingly, no significant future cumulative impacts on the fisheries in the upper Sacramento as a result of instream flow (e.g. habitat conditions) changes are anticipated.

Table 5.26-3B shows the modeled mean monthly Sacramento River water temperatures at Keswick Dam, relative to the Base Condition. Small changes (i.e., increases) were observed for the summer and late-summer months, but these increases in long-term mean monthly water temperatures do not exceed two-tenths of one degree Fahrenheit. As noted previously, both Chinook salmon and steelhead, however, possess low thermal tolerance and elevated water temperatures could reduce spawning and rearing success of these anadromous salmonids. The slight changes in temperatures, coupled with the lower baseline temperatures suggest that water temperature alone would not necessarily constitute a significant cumulative impact in this reach of the Sacramento River.

Tables 5.26-3C through 5.26-3F show the long-term future modeled annual early life stage survival of all four runs of Chinook salmon, relative to the Base Condition. Modeling results from Reclamation's Sacramento River Chinook Salmon Mortality Model showed that for both winter-run and spring-run, early life stage survival under the Future Cumulative Condition decrease by approximately one percent, relative to the Base Condition. Such decreases in estimated long-term survival of these listed species are considered a significant future cumulative impact. As discussed earlier, however, neither the Alternatives nor the various scenarios under the Proposed Action would significantly contribute to these anticipated long-term impacts.

TABLE 5.26-3B

MEAN MONTHLY SACRAMENTO RIVER WATER TEMPERATURES AT KESWICK DAM DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (°F)	Future Cumulative Condition[1] (°F)	Absolute Difference[2] (°F)	Relative Difference (%)
Oct	53.8	54.0	0.2	0.4
Nov	53.0	53.1	0.1	0.2
Dec	48.7	48.7	0.0	-0.1
Jan	45.1	45.1	0.0	-0.1
Feb	47.4	47.3	-0.1	-0.1
Mar	50.8	50.8	-0.1	-0.1
Apr	52.3	52.4	0.1	0.1
May	51.6	51.6	0.0	0.0
Jun	50.8	50.8	0.0	0.0
Jul	51.3	51.5	0.2	0.4
Aug	52.2	52.3	0.1	0.2
Sep	53.4	53.6	0.2	0.3

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in acres), representative of the mean difference over the 71-years (and subject to rounding).

TABLE 5.26-3C

SACRAMENTO RIVER ANNUAL EARLY LIFE STAGE FALL-RUN CHINOOK SALMON SURVIVAL DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993) (PERCENT SURVIVAL)

Base Condition	Future Cumulative Condition[1]	Absolute Difference[2]	Relative Difference (%)	Maximum Survival Increase[3]	Maximum Survival Decrease[4]
86.0	85.4	-0.6	0.8	1.3 (2.3) 1933 (C)	-9.0 (-11.6) 1929 (C)

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in % survival), representative of the mean difference over the 71-years (subject to rounding).
3. Maximum Survival Increase – refers to the largest increase in annual early life stage fall-run Chinook salmon survival under the Future Cumulative Condition, relative to the Base Condition. Percent increase, relative to the specific year, for which the highest percent increase occurred, shown in parentheses.
4. Maximum Survival Decrease - refers to the largest decrease in annual early life stage fall-run Chinook salmon survival under the Future Cumulative Condition, relative to the Base Condition. Percent decrease, relative to the specific year, shown in parentheses.

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

TABLE 5.26-3D

SACRAMENTO RIVER
ANNUAL EARLY LIFE STAGE LATE FALL-RUN CHINOOK SALMON SURVIVAL DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993) (PERCENT SURVIVAL)

Base Condition	Future Cumulative Condition[1]	Absolute Difference[2]	Relative Difference (%)	Maximum Survival Increase[3]	Maximum Survival Decrease[4]
98.4	98.3	-0.1	-0.1	0.7 (0.7) 1933 (C)	-3.5 (-3.7) 1934 (C)

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in % survival), representative of the mean difference over the 71-years (subject to rounding).
3. Maximum Survival Increase – refers to the largest increase in annual early life stage late fall-run Chinook salmon survival under the Future Cumulative Condition, relative to the Base Condition. Percent increase, relative to the specific year, for which the highest percent increase occurred, shown in parentheses.
4. Maximum Survival Decrease - refers to the largest decrease in annual early life stage late fall-run Chinook salmon survival under the Future Cumulative Condition, relative to the Base Condition. Percent decrease, relative to the specific year, shown in parentheses.

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

TABLE 5.26-3E

SACRAMENTO RIVER
ANNUAL EARLY LIFE STAGE WINTER-RUN CHINOOK SALMON SURVIVAL DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993) (PERCENT SURVIVAL)

Base Condition	Future Cumulative Condition[1]	Absolute Difference[2]	Relative Difference (%)	Maximum Survival Increase[3]	Maximum Survival Decrease[4]
91.8	90.5	-1.3	-5.4	5.0 (7.8) 1932 (D)	-42.8 (-97.7) 1933 (C)

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in % survival), representative of the mean difference over the 71-years (subject to rounding).
3. Maximum Survival Increase – refers to the largest increase in annual early life stage winter-run Chinook salmon survival under the Future Cumulative Condition, relative to the Base Condition. Percent increase, relative to the specific year, for which the highest percent increase occurred, shown in parentheses.
4. Maximum Survival Decrease - refers to the largest decrease in annual early life stage winter-run Chinook salmon survival under the Future Cumulative Condition, relative to the Base Condition. Percent decrease, relative to the specific year, shown in parentheses.

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

TABLE 5.26-3F

SACRAMENTO RIVER
ANNUAL EARLY LIFE STAGE SPRING-RUN CHINOOK SALMON SURVIVAL
DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)
(PERCENT SURVIVAL)

Base Condition	Future Cumulative Condition[1]	Absolute Difference[2]	Relative Difference (%)	Maximum Survival Increase[3]	Maximum Survival Decrease[4]
76.6	75.5	-1.1	-3.1	0.6 (41.8) 1970 (W)	-21.0 (-96.2) 1990 (C)

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in % survival), representative of the mean difference over the 72-years (subject to rounding).
3. Maximum Survival Increase – refers to the largest increase in annual early life stage fall-run Chinook salmon survival under the Future Cumulative Condition, relative to the Base Condition. Percent increase, relative to the specific year, for which the highest percent increase occurred, shown in parentheses.
4. Maximum Survival Decrease - refers to the largest decrease in annual early life stage fall-run Chinook salmon survival under the Future Cumulative Condition, relative to the Base Condition. Percent decrease, relative to the specific year, shown in parentheses.

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

5.26-4 Flow- and Temperature-related effects on lower Sacramento River fisheries.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in river flows or water temperatures in the lower Sacramento River resulting from this action that could affect those fisheries using those waterbodies.

As noted in the following discussions, future anticipated reductions in lower Sacramento flows would not likely result in a significant cumulative impact, however, water temperature increases, even though slight, would likely constitute a significant cumulative impact on anadromous fish using this reach of the river as an immigration route to upstream spawning habitats or as emigration route to the Delta.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Table 5.26-4A shows the simulated long-term future mean monthly flows in the Sacramento River at Freeport, relative to the Base Condition. Mean monthly flow both decrease and increase over the course of 12 months, however, in October, flows would decrease by approximately 855 cfs on average, as applied over the 72-year period of modeled hydrology. This would be a 6 percent reduction, relative to Base Condition flows and, occur during the month when flows in the Sacramento River are typically at their lowest. Such flow reductions could, however, would be offset to some degree by the long-term increases in mean monthly flows in September, relative to the Base Condition.

TABLE 5.26-4A

MEAN MONTHLY SACRAMENTO RIVER FLOWS AT FREEPORT DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR PERIOD OF RECORD (1922-1993)

Month	Absolute Difference (cfs)	Relative Difference (%)	Long-Term Mean Monthly Flows (cfs)
Oct	-855.6	-6.0	11669.0
Nov	-361.5	-2.0	15223.0
Dec	292.0	2.3	25017.7
Jan	198.5	1.4	32701.9
Feb	176.2	0.9	38991.5
Mar	375.5	1.2	34042.7
Apr	-216.8	-1.0	24132.5
May	-282.8	-1.7	19321.8
Jun	102.1	0.7	17406.8
Jul	-23.3	0.1	18314.5
Aug	-90.4	-0.9	14423.4
Sep	466.0	3.6	12859.8

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in cfs), representative of the mean difference over the 72-years (and subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Long-term future water temperatures in the lower Sacramento River show little change, relative to the Base Condition. Table 5.26-4B shows the mean monthly water temperatures at Freeport under the Future Cumulative Condition. Slight increases occur in April and May. Such increases, over the long-term are unlikely to significantly affect fish species (e.g., Sacramento splittail and striped bass) that make little to no use of the upper river (i.e., upstream of RM 163). Native and introduced warmwater fish species primarily use the lower river for spawning and rearing, with juvenile anadromous fish species also using the lower river, to some degree, for rearing.

As previously noted, many of the fish species utilizing the upper Sacramento River also use the lower river to some degree, even if only as a migratory corridor to and from upstream spawning and rearing grounds. Adult Chinook salmon and steelhead, for example, primarily use the lower river as an immigration route to upstream spawning habitats and an emigration route to the Delta. While the long-term average mean monthly water temperatures may not significantly change, the extent to which inter-annual increases may affect various life-stages of listed species is important to consider. Accordingly, the modeling results also revealed that the number of years that temperatures at this location would exceed 56°F, 60°F, and 70°F would be greater (i.e., one more occurrence for the 56°F index, 3 more occurrences for the 60°F index, and 8 occurrences more often for the 70°F index), relative to the Base Condition (see Future Cumulative Condition, Technical Appendix I, this Draft EIS/EIR). Based on these overall findings, fish species within the lower Sacramento River would experience a potentially significant future cumulative impact. As discussed earlier, however, neither the Alternatives nor the various scenarios under the Proposed Action would significantly contribute to these anticipated long-term impacts.

