

## 5. ALTERNATIVES

### 5.1 INTRODUCTION TO ALTERNATIVES

Pursuant to §15126.6(a) of the State CEQA Guidelines, this environmental impact report (EIR) includes an analysis of alternatives to the Water Forum Proposal (WFP) that could feasibly attain its basic objectives (i.e., the coequal objectives), as well as review of three types of “no project” alternative. The analysis is intended to provide a comparison of alternatives that are selected based on their potential ability to feasibly reduce at least one significant effect of the WFP and still achieve its objectives. As the WFP’s coequal objectives are to 1) provide a reliable and safe water supply for the region’s economic health and planned development through the year 2030; and 2) preserve the fishery, wildlife, recreational, and aesthetic values of the Lower American River, alternatives to the project, like the WFP itself, need to be capable of providing alternative water supplies in an environmentally sensitive manner.

State CEQA Guidelines §15126.6(a) calls for an evaluation of “a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and evaluate the comparative merits of the alternatives.” In §15126.6(f) it specifies that the range of alternatives is governed by the “rule of reason,” requiring evaluation of only those alternatives “necessary to permit a reasoned choice.” They shall be “limited to ones that would avoid or substantially lessen any of the significant effects” of the WFP. Further, an EIR “need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative.”

State CEQA Guidelines §15126.6(e) requires that, among other alternatives, a “no project” alternative be evaluated in comparison to the proposed project. It also states that the “no project” analysis “discuss the existing conditions, at the time environmental analysis is commenced, as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services.” Accordingly, this section provides an analysis of three no project alternatives: **No Project Alternative—Independent Actions**, based on the independent implementation of currently proposed and reasonably expected individual water agency actions to secure additional supply in the water service study area; **No Project Alternative—Constrained Surface Water and Groundwater**, which could occur if diversions and groundwater pumping were constrained by the lesser of future demands, existing capacity, or existing water entitlement; and **No Project Alternative—Constrained Surface Water, Unconstrained Groundwater**, which reflects surface water diversions constrained by the lesser of existing facilities, entitlements, or demand, with remaining demands met by groundwater.

The alternatives to the WFP analyzed in this EIR were designed to consider alternative means of reducing potential adverse environmental impacts, in addition to provisions already included in the WFP. For example, the WFP incorporates elements that restrict dry year diversions,

increase conservation, improve groundwater management and conjunctive use, and provide for instream flows accommodating the needs of the fisheries. Because adverse impacts of increased diversions still remain, Alternatives 1, 2, 3, and 4 were designed to explore alternative means of reducing the levels of diversions from Folsom Reservoir and the Lower American River, in order to alleviate potential adverse effects of diversions on fisheries, recreation, and water and power supply. The alternatives provide a basis for comparison of the impacts of the WFP. As with the identification of mitigation measures, this discussion is intended to assist the decision-makers in analyzing reasonable and feasible means of avoiding adverse environmental impacts.

## 5.2 DESCRIPTION OF ALTERNATIVES

This section provides a description of seven alternatives to the WFP that are analyzed in this EIR; they are:

- 1 Increased Sacramento River Diversions
- 2 Increased Groundwater Pumping
- 3 Increased Water Reclamation
- 4 More Frequent Reductions in Surface Water Diversions
- 5 No Project Alternative—Independent Actions
- 6 No Project Alternative—Constrained Surface Water and Groundwater
- 7 No Project Alternative—Constrained Surface Water, Unconstrained Groundwater

### 5.2.1 Alternative 1 - Increased Sacramento River Diversions

Alternative 1, Increased Sacramento River Diversions, would involve transferring up to 78,000 AF of surface water diversions considered in the WFP from the Lower American River to the Sacramento River with the aim of reducing impacts on the American River. In order to reach end users, water diversion, pumping, treatment and transmission facilities would be required.

The intent of this alternative is to assess whether use of Sacramento River water in lieu of American River water could reduce significant effects on the Lower American River. As such, it should be considered an alternative to Element 1, Increased Surface Water Diversions, as defined for the WFP. For purposes of analysis, it is assumed that the following diversions considered for the Lower American River in the WFP would be moved to the Sacramento River in all years.