TABLE 5.26-4B

MEAN MONTHLY SACRAMENTO RIVER WATER TEMPERATURES AT FREEPORT DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 71-YEAR HYDROLOGIC PERIOD (1923-1993)

Month	Base Condition (°F)	Future Cumulative Condition (°F)	Absolute Difference[2] (°F)	Relative Difference (%)
Oct	60.9	60.9	0.0	0.0
Nov	52.9	52.7	-0.2	-0.3
Dec	45.7	45.6	-0.1	-0.1
Jan	44.8	44.7	0.0	0.0
Feb	49.5	49.6	0.0	0.1
Mar	54.2	54.2	0.0	0.1
Apr	60.3	60.5	0.2	0.3
May	65.9	66.2	0.2	0.4
Jun	70.1	70.3	0.1	0.2
Jul	72.6	72.8	0.1	0.2
Aug	72.2	72.3	0.0	0.0
Sep	69.2	69.2	0.0	0.0

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in F), representative of the mean difference over the 71-years (and subject to rounding).

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output – 71-year hydrologic record, unpublished data.

5.26-5 Effects on Delta fisheries.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in Delta hydrology resulting from this action that could affect fisheries using those waterbodies.

As noted in the following discussions, future anticipated the upstream shift in the position of X2 under the cumulative condition would meet or exceed one-half km 13 percent of the time during the February through June period. This period is considered important for providing appropriate spawning and rearing conditions and downstream transport flows for various fish species. This would be considered a significant cumulative impact on Delta fisheries.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Table 5.25-4 showed the modeled position of X2 under the Future Cumulative Condition, relative to the Base Condition. Late fall X2 migration upstream, as an average mean monthly variation from current conditions was notable, as were the individual month and year extremes. Table 5.26-5 shows the simulated future mean monthly Delta outflow, relative to the Base Condition. Percent decreases, relative to current conditions are small, except for October. The maximum outflow decreases for each month are large, but upon closer inspection of the modeling results show that they occur in years when base Delta outflows are well above the long-term means. Large reductions

TABLE 5.26-5

**MEAN MONTHLY DELTA OUTFLOW
DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]
OVER THE 72-YEAR HYDROLOGIC RECORD (1922-1993)**

Month	Absolute Difference (cfs)	Relative Percent (%)	Maximum Outflow Decrease[2] (cfs)
Oct	-815.8	-9.6	-7801.0
Nov	-190.6	-0.9	-4181.3
Dec	-251.4	0.7	-3377.7
Jan	-294.8	0.0	-5424.6
Feb	-136.1	0.1	-5104.1
Mar	168.3	1.0	-4440.0
Apr	-247.3	-1.1	-2773.6
May	-397.2	-2.2	-4164.9
Jun	-9.3	0.8	-3093.1
Jul	49.7	1.2	-1605.9
Aug	351.2	8.3	-549.2
Sep	351.4	6.9	-1114.5

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in cfs), representative of the mean difference over the 72-years (and subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

in those years would have little effect on Delta fisheries (see Future Cumulative Conditions, Technical Appendix I, this Draft EIS/EIR).

The modeling results under the Future Cumulative Condition reveal that while October would incur potentially significant decreases in Delta outflow, the X2 position would experience significant upstream migrations in November and December.

Under the Future Cumulative Condition, the long-term average position of X2 would move upstream less than one km, relative to the Base Condition, for any given month of the year. However, during the February through June period considered important for providing appropriate spawning and rearing conditions and downstream transport flows for various fish species, the upstream shift in the position of X2 under the cumulative condition would meet or exceed one-half km 13 percent of the time (46 months out of the 360 months included in the analysis).

The model simulations conducted for the cumulative condition included conformance with X2 requirements set forth in the SWRCB Interim Water Quality Control Plan. Furthermore, Delta export-to-inflow ratios under the cumulative condition would not exceed the maximum export ratio as set by the SWRCB Interim Water Quality Control Plan. Although the cumulative condition would not cause X2 or Delta outflow standards to be violated, there would be a decrease in long-term average outflow and an upstream shift in the position of X2, relative to the Base Condition.

Overall, with these results combined, the potential future cumulative impacts on Delta fisheries are considered to be significant. As demonstrated earlier, the Alternatives including the various scenarios under the Proposed Action, while contributing to this potential significant future cumulative impact would not impart a significant increment.

5.26-6 Effects on lower American River fall-run Chinook salmon and steelhead.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in lower American River flows or temperatures resulting from this action that could affect fall-run Chinook salmon or steelhead.

As noted in the following discussions, future anticipated changes in lower American River flows and water temperatures would, when combined, act to significantly impact both fall-run Chinook salmon and steelhead. This would be considered a significant cumulative impact on these two important fisheries.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Potential effects on lower American River fall-run Chinook salmon and steelhead were evaluated through hydrologic, water temperature, and early life-stage mortality modeling under a Future Cumulative Condition, compared to an existing or Base Condition. As described earlier, the Future Cumulative Condition was developed on the best set of known actions and reasonably foreseeable projects that are incorporated into the CALSIM II model. As either operational rules or depletions, these collective actions dictate the mass balance hydrology that is produced from the modeling.

Flows and water temperatures are the primary indicators from which impacts, if any, were derived. A broad assessment of the future flows and water temperatures at select points within the lower American River were simulated and are presented. These data were then applied to known life stage requirements for fall-run Chinook salmon and steelhead to serve as the basis for the impact assessments. It should be noted that CALSIM II and its related water temperature and early life stage salmon survival models generate output data under a coarse-scale, future level scenario. Future level scenarios, by definition, are rough approximations of what could occur in the future. As discussed in detail previously, they are premised on not only anticipated institutional, regulatory, and environmental controls, but also CVP/SWP operational rules, and changing depletion/accretion assumptions. All of this is made more uncertain given the extent to which the 72-year hydrologic period of record (e.g., that used to provide the inter-annual variability in natural precipitation and water availability) remains representative of future hydrologic conditions.

Given known future depletions contemplated from the American River basin, it is expected that lower American River flows and water temperatures will be affected under the Future Cumulative Condition, relative to the Base Condition. The extent to which these reductions could adversely affect fall-run Chinook salmon and steelhead immigration, spawning and incubation, or juvenile rearing and emigration are discussed below.

Table 5.26-6A through 5.26-6C show the modeled future mean monthly flows in the lower American River, relative to the Base Condition, for the reach below Nimbus Dam, Watt Avenue, and the mouth. The modeling results show significant long-term mean monthly decreases in flows during the fall (October and November) and spring (April and May) months. Mid-winter mean monthly flows are not affected, nor are the late summer flows. An approximate 30 percent decrease in anticipated future, long-term mean monthly flows in October would have significant effects on fall-run Chinook salmon and steelhead adult immigration and could also affect early spawning and egg incubation. Such reductions in flows would reduce the amount of available Chinook salmon spawning habitat, which could result in increased redd superimposition during years when adult returns are high enough for spawning habitat to be limiting.

Simulated mean monthly flows at Watt Avenue and at the mouth under the Future Cumulative Condition show similar, if not accentuated conditions, with flow decreases more pronounced during these months. At both locations, these mean monthly flow reductions extend well into the summer months. Both fall-run Chinook salmon and steelhead may be adversely affected in terms of their long-term juvenile rearing habitat availability under such flow reductions. Equally significant is the juvenile emigration period (February through June) where long-term flows at Watt Avenue would be significantly reduced, relative to the Base Condition.

The flow reductions that would occur under the cumulative condition are of sufficient magnitude and frequency to reduce juvenile steelhead summer (July through September) rearing habitat, relative to the amount available under the existing condition. These could affect the long-term rearing success of juvenile steelhead.

TABLE 5.26-6A

MEAN MONTHLY FLOWS BELOW NIMBUS DAM
DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Future Cumulative Condition (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)
Oct	2441.8	1571.3	-870.5	-29.1
Nov	3324.2	2541.6	-782.6	-14.9
Dec	3342.0	3335.2	-6.8	3.5
Jan	4088.3	4026.8	-61.5	2.6
Feb	5103.3	4919.7	-183.6	9.8
Mar	3729.4	3632.1	-97.3	1.3
Apr	3825.3	3302.4	-522.9	-13.8
May	3683.2	3321.4	-361.8	-13.1
Jun	3933.9	3704.7	-229.2	-7.8
Jul	3846.4	3620.5	-225.9	-6.7
Aug	2138.4	2254.3	115.9	15.4
Sep	1503.2	2031.6	528.3	45.0

Notes:
1. Future Cumulative Condition assumed Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir for EID and 7.5 TAF from PCWA Auburn Pump Station for GDPUD; modeled on an August through October diversion pattern.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in cfs), representative of the mean difference over the 72-years (subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.26-6B

MEAN MONTHLY FLOWS AT WATT AVENUE
DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Future Cumulative Condition (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)
Oct	2402.7	1526.4	-876.3	-29.7
Nov	3399.7	2523.0	-776.6	-15.1
Dec	3337.4	3325.9	-11.4	3.3
Jan	4107.3	4017.3	-90.0	1.7
Feb	5134.9	4900.1	-234.8	7.1
Mar	3759.7	3596.6	-163.0	-2.5
Apr	3859.3	3253.5	-605.8	-16.7
May	3660.6	3255.9	-404.7	-14.3
Jun	3876.4	3630.2	-246.2	-8.2
Jul	3768.7	3541.4	-227.3	-6.9
Aug	2058.6	2176.0	117.3	17.3
Sep	1440.4	1967.0	526.7	48.1

Notes:
1. Future Cumulative Condition assumed Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir for EID and 7.5 TAF from PCWA Auburn Pump Station for GDPUD; modeled on an August through October diversion pattern.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in cfs), representative of the mean difference over the 72-years (subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.26-6C

MEAN MONTHLY FLOWS AT THE MOUTH
DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]
OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Future Cumulative Condition (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)
Oct	2248.3	1328.8	-919.4	-33.1
Nov	3175.8	2361.4	-814.4	-15.4
Dec	3233.0	3218.6	-14.4	4.2
Jan	3990.3	3890.5	-99.8	2.7
Feb	5010.8	4772.3	-238.5	11.1
Mar	3632.4	3439.6	-192.8	-3.1
Apr	3698.9	3027.4	-671.5	-19.6
May	3470.0	2978.9	-491.0	-17.1
Jun	3674.9	3373.8	-301.1	-10.1
Jul	3475.2	3076.2	-399.0	-13.2
Aug	1797.7	1798.7	1.0	17.5
Sep	1243.4	1698.2	454.8	56.3

Notes:
1. Future Cumulative Condition assumed Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir for EID and 7.5 TAF from PCWA Auburn Pump Station for GDPUD; modeled on an August through October diversion pattern.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in cfs), representative of the mean difference over the 72-years (subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.26-6D

MEAN MONTHLY WATER TEMPERATURES BELOW NIMBUS DAM DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 71-YEAR HYDROLOGIC PERIOD (1923-1993)

Month	Base Condition (°F)	Future Cumulative Condition[1] (°F)	Absolute Difference[2] (°F)	Relative Difference (%)
Oct	60.8	59.4	-1.4	-2.2
Nov	56.5	56.5	0.0	0.0
Dec	49.8	49.8	-0.1	-0.2
Jan	46.3	46.3	-0.1	-0.1
Feb	47.4	47.3	-0.1	-0.1
Mar	50.8	50.9	0.0	0.0
Apr	54.9	55.2	0.3	0.6
May	58.8	59.1	0.3	0.5
Jun	62.2	62.3	0.1	0.2
Jul	64.5	64.1	-0.4	-0.6
Aug	64.9	64.3	-0.6	-1.0
Sep	66.0	65.4	-0.6	-0.8

Notes:
1. Future Cumulative Condition assumed Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir for EID and 7.5 TAF from the PCWA Auburn Pump Station for GDPUD; diverted on an August through October diversion pattern.
2. Absolute Difference – difference between Base Condition and Proposed Action (in°F), representative of the mean difference over the 71-years (subject to rounding).

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output 71-year hydrologic record, unpublished data.

TABLE 5.26-6E

MEAN MONTHLY WATER TEMPERATURES AT WATT AVENUE DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 71-YEAR HYDROLOGIC PERIOD (1923-1993)

Month	Base Condition (°F)	Future Cumulative Condition[1] (°F)	Absolute Difference[2] (°F)	Relative Difference (%)
Oct	61.0	60.1	-1.0	-1.5
Nov	55.9	55.9	-0.1	-0.1
Dec	49.0	48.9	-0.1	-0.2
Jan	46.0	45.9	-0.1	-0.1
Feb	47.9	47.8	-0.1	-0.1
Mar	51.8	51.9	0.0	0.1
Apr	56.1	56.6	0.4	0.8
May	60.5	61.0	0.5	0.8
Jun	64.2	64.5	0.3	0.4
Jul	66.5	66.4	-0.2	-0.2
Aug	67.6	67.0	-0.7	-1.0
Sep	67.3	66.5	-0.7	-1.1

Notes:
1. Future Cumulative Condition assumed Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir for EID and 7.5 TAF from the PCWA Auburn Pump Station for GDPUD; diverted on an August through October diversion pattern.
2. Absolute Difference – difference between Base Condition and Proposed Action (in°F), representative of the mean difference over the 71-years (subject to rounding).

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output 71-year hydrologic record, unpublished data.

TABLE 5.26-6F

**MEAN MONTHLY WATER TEMPERATURES AT THE MOUTH
DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1]
OVER THE 71-YEAR HYDROLOGIC PERIOD (1923-1993)**

Month	Base Condition (°F)	Future Cumulative Condition[1] (°F)	Absolute Difference[2] (°F)	Relative Difference (%)
Oct	61.2	60.4	-0.7	-1.1
Nov	55.6	55.5	-0.1	-0.2
Dec	48.5	48.4	-0.1	-0.2
Jan	45.8	45.8	-0.1	-0.1
Feb	48.2	48.1	0.0	-0.1
Mar	52.3	52.4	0.1	0.1
Apr	56.8	57.3	0.5	0.9
May	61.4	62.0	0.6	1.0
Jun	65.2	65.5	0.3	0.5
Jul	67.6	67.7	0.0	0.0
Aug	69.0	68.5	-0.5	-0.7
Sep	68.0	67.2	-0.7	-1.1

Notes:
1. Future Cumulative Condition assumed Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir for EID and 7.5 TAF from the PCWA Auburn Pump Station for GDPUD; diverted on an August through October diversion pattern.
2. Absolute Difference – difference between Base Condition and Proposed Action (in°F), representative of the mean difference over the 71-years (subject to rounding).

Source: June 2007, CALSIM II Based/Water Temperature Modeling Output 71-year hydrologic record, unpublished data.

Modeled future water temperatures in the lower American River, relative to the Base Condition are provided in Table 5.26-6D through Table 5.26-6F. They cover the reach of the lower American River below Nimbus Dam, Watt Avenue, and the mouth. For all three locations, the late-spring (April through June) represent the period where long-term mean monthly water temperatures are expected to increase the greatest, relative to current conditions. At the mouth, mean monthly water temperatures for April and May were simulated to increase by approximately 0.5°F. At Watt Avenue, long-term mean monthly water temperatures would be 0.3°F or greater for each of April, May and June. Such temperature increases would impart significant effects on fall-run and steelhead juvenile rearing in the upper portions of the river. It would also likely significantly affect juvenile emigration during this period.

Table 5.26-6G shows the long-term anticipated early life-stage fall-run Chinook salmon survival, relative to the Base Condition. The modeling results reveal that, over the long-term, survival of the early life-stage fry and smolts from egg mass would increase, relative to the Base Condition by 2 percent. When comparing these data with the instream water temperature modeling results, these results can be explained by the fact that modeled water temperatures during the fall-run Chinook salmon spawning and egg incubation period (October through February) and the steelhead spawning and egg incubation period (December through March) remain outside of the period when river water temperatures would show long-term increases.

TABLE 5.26-6G

AMERICAN RIVER EARLY LIFE-STAGE FALL-RUN CHINOOK SALMON SURVIVAL DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR PERIOD OF RECORD (1922-1993) (PERCENT SURVIVAL)

	Base Condition	Future Cumulative Condition[1]	Absolute Difference	Relative Difference
Mean	84.9	86.9	2.0	2.4
Median	85.4	88.5	1.9	2.3
Minimum	73.8	75.0	-3.5	-4.4
Maximum	93.7	93.8	7.7	9.8

Note:
1. Future Cumulative Condition assumed Proposed Action – Scenario A – modeled 7.5 TAF for EID from Folsom Reservoir and 7.5 TAF for GDPUD from the PCWA Auburn Pump Station; all diverted on an August through October diversion pattern.

The Salmon Mortality Models produce a single estimate of early life stage Chinook salmon mortality in each river for each year of the simulation. The overall salmon mortality estimate consolidates estimates of mortality for three separate Chinook salmon early life stages: (1) pre-spawned (in utero) eggs; (2) fertilized eggs; and (3) pre-emergent fry. The mortality estimates are computed using output water temperatures from Reclamation's water temperature models as inputs to the Salmon Mortality Models. Thermal units (TUs), defined as the difference between river water temperatures and 32°F, are used by the Salmon Mortality Models to track life stage development, and are accounted for on a daily basis. For example, incubating eggs exposed to 42°F water for one day would experience 10 TUs. Fertilized eggs are assumed to hatch after exposure to 750 TUs. Fry are assumed to emerge from the gravel after being exposed to an additional 750 TUs following hatching.

Since the models are limited to calculating mortality during early life stages, they do not evaluate potential impacts on later life stages, such as recently emerged fry, juvenile out-migrants, smolts, or adults. Additionally, the models do not consider other factors that may affect early life stage mortality, such as adult pre-spawn mortality, instream flow fluctuations, redd superimposition, and predation. Simulation output from the Salmon Mortality Models provides estimates of annual (rather than monthly mean) losses of emergent fry from egg potential (i.e., all eggs brought to the river by spawning adults).

Overall, based on the hydrologic, water temperature and salmon survival modeling output and, in consideration of the listed status of fall-run and steelhead, modeled flow reductions and increased water temperatures during any one of the several life-stages of these fish species are sufficient to impart a potentially significant future cumulative impact on this resource. The future cumulative impact on fall-run Chinook salmon and steelhead is considered potentially significant. As shown earlier, the potential effects of the various Alternatives on fall-run Chinook salmon and steelhead in the lower American River varies. The Alternatives that contemplate the full 15,000 AFA diversion (e.g., Alternatives, 2A, 2B and 2C; Alternative 3, and Alternative 1A) were shown to impart slight, but notable potential effects. The Alternatives that proposed reduced diversions (e.g., Alternatives 4A, 4B and 4C) did not. Identified mitigation for the Alternatives, 2A, 2B and 2C; Alternative 3, and Alternative 1A included a shift in diversion pattern (from that modeled). With this mitigation, the

Alternatives, therefore, while contributing to this significant future cumulative impact, would have a less-than-significant incremental contribution.

5.26-7 Effects on lower American River splittail.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in lower American River flows resulting from this action that could affect splittail.

As noted in the following discussions, future anticipated changes in lower American River flows at Watt Avenue during the splittail spawning months (February – May) would be of sufficient magnitude and frequency to significantly affect usable spawning habitat. This would be considered a significant cumulative impact on splittail.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As shown in Table 5.26-6B, modeled mean monthly flows in the lower American River at Watt Avenue, under the Future Cumulative Condition, would be significantly reduced during the February through July period, relative to the Base Condition. April and May showed the largest mean monthly reductions; approximating 15 percent. These modeling data suggest that the splittail spawning period (February through May) would experience a long-term decline in average usable riparian habitat. Given the uncertainty regarding the magnitude and extent of splittail spawning habitat in the lower American River, and the actual amount of potential spawning habitat available at specific flow rates throughout the river, the effects of flow reductions during the February through May period are also uncertain, and therefore, represent a potentially significant future cumulative impact on this federally species. As demonstrated earlier, the Alternatives including the various scenarios under the Proposed Action, while contributing to this potential significant future cumulative impact would not impart a significant increment.

5.26-8 Effects on striped bass.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in lower American River flows resulting from this action that could affect striped bass.

As noted in the following discussions, future anticipated changes in lower American River flows at the mouth during the spring and early months would be of sufficient magnitude and frequency to significantly affect striped bass rearing. This would be considered a significant cumulative impact on splittail.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Table 5.26-6C showed the mean monthly flows at the mouth of the lower American River under the Future Cumulative Condition. Modeled flows were shown to decrease throughout the spring and early summer months. Such flow reductions, over the long-term, could have potentially significant impacts on striped bass juvenile rearing, which occurs during the months of May and June. Using the CDFG attraction flow index of 1,500 cfs, the Future Cumulative Condition would result in several additional years where flows would be less than the 1,500 cfs target, relative to the Base Condition. There would be 12 occurrences in May, representing a 17 percent increase in the frequency with which flows would be less than the 1,500 cfs target, and 5 occurrences in June, representing a 7 percent increase in frequency. Overall, based on the modeled future flow conditions in the lower American River, there would be a significant future cumulative impact on the striped bass recreational sport fishery. As demonstrated earlier, the Alternatives including the various scenarios under the Proposed Action, while contributing to this potential significant future cumulative impact would not impart a significant increment.