Diversion By:	Diversion Amount:
South County Agricultural Water Users	35,000 AF
City of Folsom	14,000 AF
Northridge Water District	29,000 AF
<b>Total</b>	<b>Up to 78,000 AF</b>

This alternative assumes water diversions from two locations on the Sacramento River. They would include a new surface water diversion at Freeport, approximately 10 miles downstream of the confluence of the Sacramento and American rivers, and a new diversion near Elkhorn, approximately 10 miles north of the confluence. The new diversion at Freeport was the subject of preliminary study by the City of Sacramento, and was addressed as a diversion alternative in the CVP Water Supply Contracts Draft EIR/EIS (SCWA/USBR, 1997), and the Elkhorn diversion is currently proposed by the combined interests of Northridge Water District, Natomas Mutual Water District, the City and County of Sacramento, and Placer County Water Agency (PCWA).

For purposes of this alternative, it is assumed that water for South County Agricultural Water Users and the City of Folsom would be diverted at Freeport and water for Northridge Water District would be diverted at Elkhorn.

In terms of new facilities, this alternative would require construction of the Freeport and Elkhorn diversions and water treatment plants; treated water pipeline to convey water to Folsom (to approximately U.S. Highway 50 and Prairie City Road); a canal to transport raw water from Freeport to South County agricultural water users; and a raw water pipeline to transport water to the Folsom South Canal. Water for Northridge Water District would be conveyed east by a pipeline already planned under the combined project.

### **5.2.2 Alternative 2 - Increased Groundwater Pumping**

Alternative 2 would involve meeting a larger portion of future demands (up to approximately 612,000 AF/Yr in 2030) through additional groundwater pumping. This alternative assumes that local groundwater from three subareas of the groundwater basin in Sacramento County would be extracted to meet projected growth in the County through the year 2030. There are no substantial groundwater resources in El Dorado or Placer counties that could replace surface water resources, so the focus of this alternative is Sacramento County. The intent of this alternative is to assess whether greater amounts of groundwater could be used in lieu of American River water to reduce significant effects of the WFP on the Lower American River and Sacramento River.

The three subareas of the groundwater basin in Sacramento County include the Sacramento North Area, South Sacramento Area, and Galt Area (see Exhibit 4.3-1). The hydrologic boundaries separating the zones are the American River (separating the Sacramento North and South Sacramento areas), and the Cosumnes River (separating the South Sacramento and Galt areas).

In order to evaluate the groundwater resource availability in the Sacramento County area under different scenarios, an Integrated Groundwater - Surface Water Model (IGSM) was developed which incorporates all of the major components of surface and groundwater hydrology in the county area. A detailed discussion of model development, various model runs, and data analysis are provided in Sacramento County Water Agency, Phase II - Groundwater Yield Analysis Technical Memorandum No. 1, Baseline Conditions (Sacramento County Water Agency,

1994); Technical Memorandum No. 2, Impacts Analysis (Sacramento County Water Agency, 1995); and (Appendix E) Sacramento County Water Agency, Baseline Conditions for Groundwater Yield Analysis, Final Report (Sacramento County Water Agency, May 1997).

Under this alternative, the 2030 level of development is assumed to correspond with the 1993 Sacramento County General Plan buildout condition of the Urban Policy Area (UPA). As described in Section 4.10, Land Use and Growth-Inducing Impacts, buildout of the UPA is expected to occur in 2024 based on projected growth rates (Boyle Engineering, 1995), with some development outside the UPA by 2030. Although this increment of development was not included in the model, this analysis is still conservative with respect to the amount of surface water needed because it considers meeting nearly all future growth demands in Sacramento County by extracting groundwater, with few increases in surface water diversion.

Based on land use projections and estimated levels of municipal, rural, and industrial water use, urban water use in the County is expected to increase from approximately 389,000 AF in the base condition to approximately 695,000 AF in 2030. Based on IGSM model results and agricultural acreage and crop distribution projections by the California Department of Water Resources (SMWA/USBR, 1996), a net decrease in agricultural water demand of 76,000 AF is expected by 2030. Most of this decrease would occur in the North and South Sacramento County areas. Unlike the WFP, these projections do not assume 25.6% conservation through implementation of best management practices, and may therefore, be overstated.