5.27. RIPARIAN RESOURCES – CUMULATIVE IMPACTS

Riparian resources throughout the CVP are dependent on system-wide hydrological operations to ensure adequate flows both in volume and seasonally. Long-term future changes in reservoir and instream operations have the potential to affect riparian diversity, sustenance, and expansion in reservoirs and river reaches throughout the CVP, including the highly sensitive Delta. CALSIM II modeling was used as the primary simulation tool to predict hydrological changes and relate those changes to riparian resource communities throughout the CVP.

5.27-1 Effects of changes in water surface elevations on Folsom, Trinity, and Shasta reservoir vegetation.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in CVP reservoir hydrology or operations resulting from this action. Under the future cumulative condition, this impact would be less than significant.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Long-term average end-of-month storage and/or water surface elevations for Folsom and Shasta reservoirs would be reduced, relative to the Base Condition, with the most significant reductions occurring during the fall period (October and November) (see Table 5.25-1 for Folsom Reservoir; Table 5.25-2 for Shasta Reservoir end-of-month storages). Trinity Reservoir showed slight, albeit insignificant long-term changes in water surface elevations (see Table 5.27-1). The most significant changes occurred outside of the growing season months of March through September.

TABLE 5.27-1

MEAN MONTHLY WATER SURFACE ELEVATIONS IN TRINITY RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (ft msl)	Future Cumulative Condition[1] (ft msl)	Absolute Difference[2] (ft msl)	Relative Difference (%)
Oct	2275.7	2270.4	-5.2	-0.2
Nov	2277.6	2273.2	-4.3	-0.2
Dec	2282.6	2278.6	-4.0	-0.2
Jan	2288.0	2284.5	-3.6	-0.2
Feb	2299.8	2296.5	-3.3	-0.2
Mar	2309.1	2306.3	-2.8	-0.1
Apr	2321.2	2318.8	-2.3	-0.1
May	2319.7	2317.4	-2.3	-0.1
Jun	2315.5	2313.0	-2.6	-0.1
Jul	2303.1	2300.4	-2.7	-0.1
Aug	2290.6	2287.4	-3.2	-0.1
Sep	2280.1	2275.9	-4.2	-0.2

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in feet msl), representative of the mean difference over the 72-years (and subject to rounding).

For most reservoirs, weedy vegetation, rather than vegetation that would provide higher quality wildlife habitat, typically establishes in the drawdown zone, due to the constant fluctuations in reservoir elevation that result from annual/seasonal reservoir drawdown. Consequently, reductions in reservoir elevations that would occur in the future would not affect areas of high and consistent habitat value that are available for species associated with the reservoir. Accordingly, the future cumulative impact on reservoir riparian vegetation in Shasta, Trinity, and Folsom reservoirs would be less than significant.

5.27-2 Flow-related effects on upper and lower Sacramento River riparian vegetation.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in upper Sacramento River flows resulting from this action. Under the future cumulative condition, this impact would be less than significant.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Under the Future Cumulative Condition, upper Sacramento River long-term average flows during the March through October growing season remain unaffected, relative to the Base Condition. In fact, the early months of the growing season showed long-term mean monthly flow increases, as releases from Keswick Dam, relative to the Base Condition (see Table 5.26-3A). In the upper Sacramento River, simulated future reductions in mean monthly flow releases from Keswick Dam occurred in the months of January and February. Accordingly, anticipated long-term flow reductions that would occur under the Future Cumulative Condition would not be of sufficient magnitude and/or frequency to significantly alter upper Sacramento River riparian vegetation and related species.

Modeled reductions in long-term average flows of the lower Sacramento River at Freeport under the Future Cumulative Condition revealed only slight changes, relative to the Base Condition (see Table 5.26-4A). No long-term changes in mean monthly flows were observed over the growing season in early spring and mid-summer months. Therefore, significant adverse effects on riparian habitats of the lower Sacramento River would not be expected under the Future Cumulative Condition.

5.27-3 Flow-related effects on Delta riparian vegetation and special-status species.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in Delta hydrology resulting from this action. Under the future cumulative condition, flow-related effects on Delta riparian vegetation and special-status species was deemed to be less than significant.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Modeled Delta outflow conditions under the Future Cumulative Condition showed that while there would be slight mean monthly reductions in outflow during April and May (peak riparian growing season), by mid-summer, simulated outflows would increase, relative to the Base Condition (see Table 5.26-5). The month of October revealed the largest simulated reduction in long-term average mean monthly Delta outflow.

As noted previously, the long-term average reduction in lower Sacramento River flow would not affect the growing season months. Potential shifts in the long-term average position of X2 were slight, under the Future Cumulative Condition with the mid-winter months of November and December revealing the largest upstream migrations of X2. Water quality conditions, at least in terms of the X2 salinity surrogate for riparian vegetation would not be significantly affected under the Future Cumulative Condition. Overall, anticipated flow reductions and the general maintenance of the X2 position during the critical growing season would be considered minor perturbations and would not adversely affect Delta vegetation or special-status species dependent upon Delta habitats. The future cumulative impact on Delta riparian vegetation and special-status species relying upon those botanical communities would be less than significant.

5.27-4 Flow-related effects on lower American River riparian vegetation and special-status species dependent upon riparian and open water habitats.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in lower American River hydrology resulting from this action that would affect riparian vegetation and special-status species. Under the future cumulative condition, sufficient changes anticipated in the future in riverine hydrology would be a significant cumulative impact on riparian vegetation and special-status species in the lower American River.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Riparian plant communities along the lower American River are maintained through hydrologic, geomorphic, and substrate conditions that have occurred there over time. Spatially, they are varied along the longitudinal profile of the river with alder-dominated vegetation occurring as stringers along the upper reaches of the river while, further down, gravel bars and point bars occur as a result of sediment transport and storage along the channel bed. Regeneration of willows occurs on scoured gravel bar sites. Cottonwoods also form small stringers on freshly deposited sediment on point bars as well as on less steep terraces with suitable seed beds, where even-aged stands of older cottonwoods occur. As noted previously, most of the riparian forest habitat immediately adjacent to the lower American River is dominated by cottonwood intermixed with willows. Several backwater and off-river ponds occur at some of the bars along the river.

Long-term future changes in lower American River flows could result in more frequent occurrences where flow indices for cottonwood growth and terrace inundation are not met. As an example, flows could be below the radial growth maintenance index more frequently than that occurring presently.

Table 5.27-1A shows tabulations from modeled future simulations of the number of months under the Future Cumulative Condition when mean monthly lower American River flows (at four locations) would be below 1,750 cfs, the threshold flow considered necessary to support the continued radial growth of cottonwoods during the growth season (May through September). Significant increases in the number of months were observed under the Future Cumulative Condition (e.g., a 19 percent increase in the number of months from the Base Condition was tabulated for Watt Avenue). This would be a potentially significant future cumulative impact on cottonwood growth along the lower American River.

Higher flows earlier in the growing season (i.e., April through June) are often critical to the establishment of seedlings on riverine terraces. Table 5.27-1B tabulates the number of years, for each month under the Future Cumulative Condition, when mean monthly flows in the lower American River below Nimbus Dam would be within the flow range considered optimal (i.e., between 2,700 and 4,000 cfs) and compares the Base Condition with the Future Cumulative Condition. The early growing season (May) shows a noticeable reduction in the number of months, relative to the Base Condition, when mean monthly flows would be within the 2,700 to 4,000 cfs range considered optimal for riparian growth and sustenance. This would be a potentially significant future cumulative impact on riparian growth along the lower American River.

TABLE 5.27-1A

NUMBER OF MONTHS WHEN LOWER AMERICAN RIVER FLOWS ARE BELOW 1,750 CFS (MAY THROUGH SEPTEMBER PERIOD) UNDER THE FUTURE CUMULATIVE CONDITION[1]

	Base Condition	Future Cumulative Condition[1]	Difference[2]
Nimbus			
	92	101	9
Watt Avenue			
	112	133	21
H Street			
	129	157	28
LAR Mouth			
	129	158	29

Notes:
1. Future Cumulative Condition assumed Proposed Action – Scenario A – modeled 7.5 TAF for EID diverted from Folsom Reservoir and 7.5 TAF for GDPUD diverted at the PCWA Auburn Pump Station; on an August through October diversion pattern.
2. Difference represents the numerical difference in number of months between Base Condition and Future Cumulative Condition.

Based on CALSIM II 72-year hydrologic period of record (1922-1993).
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

TABLE 5.27-1B

NUMBER OF YEARS WHEN LOWER AMERICAN RIVER FLOWS BELOW NIMBUS DAM IN OPTIMAL RANGE (2,700 TO 4,000 CFS) UNDER THE FUTURE CUMULATIVE CONDITION[1]

Month	Base Condition	Future Cumulative Condition[1]	Difference
Oct	16	2	-14
Nov	10	8	-2
Dec	2	2	0
Jan	6	5	-1
Feb	7	10	3
Mar	11	9	-2
Apr	14	13	-1
May	20	12	-8
Jun	21	24	3
Jul	19	22	3
Aug	12	12	0
Sep	0	17	17

Notes:
1. Future Cumulative Condition assumed Proposed Action – Scenario A – modeled at 7.5 TAF for EID diverted from Folsom Reservoir and 7.5 TAF for GDPUD diverted at the PCWA Auburn Pump Station; diverted on an August through October diversion pattern.

Based on CALSIM II 72-year hydrologic period of record (1922-1993).
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

Table 5.27-1C shows the number of years, for each month under the Future Cumulative Condition, when mean monthly flows in the lower American River at H Street would be within the threshold criteria for minimum backwater pond sustenance and continuous recharge. Tabulated years from CALSIM II hydrology output for the lower American River at this location show the variation between current conditions (Base Condition) and the simulated hydrology under the Future Cumulative Condition. The largest reduction occurs in October, although May also reported 6 fewer occurrences (or an 8 percent reduction) when flows would be within the minimal/optimal range for backwater pond sustenance and continuous recharge. This would be a potentially significant future cumulative impact on backwater pond maintenance along the lower American River.