As noted above, this alternative assumes that projected water demands in the County will be met through local groundwater supplies and that existing levels of surface water diversions will remain the same, with the following exceptions. First, the City of Folsom, Rancho Murieta, and the Sacramento Municipal Utility District (SMUD) are presently served solely by surface water and are located in areas with limited groundwater availability. Therefore, Alternative 2 assumes that all demands in these areas will continue to be met through surface water supplies, resulting in the need for some additional diversions. Second, the City of Sacramento has water rights from the Sacramento River (within the city limits) and the American River (for the City of Sacramento Place of Use [POU]), so it is assumed that additional demands within the City limits and some areas within the POU would be met through increased surface water diversions.

Based on these assumptions, groundwater use is projected to increase from approximately 497,000 AF in the base condition, to approximately 612,000 AF in 2030. Most of the increase would occur in the South Sacramento area where substantial urban growth is planned.

### **5.2.3 Alternative 3 - Increased Water Reclamation**

Alternative 3 would involve increased use of reclaimed water (up to approximately 300,000 AF/Yr by 2010) to offset groundwater pumping and new surface water diversions for non-potable consumptive uses such as irrigation, industrial use, and wetlands management. Specifically, reclamation studies for the County of Sacramento, the City of Roseville, and the El Dorado Irrigation District (EID), have been conducted and are considered in the definition of Alternative 3.

The intent of Alternative 3 is to assess whether increased use of reclaimed water is capable of feasibly reducing--even if indirectly through reduced groundwater pumping--adverse effects associated with surface water diversions proposed in the WFP. Although capable of reducing groundwater pumping and some surface water diversions, Alternative 3 could not entirely substitute for any element of the WFP due to the limited uses of reclaimed water. In addition, implementation of the WFP would not preclude increased use of reclaimed water as described in Alternative 3.

## **Sacramento County**

Sacramento County completed a countywide Reclamation Study (Sacramento County Regional Sanitation District, 1994) to determine the role of reclaimed water in countywide water management, and to evaluate reclaimed water markets, particularly for agriculture and landscape irrigation.

The potential market for agricultural reclaimed water was quantified through analysis of cropping patterns and irrigation requirements. These data were refined through additional literature review and personal interviews with farmers, irrigation managers, and water district staff from areas that could potentially use reclaimed water for irrigation. Based on the results of the study, the potential reclaimed water demand for agricultural use in Sacramento County would be concentrated in the South County area. Potential demand was estimated to increase over time from approximately 150,000 AF in the study's base year of 1993 to approximately 263,000 AF in the year 2010, with some out-of-county exports after 2005 due to insufficient in-County demand south of the American River.

It should be noted that almost all of the demand that could be met by reclaimed water is currently supplied from groundwater or the Cosumnes River. It is not supplied from the American or Sacramento Rivers.

Non-agricultural reclaimed water users in the County (primarily irrigators of parks, schools, roadway rights-of-way and medians, cemeteries, and golf courses) were identified and potential reclamation water use was quantified. Based on the results of the survey, the potential non-agricultural reclaimed water demand for all of Sacramento County was estimated at 33,000 AF, 15,414 AF of which would be south of the American River and could be served from the Sacramento Regional Wastewater Treatment Plant. It would not be cost-effective to serve the area north of the American River.

Implementation of the Sacramento County Reclamation Project would involve use of reclaimed water for agricultural (263,000 AF within Sacramento County and 14,586 AF within San Joaquin County) and non-agricultural (15,414 AF) uses south of the American River. Conveyance, storage, and distribution facilities for reclaimed water would include pump stations, storage tanks, reservoirs, pipelines, and canals. The Clay Station Reservoir site on Laguna Creek would need to be developed as a 170,000 AF reclaimed water reservoir. Use of treated effluent diverted for reclaimed water use (and thus not discharged to the Sacramento River) would decrease Delta outflows by a like amount. See Executive Summary.