TABLE 5.27-1C

NUMBER OF YEARS WHEN LOWER AMERICAN RIVER FLOWS AT H STREET IN MIN/OPTIMAL RANGE (1,300 TO 4,000 CFS) UNDER THE FUTURE CUMULATIVE CONDITION[1]

Month	Base Condition	Future Cumulative Condition1	Difference[2]
Oct	61 (84.7)	39 (54.2)	-22(-30.6)
Nov	43 (59.7)	47 (65.3)	4 (5.6)
Dec	45 (62.5)	38 (52.8)	-7 (-9.7)
Jan	36 (50.0)	38 (52.8)	2 (2.8)
Feb	29 (40.3)	28 (38.9)	-1 (1.4)
Mar	31 (43.1)	36 (50.0)	5 (6.9)
Apr	40 (55.6)	40 (55.6)	0 (0)
May	44 (61.1)	38 (52.8)	-6 (-8.4)
Jun	43 (59.7)	43 (59.7)	0 (8.3)
Jul	31 (43.1)	33 (45.8)	2 (2.8)
Aug	44 (61.1)	37 (51.4)	-7 (-9.7)
Sep	40 (55.6)	44 (61.1)	-4 (5.6)

Notes:
1. Future Cumulative Condition assumed Proposed Action – Scenario A – modeled at 7.5 TAF for EID from Folsom Reservoir and 7.5 TAF for GDPUD at the PCWA Auburn Pump Station; diverted on an August through October diversion pattern.
2. Difference represents the numerical difference in number of months between Base Condition and Future Cumulative Condition; percent differences shown in parentheses.

Based on CALSIM II 72-year hydrologic period of record (1922-1993).
Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Overall, the modeling results for the Future Cumulative Condition show that lower American River hydrology would be affected substantially during portions of the riparian growth seasons. Such changes in hydrology are considered sufficient to represent a potentially significant future cumulative impact on riparian communities and backwater pond and wetlands. The Alternatives, along with the various scenarios under the Proposed Action, while contributing to this potentially significant future cumulative impact would not impart a significant increment. This was illustrated earlier in the project-specific effects of the proposed new contract.

5.28. Water-Related Recreational Resources – Cumulative Impacts

Future changes in system hydrology have the potential to affect water-related recreational facilities and activities in various reservoirs, waterways, and in the Delta through reduced water surface elevations, water surface area, and river flows.

5.28-1 Impacts on recreational facilities and activities at Shasta and Folsom reservoirs.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in reservoir storage, water surface elevations or reservoir surface area in Shasta or Folsom reservoirs resulting from this action. Under the future cumulative condition, while Shasta and Trinity reservoirs showed changes in long-term end-of-month water surface area these were not considered significant. For Folsom Reservoir, however, projected end-of-month water surface area and water surface elevations occurring within the recreational season would be considerable and constitute a significant future cumulative impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Tables 5.26-1A through 5.26-1C, as shown previously, provided output data for future simulated reservoir water surface areas for Shasta, Trinity, and Folsom reservoirs, respectively, relative to the Base Condition. Shasta Reservoir showed slight mean, long-term, end-of-month water surface area changes, relative to the Base Condition, but these monthly reductions did not exceed 2 percent. Trinity Reservoir showed no measurable changes in water surface elevations; most mean monthly long-term changes were less than one-tenth of one percent of Base Condition elevations. Folsom Reservoir showed the most noticeable changes with September revealing a 9 percent reduction in mean end-of-month water surface area, relative to the Base Condition, with an 11.2 ft reduction in long-term water surface elevation in September (see Table 5.28-1).

TABLE 5.28-1

MEAN MONTHLY WATER SURFACE ELEVATIONS IN FOLSOM RESERVOIR DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] DURING THE MAY – SEPTEMBER RECREATIONAL SEASON OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (ft msl)	Future Cumulative Condition[1] (ft msl)	Absolute Difference[2] (ft msl)	Relative Difference (%)
May	451.2	450.6	-0.6	-0.1
Jun	446.2	445.3	-0.9	-0.2
Jul	430.9	429.3	-1.6	-0.4
Aug	425.6	420.3	-5.3	-1.2
Sep	424.8	413.6	-11.2	-2.6

Notes:
1. Future Cumulative Condition assumed Proposed Action – Scenario A – modeled at 7.5 TAF for EID diverted from Folsom Reservoir and 7.5 TAF for GDPUD diverted at the PCWA Auburn Pump Station; diverted on an August through October diversion pattern.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in ft msl), representative of the mean difference over the 72-years (and subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, unpublished data.

At Shasta Reservoir, the slight long-term reductions in water surface area and corresponding elevations are unlikely to represent a significant future cumulative impact given the size of the reservoir and, therefore, the ability of recreationists to seek our alternative locations for activity (e.g., boat launching, swimming, fishing access, etc.). At Folsom Reservoir, however, to the extent that September represents an important end of season recreational month (e.g., Labor Day weekend), the magnitude and frequency of the simulated reductions in water surface elevations and surface area would likely have a significant future cumulative impact on recreational activities and facilities. As shown in earlier analyses of the specific Alternatives, the Alternatives and various scenarios under the Proposed Action, while contributing to this future cumulative impact; would not impart a significant incremental contribution.

5.28-2 Impacts on recreational activities along the lower American River.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in Folsom Reservoir releases or lower American River flows resulting from this action. Under the future cumulative condition, the expected frequency of mean monthly flows in the lower American River being below that considered optimal for water-related recreation during the May through September period would increase substantively. This would be considered a significant future cumulative impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As previously shown in Table 5.27-1A, the frequency with which mean monthly flows all along the lower American River would be below the minimum 1,750 cfs necessary for water-related recreational activities would increase, relative to current conditions. At Watt Avenue, for example, mean monthly river flows under the Future Cumulative Condition would be below 1,750 cfs during the May through September recreational season, approximately 20 percent more often than today. This alone, would be a significant future cumulative impact on lower American River water-dependent recreational activities. As illustrated in analyses presented earlier for the specific Alternatives, the Alternatives including the various Proposed Action scenarios, while contributing to this future cumulative impact, would not impart a significant increment.

5.28-3 Impacts on recreational activities in and along the upper and lower Sacramento River.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in Folsom Reservoir releases or lower American River flows resulting from this action. Under the future cumulative condition, flows in the upper and lower Sacramento River would change, however, flows are not typically limiting for recreational purposes. There is no anticipated significant cumulative impact on water-related recreational activities in and long the upper and lower Sacramento River.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Riverine recreational activities depend on adequate flows. While recreationists have the ability to choose when and where they recreate and so, would tend to avoid conditions unsuitable for water-related activities, summer time flows are an important determinant of recreational activity. In the Sacramento River, flows are rarely limiting during the May through September recreational season. As shown in Table 5.28-3A, long-term mean monthly flows, on average, were simulated to increase, relative to Base Condition levels in the upper Sacramento River, with the exception of September. The mean monthly flow reduction for September, however, is not significant and long-term September flows under the Future Cumulative Condition are still well above 6,000 cfs.

TABLE 5.28-3A

MEAN MONTHLY SACRAMENTO RIVER FLOW RELEASES BELOW KESWICK DAM DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] DURING THE MAY TO SEPTEMBER RECREATIONAL SEASON OVER THE 72-YEAR HYDROLOGIC PERIOD (1922-1993)

Month	Base Condition (cfs)	Future Cumulative Condition[1] (cfs)	Absolute Difference[2] (cfs)	Relative Difference (%)
May	8241.9	8253.6	11.7	0.2
Jun	10365.3	10532.9	167.6	1.7
Jul	12708.9	12728.3	19.4	0.4
Aug	10505.2	10676.4	171.2	1.7
Sep	7035.7	6998.2	-37.5	-0.3

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in cfs), representative of the mean difference over the 72-years (and subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

In the lower Sacramento River, mean monthly flows under the Future Cumulative Condition showed similar trends with that occurring upstream. Slight changes, over the long-term, are predicted. Any reductions in mean monthly, long-term averaged flows, would be less than significant. Future cumulative condition flows in the lower Sacramento would remain well above 10,000 cfs throughout the summer recreational period (Table 5.28-3B).

TABLE 5.28-3B

MEAN MONTHLY SACRAMENTO RIVER FLOWS AT FREEPORT DIFFERENCE BETWEEN BASE CONDITION AND FUTURE CUMULATIVE CONDITION[1] DURING THE MAY TO SEPTEMBER RECREATIONAL SEASON OVER THE 72-YEAR PERIOD OF RECORD (1922-1993)

Month	Absolute Difference (cfs)	Relative Difference (%)	Long-Term Mean Monthly Flows (cfs)
May	-282.8	-1.7	19321.8
Jun	102.1	0.7	17406.8
Jul	-23.3	0.1	18314.5
Aug	-90.4	-0.9	14423.4
Sep	466.0	3.6	12859.8

Notes:
1. Future Cumulative Condition assumed implementation of Proposed Action – Scenario A – modeled 7.5 TAF from Folsom Reservoir on an August through October diversion pattern – diverted at EID's existing intake and 7.5 TAF from the Auburn Pumps for GDPUD.
2. Absolute Difference – difference between Base Condition and Future Cumulative Condition (in cfs), representative of the mean difference over the 72-years (and subject to rounding).

Source: June 2007, CALSIM II Modeling Output – 72-year hydrologic record, Unpublished data.

Overall, the future cumulative impacts on upper and lower Sacramento River water-dependent recreational activities would be less than significant.

5.29. WATER-RELATED CULTURAL RESOURCES – CUMULATIVE IMPACTS

River flow fluctuations and reservoir levels are influential hydrologic factors possessing the ability to potentially affect cultural resources in those waterbodies. Long-term reservoir elevation and river flow decreases could expose previously submerged resources, while reservoir and flow increases could damage or submerge existing exposed resources.