## **City of Roseville**

The City of Roseville has rights to the tertiary treated effluent from the Regional Wastewater Treatment Plant on Booth Road in Roseville. Planned capacity of the treatment plant is 54 million gallons per day (mgd) and a portion of the reclaimed water is currently used in Roseville's existing reclaimed water system. Roseville considered a project to replace its consumptive use of American River water. The project would involve construction of a pumping and conveyance system to transport up to 40,000 AF of reclaimed water upstream to be discharged to the American River at a point upstream of Nimbus Dam (Whitehead, pers. comm., 1997). The Roseville project is inconsistent with existing Regional Water Quality Control Board (RWQCB) standards for the Lower American River, and is considered a low-priority project in the near term (3 to 5 years).

## **El Dorado Irrigation District**

The El Dorado Irrigation District (EID) prepared a Water Reclamation Master Plan (EID, 1994) that considers reclaimed water use of approximately 3,110 AF by 2010. EID has recently upgraded both of its wastewater treatment plants (Deer Creek and El Dorado Hills) to meet DHS regulations contained in Title 22 of the California Code of Regulations. Each plant delivered approximately 500 AF of reclaimed water in 1996 (Witter, pers. com., 1997). Alternative 3 assumes augmentation of EID's reclaimed water delivery system to achieve 3,110 AF of reclaimed water by 2010.

With these three sources of reclaimed water totaling up to 300,000 AF by 2010, Alternative 3 would substantially reduce the need for groundwater pumping and allow some reductions in surface water diversions on the American and Sacramento rivers.

### **5.2.4 Alternative 4 - More Frequent Reductions in Surface Water Diversions**

Alternative 4, More Frequent Reductions in Surface Water Diversions, assumes a reduction in the delivery of surface water during drier and driest years by diverters upstream of Nimbus Dam, while allowing deliveries similar to those described in the WFP in wet and average years. Under this alternative, the term "drier years" is redefined to include those years in which March through November unimpaired inflow to Folsom Reservoir is below 1,600,000 AF. Based on the 70-year hydrologic record, this redefinition results in about 43% of years falling into the drier or driest water year categories, as opposed to 18% under the WFP. As such, drier year cutbacks would be more frequent.

### **5.2.5 Alternative 5 - No Project Alternative—Independent Actions**

In the absence of the WFP, one reasonably expected scenario is that water purveyors would independently pursue individual actions to secure water supplies necessary to meet projected growth in their service areas. Under this No Project alternative, surface water diversions are assumed to be somewhat higher than the wet/average year diversions under the WFP and

without any WFP dry year restrictions, water conservation programs, or the Lower American River Habitat Management Element.

### **5.2.6 Alternative 6 - No Project Alternative—Constrained Surface Water and Groundwater**

Under Alternative 6, water purveyors would be limited to surface water diversions that could be accommodated as constrained by the capacity of existing surface and groundwater facilities, the amount of existing water entitlements, or future demand, whichever is less. This No Project alternative would represent most closely the continuation of existing conditions, as required by the State CEQA Guidelines. For a description of surface water diversions assumed to occur under this alternative, see Table 4.1-2 in Section 4.1.4.

### **5.2.7 Alternative 7 - No Project Alternative—Constrained Surface Water, Unconstrained Groundwater**

Under Alternative 7, No Project Alternative—Constrained Surface Water, Unconstrained Groundwater, represents a condition at 2030 that could occur if surface water diversions by Water Forum purveyors were constrained to the lesser of future demands, existing surface water capacity, or existing water entitlements. This No Project alternative assumes that future demands would be met through groundwater pumping where groundwater is available. As such, the impacts of this alternative would be similar to Alternative 2, Increased Groundwater Pumping.

### **5.2.8 Alternatives Eliminated from Detailed Consideration**

Several additional alternatives were considered during the planning process, but were eliminated from detailed consideration in the EIR, because they cannot feasibly attain the objectives of the WFP for financial, legal, technological, and/or environmental reasons. These alternatives are summarized below, in accordance with State CEQA Guidelines §15126.6(c). The environmental impacts of the alternatives eliminated from detailed consideration need not be discussed further in the EIR.

#### **Auburn Dam**

Auburn Dam would require federal authorization and appropriation. As detailed in the American River Water Resources Investigation (ARWRI), USBR studied Auburn Dam as an alternative for meeting the region's water supply needs (SMWA/USBR, 1996; SMWA/USBR, 1997), and for regional flood control (USACE/DWR, 1991). In May 1998, USBR issued its Record of Decision regarding the proposed action for the ARWRI. The ARWRI is the subject of the Final Environmental Impact Statement (FEIS), ARWRI, California (FES 97-36, dated November 27, 1997), developed in compliance with the National Environmental Policy Act (NEPA). The adopted decision is as follows:

“Reclamation has not identified a Federal role for meeting the future water needs of the ARWRI study area; therefore, a Federal program is not being selected.