5.29-1 Effects of changes in magnitude and/or frequency of Folsom reservoir elevations on cultural resources.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in Folsom Reservoir water surface elevations resulting from this action. Under the future cumulative condition, while modeled changes in end-of-month water surface area would decline appreciably, the extent to which the reservoir has fluctuated historically and, thereby, already affected cultural resources suggests that no additional effects on cultural resources would occur under the Future Cumulative Condition.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

For Folsom Reservoir, each of the mean monthly average water surface elevations under both the Base Condition and under the Future Cumulative Condition, are well within the 395 to 466 ft msl zone of historic maximum fluctuation as discussed earlier. A review of the entire 874 monthly record shows that, under the Future Cumulative Condition, there would be 37 additional months when Folsom Reservoir water surface elevations would be below 395 ft msl, relative to the Base Condition. This represents an approximate 4 percent increase in the frequency with which water elevations would be below 395 ft msl. Nevertheless, as discussed previously, the maximum long-term mean monthly water surface elevation decrease for Folsom Reservoir was approximately 11 ft msl. An 11 ft vertical drop in water surface, depending on reservoir slope and bathymetry, could affect a large area of shoreline. As shown in Table 5.26-1C, the maximum reduction in mean end-of-month water surface area for Folsom Reservoir was 740 acres (or 9 percent of the reservoir's water surface area for that month, under the Base Condition). Such reductions could represent a significant impact; however, the extent to which Folsom Reservoir has undergone numerous wetting and drying cycles (i.e., lowering and raising water levels as a part of its historic operations) suggests that no additional effects on cultural resources would occur under the Future Cumulative Condition. Accordingly, insofar as Folsom Reservoir is concerned, future changes in hydrology are considered to represent a less-than-significant future cumulative impact on cultural resources.

5.29-2 Effects of changes in magnitude and/or frequency of lower American River and Sacramento River flows on cultural resources.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in lower American River or Sacramento River flows resulting from this action. Under the future cumulative condition, while changes in river flows are anticipated, it unlikely that such changes would significantly affect the remaining cultural resources along these waterways that would have already been subject to the full range of inundation and exposure. This is considered to be a less-than-significant future cumulative impact.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Modeling data for the Future Cumulative Condition confirm that, overall, long-term flow reductions are anticipated through CVP watercourses. As explained previously, however, changes in river flows, therefore, would have a much more limited effect on either inundating (through water elevation rise) or desiccating (through water level decline) cultural resource sites along the channel embankments. More importantly, the 72-year hydrologic period of record includes numerous episodes of extremely high flows within both in the lower American and Sacramento rivers. At such flows, any cultural resource sites along the river channels would have historically been inundated through substantial river stage increases. Accordingly, while future flow changes (i.e., reductions) are anticipated to occur, it is unlikely that such changes would significantly affect the remaining cultural resources along these waterways that would have already been subject to the full range of inundation and exposure. Potential future cumulative impacts on cultural resources along these waterways is considered to be less than significant.

5.30. LAND USE – CUMULATIVE IMPACTS

As discussed previously, for this action, no new facilities, improvements to existing infrastructure, nor construction activities are proposed. To the extent that construction of certain facilities are required to fully implement the P.L.101-514 contract, appropriate project-level environmental documentation would be prepared by those agencies at such time in the future when those decisions would be made. Accordingly, for this EIS/EIR, service area-related effects including those associated with future cumulative effects can only be discussed in limited detail and, only where relevant. Much of this analysis and discussion has already been provided as part of the County's most recent General Plan and EIR process. This process effectively provided a future cumulative assessment of the various plans, programs, policies, ordinances and planning process applicable to El Dorado County under anticipated future growth pressures. It also accommodated, at the time, a full inspection of the contentious issues under the Writ of Mandate which, after additional work, was successfully lifted by the court in 2006. This new contracting action does not, in any way, conflict with or circumvent those policies and committed obligations and mitigation measures made by the County. In fact, much of the discussions provided herein are taken from the General Plan EIR.

This subchapter and the ensuing subchapters address the potential indirect, service area-related future cumulative impacts related to the implementation of the project. As noted, it defers significantly to the already completed County General Plan EIR which, as an out-year (or cumulative assessment) in its own right, provided a future assessment of the anticipated activities, levels of service, facilities, and growth-related issues and pressures facing the County as it proceeds towards buildout.

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in any service area related activities, land uses, facilities, or services resulting from this action.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Land use is generally a County-specific issue, except where land uses may interact with surrounding jurisdictions. Continued concentration of urban development along the U.S. 50 corridor under the County's General Plan would extend a corridor of urban land uses east from Sacramento County. It is now likely that future urbanization will occur south of U.S. 50 in the City of Folsom, given the recent sphere of influence boundary expansion for that city. However, it would be speculative to assign any land use assumptions to that area because there are no current plans for its development. Extending an urban pattern along a freeway corridor, by itself, would not cause significant land use impacts that interact with development in other counties of the region to cause cumulative land use impacts.

There is the potential, however, that as the U.S. 50 corridor continues to urbanize, the separation between El Dorado County and the City of Folsom will become less distinct, to the point where they merge together. This could alter the community identity/character of the county and the city. The urban development in El Dorado County north of U.S. 50 that is adjacent to the city of Folsom, Promontory, is covered by a development agreement and is adjacent to the approved Russell Ranch project in Folsom. Both projects include a mix of housing product type, and it is likely that once developed, the separation between Folsom and El Dorado County will be difficult to distinguish. Both these projects are approved; therefore, this impact is considered potentially significant and unavoidable. South of U.S. 50 is Carson Creek in El Dorado County, which is also approved under a development agreement with a mixture of residential and research and development land uses. This area abuts open space/agricultural land in Sacramento County, and this area is within the newly expanded Folsom sphere of influence. If it were to develop with uses similar to Carson Creek, the area to the south of U.S. 50 would also lose the physical separation between communities. Given that there currently no plans for this area of Sacramento County, it would be speculative to conclude whether any impacts would occur.

The El Dorado County General Plan is intended to guide the location and intensity of land uses in El Dorado County. In the County's General Plan EIR, the four equal-weight alternatives that were considered differed with respect to their land use maps; however, they all considered existing land use patterns, and specifically, areas that have already been developed with residential uses. The potential for land use incompatibility would continue into the future, primarily as a result of the range of uses allowed by right. Incompatibilities could be created by the Low-Density Residential designations; siting of government buildings in inappropriate zoning districts; lack of compatibility review for the wide variety of uses allowed by right; and conflicting uses permitted in Rural Regions (e.g., ranch marketing, timber harvesting, mining, agriculture, residential). Development intensity and density could be more widespread at buildout because all available developable land could already be in use by that time. The potential for incompatibilities that could be encountered throughout the County in 2025 could be fully realized at buildout. Moreover, the General Plan acknowledged that the discretionary review process could allow development near existing mining operations resulting in land use compatibilities. This impact was considered significant and represents a significant cumulative impact.

The County committed to following shall be considered when reviewing capital improvement plans and proposals for new facilities by other agencies:

A. Schools shall be considered incompatible on land designated Industrial, Research and Development, Agriculture, Natural Resources and Open Space;

B. Active parkland (i.e., playgrounds and ball fields) shall be considered incompatible on land designated Natural Resources and Open Space;

C. Fire stations, public service buildings, and other similar public facilities shall be considered appropriate in all land use designations except Natural Resources and Open Space.

5.31. TRANSPORTATION AND CIRCULATION – CUMULATIVE IMPACTS

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in any service area related activities, land uses, facilities, or services resulting from this action.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Traffic impacts are a regional concern. As regional growth continues, development patterns will affect traffic and circulation in El Dorado County, and planned growth in the county resulting from the equal-weight alternatives would affect the regional road network, including the U.S. 50 corridor. Growth may foster increased improvements to the County's roadway system, but would also cause greater levels of traffic and a greater level of improvement need.

Jobs created in El Dorado County would result in employees commuting from Sacramento and Placer counties. Similarly, housing opportunities in western El Dorado County resulting from General Plan implementation would increase peak-hour trips into Sacramento, Rancho Cordova, Folsom, and other areas of Sacramento County where most of the regional area jobs are concentrated.

The Metropolitan Transportation Plan (MTP) is intended to respond to the cumulative traffic effects that local plans have on the circulation system of the entire Sacramento region. These significant General Plan impacts would also cause a considerable contribution to significant regional traffic impacts. Much of the cumulative traffic impact outside of El Dorado County would occur in Sacramento County as a result of the increased commute traffic along the U.S. 50 corridor. The SACOG MTP projected a regional (SACOG-wide) increase in population of 928,048 between 2000 and 2025. The MTP allocated a share of this population growth, 69,500, to El Dorado County. To the degree that the county does not accommodate this level of growth, it is possible that this growth would occur in the adjacent counties, Sacramento, Placer, and Amador. This would place higher traffic levels in these counties.

The various alternatives considered by the County as part of their General Plan concluded that by 2025, a range of shortfalls relative to the MTP allocation would occur. A potential shift of traffic volume to adjacent counties traffic that would otherwise have occurred in El Dorado County could result. This is a potentially significant cumulative impact, although surrounding jurisdictions retain land use authority and authority over the approval of land uses that may result in significant traffic impacts. It is not feasible to mitigate such an impact because it is not known where; or whether it would occur, and mitigation would be the responsibility of whichever surrounding county would approve development that would cause the impact. The only other means available to mitigate this impact would be to increase the development potential of the County's growth alternatives, and this would require substantially modifying land use maps and/or altering the basic conditions that defined the alternatives contemplated in the General Plan EIR (no new subdivisions of residential land under the No Project Alternative and maximum subdivision of four parcels under the Roadway Constrained 6-Lane "Plus" Alternative). This was considered infeasible because it would entirely redefine these alternatives. Therefore, this impact was considered potentially significant and unavoidable under the General Plan alternatives considered by the County.

The proposed Shingle Springs Rancheria Casino/Hotel project was projected to add additional traffic impacts on U.S. 50 and other county roads. The traffic associated with the casino would have a considerable contribution to cumulatively significant regional traffic impacts.

Implementation of various mitigation measures by the County would minimize El Dorado County's contribution to cumulative traffic impacts, but would not reduce them to less-than significant levels. Consequently, cumulative regional traffic impacts are considered significant and unavoidable.

The adopted General Plan includes concurrency policies. As a result, roadway improvements are expected to generally keep pace with new development. However, even under the concurrency policies, some new traffic could occur in advance of transportation improvements.

There are numerous uncertainties involved in modeling traffic in the buildout scenario. For example, while maximum buildout of any given area of the county is always a possibility, it is much less realistic to assume that maximum buildout of available land would occur countywide. Economic, environmental, physical, political, and other constraints are likely to limit maximum development in parts of the county, either as a practical matter or through application of the policies in the General Plan reflecting those constraints. In fact, many factors are indeed uncontrollable such as the current state of the housing market, economic vitality, job growth, and the overall financial health of the County and State.