While no Federal action will be initiated to meet the water needs of the local area, Reclamation will, as appropriate, cooperate with local agencies as specific water management activities are proposed and implemented. Reclamation would exercise its statutory authorities, such as that afforded by the Central Valley Project Improvement Act, to provide assistance in implementation and cooperate in the process with local lead officials. Such cooperation may involve individual actions on the part of Reclamation that constitute “major Federal actions,” and as such would require that Reclamation comply with the NEPA and other Federal statutes. Under those circumstances, Reclamation would prepare the required additional documentation.”

### **Feather River Diversions**

Diversions from the Feather River have been considered for Placer County and parts of Sacramento County to reduce the need for American River diversions. A fatal flaw analysis was prepared to examine the feasibility of diverting water at a rate of 200 mgd (310 cfs) from the Feather River to help meet the 2030 demands of South Placer and north Sacramento counties. The analysis addressed the potential impacts to biological resources from two alternative diversion locations on the Feather River--one near the State Route 99 crossing at Nicolaus, and the other near the western extension of West Catlett Road approximately 3.8 miles upstream of the confluence with the Sacramento River.

The primary management concern is that several fish species migrate and spawn upstream of the diversion locations, and that the most sensitive life stages (i.e., eggs, larvae, and juveniles) of the fish spawning upstream would be exposed to the diversion during downstream migration. Based on this information, virtually every agency representative emphasized that any diversion from the Feather River would require a “state-of-the-art” fish screen. Presently, this term is not well defined, but is generally understood to mean a screening facility that would best meet the site-specific objectives to prevent or minimize entrainment of fish. Similarly, the diversion could substantially affect in-stream flows. Because a diversion from the Feather River would likely have significant impacts to fisheries, and a new diversion of the river could involve a lengthy and uncertain permit process, this alternative was eliminated from detailed consideration in the EIR.

### **Additional Conservation Beyond Best Management Practices**

The WFP includes a Water Conservation Element which sets forth the water purveyors' programs for implementing water conservation measures, or best management practices (BMPs). The majority of these BMPs are similar to those identified in the Memorandum of Understanding Regarding Urban Water Conservation in California (MOU) (Urban Water Conservation Council, 1994). The WFP Water Conservation Element is expected to achieve a conservation level of 25.6%.

The California Urban Water Conservation Council continues to seek out enhanced conservation measures and update the Memorandum of Understanding Regarding Urban Water Conservation in California. The MOU recognizes in its Section 4.3 that a dynamic BMP assessment process needs to be conducted to regularly review, update, redefine BMPs, and refine implementation schedules as more data becomes available (CUWCC, 1998).

Although enhanced conservation beyond the proposed BMPs would not feasibly attain the project's basic objectives at this time, nothing prevents the Water Forum purveyors from implementing other, more aggressive conservation approaches as they become feasible and available in the future. If needed for greater conservation in the future, it is reasonable to expect purveyors to implement aggressive conservation techniques, including additional demand reduction measures, technological improvements, additional agricultural water conservation, and additional incentive programs.

### **5.3 ALTERNATIVES ANALYSIS**

This section provides a discussion of the potential impacts that would be expected to occur under each of the project alternatives defined in Section 5.2, relative to the impacts identified for the WFP and the Future Cumulative Condition (i.e., 2030 with WFP). Because the analysis of each alternative--with the exception of Alternative 6, No Project Alternative, Constrained Surface Water and Groundwater--is qualitative and discusses the relative effect of increased or decreased reliance on surface water or groundwater resources, or the effect of a change in diversion location, the analyses are valid for comparison to both the WFP alone (WFP added to base conditions) and the cumulative future condition (2030 plus WFP). A quantitative impact discussion is provided for Alternative 6 because the WFP, Future Cumulative Condition, and Alternative 6 were all modeled.