5.32. AIR QUALITY – CUMULATIVE IMPACTS

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in any service area related activities, land uses, facilities, or services resulting from this action.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Air quality is a regional environmental issue, with the majority of air pollutant emissions being created by motor vehicle use within the county's air basins and other air basins in the region. As noted previously, the designated growth areas of the county are on the west slope, which is in the MCAB. The MCAB is designated as non-attainment for the State and national ozone standards and the State particulate (PM10) standard. Ozone pollution is the primary air quality impact of cumulative concern, because precursor emissions of ozone can occur throughout the region and combine to exacerbate attainment of air quality standards in El Dorado County. Pollutants transported from the San Francisco Bay area also contribute to regional air quality impacts. The County AQMD participated with other AQMDs in the Sacramento area to prepare the 1991 Air Quality Attainment Plan, which includes strategies for achieving the State and national air quality standards. The various alternatives of the County's General Plan include policies and mitigation measures to support reduction of air emissions and help attain the standards, in keeping with the attainment plan. While various mitigation measures designed to address potential air pollutant emissions related to stationary and mobile sources resulting from implementation of County growth were proposed, it was determined that the significant impacts on regional air quality could not be avoided, despite the inclusion of all feasible mitigation measures. The significant air quality impact in El Dorado County would contribute to a cumulative significant air quality in the region, which also could not be avoided.

Implementation of the County General Plan would result in planned development, leading to increases in motor vehicle travel, wood fire stoves/fireplaces, and other sources. These would contribute cumulatively to the significant impact on air quality in the region. Although all feasible policies and mitigation measures were included in the General Plan EIR, this cumulative impact was, and is still considered significant and unavoidable.

The construction of 21,434 new dwelling units, nonresidential development (to support 36,188 new jobs), and other supporting infrastructure would generate emissions of ROG, NO_X, and PM_{10}. As noted in previous discussions, such emissions would be caused by site grading and excavation, paving, application of architectural coatings (e.g., paint, stucco), motor vehicle exhaust associated with construction equipment and construction employee commute trips, material transport (especially on unpaved surfaces), demolition, and other construction operations. Construction of nonresidential development and other supporting infrastructure would result in some new ROG, NO_X, and PM_{10} emissions, but residential construction, which would occur at a rate of about 1,000 units per year, would account for the majority of construction and this would contribute the majority of construction-related emissions.

Increased development and related resident transportation needs would result in regional emissions of ROG, NO_X, CO, and PM_{10} due to vehicle trips, use of natural gas, burning, use of maintenance equipment and consumer products that exceed the applicable thresholds and thus would contribute to a violation of applicable NAAQS or CAAQS. Most recently, diesel exhaust particulate was added to the CARB list of TACs. Activities involving the long-term use of diesel-powered equipment and heavy duty trucks, such as gravel mining and landfilling activities are, therefore, of particular concern. In addition, the attainment plan would potentially be conflicted with due to the increase in population and employment growth, which consequently leads to an increase in VMT and mobile-source emissions. As a result, this impact is considered cumulatively significant.

Odor impacts are also affected by meteorological conditions, in which case some odor emission sources (e.g., agriculture operations, landfills, rendering plants, food-processing facilities, wastewater treatment facilities) can affect sensitive receptors at distances of more than a mile from the source. Emission sources common within urbanized settings, such as fast-food restaurants particularly those using charbroiling equipment, and dry-cleaning establishments, are not typically considered major odor emission sources. Though such sources often do not affect large numbers of people, sensitive receptors located within close proximity can be exposed to odors on a frequent basis. Odor-generating sources can reduce impacts by modifying operations or by installation of odor-controlling equipment. However, for sensitive receptors, mitigation measures are limited. In fact, in some instances, the only measures available to sensitive receptors is to relocate upwind or further downwind from a source.

Continued development within the County would result in the location of sensitive receptors near odor-generating sources. Continued enforcement of AQMD Rule 205 and implementation of general plan policies to limit development near odor emission sources would reduce this impact, but would not eliminate exposure of sensitive receptors to nuisance odors. As a result, this impact is considered cumulatively significant.

5.33. NOISE – CUMULATIVE IMPACTS

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in any service area related activities, land uses, facilities, or services resulting from this action.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Noise is generally a county issue, except for roadways that carry significant traffic between counties. As noted previously, for most noise-related impacts, the location of the impact is site specific and influenced by local rather than regional conditions (e.g., traffic on a roadway, local topographic conditions, and adjacent stationary noise sources). As overall development within the County occurs, ambient noise levels will increase. Compliance with standards that define noise impacts, however, will continue to be invariably controlled by traffic levels and site-specific development.

Potential cumulative noise impacts that warrant consideration are traffic noise on the regional freeway, U.S. 50, and aircraft noise from Mather Field in Sacramento County. Increases in traffic noise on U.S. 50 resulting from growth would affect adjacent land uses in Sacramento and El Dorado counties. The source of traffic noise in El Dorado County on U.S. 50 is from a broader regional area (Sacramento County and other areas), not just El Dorado County. These cumulative traffic noise levels were evaluated in the County General Plan EIR. In addition to traffic noise in El Dorado County, traffic from development of any of the General Plan alternatives in combination with other regional growth would increase noise levels adjacent to U.S. 50 in Sacramento County.

The Draft Program EIR on the Final Draft MTP 2025 evaluated, among other things, increases in noise levels on several regional roads as a result of growth in the six-county SACOG region, including El Dorado County. The MTP EIR predicts a 3 dBA increase in traffic noise along U.S. 50 from Prairie City Road to the El Dorado County line. The General Plan would contribute to this cumulatively significant impact, and the contribution would slightly exceed (in 2025) what was predicted in the MTP EIR. The MTP EIR identifies mitigation measures for these cumulative impacts, including construction of sound walls as needed (to a limit) and other noise barriers, and specifies that such measures are the responsibility of the implementing agency for specific road projects. SACOG acknowledges that this impact may not be able to be fully reduced, and concludes it would be significant and unavoidable.

From an air traffic noise perspective, noise from continued aircraft operations at Mather Field in Sacramento County would add to the noise impact on El Dorado County residents through exposure to aircraft overflights. As residential development increases south of U.S. 50 near the Sacramento County line, more residences would be under one or more of the common aircraft approach paths to this airfield. A greater number of El Dorado County residents would be exposed to aircraft noise because of the location of residential development, but this would be a direct General Plan-related effect, rather than a contribution to a regional, cumulative impact concern.

As additional development occurs throughout the county, the potential exists for new noise-sensitive land uses to encroach upon existing or proposed stationary noise sources. Development of new stationary noise sources, such as industrial and commercial operations, may also result in a noticeable increase in ambient noise levels at nearby existing noise-sensitive land uses. To the extent that new development is discretionary, noise-related impacts associated with many of these uses, such as new shopping centers, industrial uses, emergency sirens associated with fire stations, etc. would be considered by the County during project review. As previously discussed, many of the major stationary sources of noise, such as mining and lumber mill operations, are located in the more rural areas of the county.

Implementation of the relevant General Plan goals and policies would help to protect both existing and proposed noise-sensitive land uses from non-transportation noise sources. Nonetheless, even though sources may not exceed the applicable maximum allowable noise standards, increased development would likely still result in substantial increases in ambient noise levels at some existing and future noise-sensitive land uses. Consequently, this impact is considered a cumulatively significant.

Finally, under 2025 conditions, additional development throughout the County may lead to incompatibility between noise-sensitive land uses and stationary noise sources. Implementation of the relevant General Plan goals and policies would help to protect both existing and proposed noise-sensitive land uses from non-transportation noise sources, but would not prevent impacts related to increases in ambient noise levels caused by non-transportation noise sources. This impact is considered significant.

5.34. GEOLOGY, SOILS, MINERAL RESOURCES, AND PALEONTOLOGICAL RESOURCES – CUMULATIVE IMPACTS

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in any service area related activities, land uses, facilities, or services resulting from this action.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

By virtue of higher levels of anticipated development in the future, potential impacts associated with the loss in accessibility of mineral resources would be more severe at buildout than under current or even 2025 conditions. This impact is considered significant cumulative impact.

In general, the adoption of and adherence to various General Plan policies and implemented mitigation measures can offset soil erosion, mass wasting, and other soil loss events from occurring. Also, differing acreage thresholds and/or a slope thresholds could help mitigate soil loss through erosion. Agricultural activities, however, by definition would continue to allow erosion effects. This impact would remain significant and unavoidable.

A significant issue relates to those projects outside of the CEQA and permitting where discretionary and ministerial development could still occur on steep slopes, the primary factor influencing the rate and extent of erosion, and because agricultural grading activities are generally exempt from the grading permit process, this impact is considered significant. Nondiscretionary development could occur in areas prone to landslides and avalanches, this impact is also considered significant as the proposed policies and the County Building Code would not fully mitigate impacts associated with potential development in areas subject to landslides and avalanches. Therefore, this impact is considered a significant cumulative impact.

Implementation of the General Plan can result in conversion of farmland (Important Farmland, land currently in agricultural production, grazing land, or land under Williamson Act contract) to nonagricultural uses both directly and indirectly. Direct conversion could occur by designating farmlands for nonagricultural (e.g., residential or commercial) uses. Indirect conversion can occur by allowing incompatible uses, either near or directly on land designated for agricultural uses, without adequate safeguards in place to protect the farmlands from conversion.

Through its various policies and implementation measures identified in its Conservation and Open Space Element relevant to paleontological resources, there is guidance to help identify, avoid, or otherwise mitigate any potential future planned activities on these resources.

5.35. RECREATION – CUMULATIVE IMPACTS

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in any service area related activities, land uses, facilities, or services resulting from this action.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Projected new development within the County would increase the demand for park and recreation facilities. Since it is not certain that adequate new park and recreation facilities would be developed concurrent with new development based on potential funding limitations, there may be a degradation in existing facilities.

The provision of adequate parkland to serve new population growth is an objective of all of the General Plan growth scenarios. The definition of “adequate” parkland is based on county-wide standards of 5 acres per 1,000 persons within the residential development context. Based on the level and distribution of anticipated residential development, the amount of parkland needed to serve new growth to meet County standards would be approximately 268 acres through 2025.

In order to meet parkland standards for this level of projected growth, a range of between approximately 404 and 984 acres of developed parks would be required through 2025 and/or buildout.

The provision of parkland under Quimby Act requirements does not ensure the development of parks to serve the population. Substantial funding would be required to develop and also to operate and maintain parks. Limited funding, however, has historically been made available to local service providers (i.e., El Dorado Hills CSD, Cameron Park CSD, and the GDRD) through property tax revenue; these funds are typically used for operation and maintenance of parks, and are not always sufficient for these purposes. The potential inability to meet established park standards could result in the potential overuse of existing park facilities, which may lead to substantial physical deterioration of existing facilities. The lack of adequate funding for maintenance of park facilities coupled with increased use could further accelerate their deterioration. This impact would be considered a significant cumulative impact.

It should be noted that park and recreation facility development may also require land use permits in some instances since the development of park facilities could potentially result in adverse physical effects on the environment. Parks that are developed in response to population growth could result in adverse physical impacts on the environment. However, because specific locations for new park facilities have not been identified, the specific physical impacts of constructing new parks cannot be determined at this time. It is reasonable to assume that construction and operation of park facilities would not result in significant impacts apart from the impacts of other types of development that are allowed within the various land use categories. The developed park facilities needed to serve the future population growth could be developed on all lands in the County, regardless of General Plan land use designation, as a matter of right.

5.36. VISUAL RESOURCES – CUMULATIVE IMPACTS

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in any service area related activities, land uses, facilities, or services resulting from this action.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

The continued urbanization of the U.S. 50 corridor through Sacramento County, the City of Folsom, and into western El Dorado County would have a significant cumulative effect on the visual resources of that region, because of a change in landscape from one with a more rural, pastoral character to one of urban and suburban development. This change is already in process, and the change in visual character is significant and unavoidable.

This corridor plays an important scenic role as the gateway to El Dorado County from the west. Conversion of the rural landscape to a suburban appearance would result in the reduction of the natural aesthetic qualities of the corridor. While the visual impacts in the U.S. 50 corridor would be reduced by policies and mitigation measures set forth in the General Plan, they cannot feasibly be avoided or reduced to a less-than-significant level. Therefore, the cumulative reduction in the natural aesthetic qualities of the U.S. 50 corridor is considered a significant and unavoidable impact.

While the County generally encourages the design of new development to emulate the best characteristics of existing nearby development and provide for design review, the visual character of some areas will inevitably change and, in some cases, change substantially. The County, as a whole, could begin to take on a different character, but lower densities and protected sensitive resource areas could allow relatively higher amounts of open space and scenic resources to be retained. Nevertheless, based on the fact that substantial residential growth could occur, the County is unlikely to retain its rural character. This impact is considered cumulatively significant.

While the availability of clustered development in and near Community Regions and Rural Centers would provide a disincentive for large amounts of dispersed residential development in Rural

Regions, the anticipated absolute level of residential development would result in the visual character of some specific areas of the county to change. New subdivisions in areas that are currently relatively undeveloped can be expected to change the rural character to one that is more sub-urban in nature. While certain General Plan Policies, such as LU-3a through LU-3, would require that new subdivisions be designed to provide open space, avoid important natural resources, incorporate design elements of nearby development, encourage pedestrian circulation and transit access, and locate services near high-density residential areas, the overall trend towards urban, as opposed to rural character, would make this a visual long-term and unavoidable cumulative impact.

In addition, each subdivision's Design Improvement Standards Manual would identify structural design, landscaping, and infrastructure design standards for that development.

5.37. Cultural Resources – Cumulative Impacts

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in any service area related activities, land uses, facilities, or services resulting from this action.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

Cultural resources are a site-specific resource in the County, and although there is potential for the cumulative loss of such resources throughout the region, policies contained in the various growth scenarios associated with the General Plan contain mitigation measures that, in general, would adequately protect those resources in El Dorado County. No cumulative impacts on cultural resources have been identified.

As discussed in the Conservation and Open Space Element of the El Dorado County General Plan, numerous policies and goals have been identified by the county to protect and preserve cultural resources. Over the years, numerous county and private organizations and commissions have endeavored to heighten public awareness of El Dorado County's prehistoric and historic cultural heritage and to preserve and manage numerous cultural resource sites in the area. These include the County Historical Museum, County Historical Society, and County Pioneer Cemetery Commission. These organizations and commissions serve in an advisory capacity to the county and assisted in the development of some of the policies contained in the Conservation and Open Space Element.

5.38. Terrestrial and Wildlife Resources – Cumulative Impacts

Alternative 1B – No Project Alternative

Under the No Project Alternative, no project-induced actions are proposed either currently or in the future. Consequently, there would be no change in any service area related activities, land uses, facilities, or services resulting from this action.

Alternatives 2A, 2B and 2C – Proposed Action – All Scenarios, Alternatives 4A, 4B and 4C – Reduced Diversion Alternatives, Alternative 3 – Water Transfer Alternative, Alternative 1A – No Action Alternative

As a result of planned development in foothill counties, including El Dorado County, a cumulative loss and fragmentation of natural habitats is a growing impact concern in this important ecologic area. Foothill woodland and chaparral habitats are two habitat types experiencing substantial cumulative loss and fragmentation as a result of growth pressures. Additionally, riparian habitats are also experiencing encroachment by urban uses, vegetation loss, and fragmentation. The populations of special-status species that occupy these habitats, such as rare plant communities and the California red-legged frog are experiencing cumulative loss of habitat and reduction in numbers of individuals.

The County General Plan contains various policies to protect habitats and special-status species; however, development permitted in El Dorado County under any of the anticipated growth scenarios would contribute to the cumulatively significant impact of the loss and fragmentation of woodland and chaparral habitats, riparian corridors, and other important biological resources of the Sierra Nevada foothills and impacts on special-status species. At the time the General Plan policies and mitigation measures were identified, it was deemed that they would reduce the habitat and special-status species effects to the extent feasible. However, the impact of habitat loss and fragmentation was considered significant and unavoidable. As discussed earlier, the County, along with various partnering El Dorado interests including EDCWA have participated in, and continue to participate in various programs and efforts to address the long-term resource management threats related to these important species/habitats.[216]

5.39. Significant Unavoidable Adverse Impacts

The CEQA Guidelines 15126.2(b) state that any significant impacts, including those which can be mitigated but not reduced to a level of insignificance must be described. For the delivery of the new CVP water service contract supplies to El Dorado County as described in Chapter 5.0 (Environmental Consequences), no significant unavoidable adverse impacts on the environment were identified. For CVP hydropower generation/capacity and local pumping power impacts at Folsom Dam, such effects were deemed to be significant and unavoidable, but were considered economic impacts and not environmental.

There would be significant and unavoidable impacts resulting from growth that would be accommodated by the proposed water supply contracts. These significant and unavoidable impacts were fully evaluated in the certified General Plan EIR. Resources that would be affected are: land use, agriculture and forestry, visual resources, traffic and circulation, water, utilities, public services, human health and safety, noise, air quality, and biological resources. For additional description, please see Chapter 6.0 (Growth-Inducing Impacts).

216 The Proposed Action is in informal consultation with the USFWS under Section 7 of the ESA for listed species within the Subcontractor service areas. In light of the relationship between the Biological Assessment and this EIS/EIR, additional discussion pertaining to special-status species within El Dorado County is provided in this Draft EIS/EIR as it relates to approved General Plan growth in the County. The reader is referred to Subchapter 6.7 (Growth-Inducing Impacts).

5.40. Significant Irreversible and Irretrievable Commitments of Resources

The CEQA Guidelines 15126.2(c) note that uses of non-renewable resource during the initial and continued phases of the project may be irreversible since a large commitment of such resources makes removal or non-use, thereafter, unlikely. Any irretrievable commitment of resource should be evaluated to assure that such currently proposed consumption is justified. Typically, these provisions are relevant in projects involving construction, infrastructure development, land conversions, or resource extraction.

Under NEPA (40 CFR 1502.16), the discussion of environmental consequences shall include any adverse environmental effects which cannot be avoided should the proposal be implemented, the relationship between short-term uses of man's environment and the maintenance and enhancement of long-term productivity, and any irreversible or irretrievable commitments of resources which would be involved in the proposal should it be implemented. [43 FR 55994, Nov. 29, 1978; 44 FR 873, Jan. 3, 1979]

The proposed new CVP water service contracts under this Proposed Action represent a long-term consumptive use of CVP water. A new water allocation is being committed under the P.L.101-514 contract. Hydropower generation, pumping power, and CVP water would, in specified quantities and, during specified periods of time, no longer be available for use by Reclamation and others. Unlike other resource extraction projects, CVP water supplies along with all other non-federal water supplies are replenished annually and naturally. While physical constraints (e.g., reservoir size) of existing infrastructure may act to limit the adequacy of this inter-annual replenishment, the hydrologic water balance of the State confirms that precipitation totals are orders of magnitude greater than consumptive demands. Hydrologically, therefore, as far as precipitation inputs State-wide are concerned, water is renewable on an inter-annual basis. An altered hydrometeorologic regime such as those potentially occurring under forced climatic perturbations may, however, change this balance over the long-term.

For potential future project-specific actions associated with the diversion, conveyance, treatment and distribution of new treated water, an irretrievable and irreversible commitment of resources may occur. It is normally assumed that resources such as fossil fuels will be expended during any construction project, primarily for earth moving operations, and other vehicular transport. In addition, the operation and maintenance of new water facility infrastructure (e.g. river intake pumps, water treatment plants, booster pump stations, pipelines) would require the commitment of energy resources. Depending on the energy source, such energy expenditure could be irretrievable.

Finally, different types of materials would also be used during the construction of any new water facilities. For example, concrete, asphalt, steel, wire, wood, plastics, etc. would be used in varying amounts in the construction of both new water infrastructure and support facilities and buildings. The longevity of these materials (designed to maximize longevity) and their recyclable qualities would determine the extent to which such resource materials would be irretrievable lost. Finally, where new facilities require land clearing (especially in currently undeveloped areas), a loss of topsoil and vegetation would occur. Topsoil loss would, in most cases, be irretrievable, however, vegetative re-plantings and off-site mitigation measures may avoid an irreversible and irretrievable loss of trees and shrubs.