#### **5.3.1 Alternative 1 - Increased Sacramento River Diversions**

Alternative 1 would involve transferring approximately 78,000 AF/Yr of surface water diversions considered in the WFP from the American River system (i.e., Folsom Reservoir and the Lower American River) to the Sacramento River. This alternative would require the construction of new water diversion, treatment, pumping, and transmission facilities.

#### **Groundwater Resources**

Because the total volume of surface water and groundwater diverted and used under Alternative 1 would essentially equal that of the proposed WFP, impacts to groundwater would be similar to the proposed WFP.

#### **Water Supply**

Impacts to CVP contractors north of the Delta under Alternative 1 would remain essentially the same as under the WFP, since surplus water from the Sacramento River would be used to meet a portion of the additional demands in the region. Conversely, the use of surplus water could

reduce the volume of water available for export from the Delta, potentially resulting in slightly greater impacts to both CVP and SWP water users south of the Delta.

## **Water Quality**

Water quality within the American River system, the Sacramento River, and the Delta under this alternative would remain essentially equivalent to the WFP. However, a greater proportion of regional municipal water supplies would be diverted from the Sacramento River, which is lower in quality as a raw municipal water supply compared to raw water supplies diverted from Folsom Reservoir and the Lower American River. Reduced raw water quality could result in higher treatment costs and reduced treated water quality for those purveyors having to divert from the Sacramento River, rather than from Folsom Reservoir or the Lower American River. For example, the higher total organic carbon (TOC) content of Sacramento River water could result in higher concentrations of trihalomethanes (THMs) in treated drinking water supplies, assuming the treatment process remains unchanged. Also, raw water supplies diverted from the Sacramento River during the summer months would be warmer than raw water supplies diverted from Folsom Dam or the Lower American River. Although higher water temperature could be beneficial to the disinfection process, it would contribute further to THM formation and could increase the incidence of taste and odor problems.

## **Fisheries Resources and Aquatic Habitats**

In general, Alternative 1 would allow use of “surplus water” from the Sacramento River to meet a portion of the additional future demands for the region during the winter and spring period. Surplus water is defined as that portion of Sacramento River flow that is in excess of what would be required to meet river and Delta water quality/flow standards and diversion demands, including the state and federal water projects. Use of Sacramento River surplus flows would require less water to be released from Folsom Reservoir to meet demands. Therefore, to the extent that surplus flows are available in the Sacramento River, and to the extent that the volume of water that would not have to be released from Folsom Reservoir could be stored (not spilled), Folsom Reservoir's storage and elevation would be higher during some periods of the spring, summer, and fall in some years under Alternative 1, relative to the WFP.

Because additional future demands would not be entirely met from surplus flows in the Sacramento River, water would be released from Folsom and Shasta reservoirs to “make-up” the difference. Additional releases from Shasta Reservoir could be made in some years to meet part of the 78,000 AF/Yr additional demand placed on the Sacramento River under this alternative, thereby further reducing the demand on Folsom Reservoir and thus further contributing to higher seasonal storage in Folsom Reservoir. Consequently, impacts to littoral habitat availability in Folsom Reservoir are expected to be somewhat less under this alternative, relative to those identified for the WFP.

Under current implementation of AFRP flows, higher seasonal storage in Folsom Reservoir could prescribe higher releases into the Lower American River. This, coupled with a portion of the future demand being shifted to the Sacramento River, would be expected to frequently

contribute to higher flows occurring throughout the Lower American River during the spring, summer, and/or fall months. In the years when they would occur, greater flows in the Lower American River during one or more months of the October through December period could reduce or even eliminate the flow-related impacts to fall-run chinook salmon spawning and incubation identified under the WFP. Higher river flows during the March through June period during the driest years also could benefit juvenile fall-run chinook salmon rearing in the river during these months. With regard to river temperatures, the essentially equivalent or higher seasonal Folsom Reservoir storage and essentially equivalent or higher Lower American River flows that would generally occur under this alternative during the summer and fall months could result in similar or cooler water temperatures in the Lower American River during these periods. On a long-term average basis, impacts to Lower American River fall-run chinook salmon would be somewhat reduced under Alternative 1, relative to the WFP.

Lower American River flows under this alternative would often be essentially equivalent to those under the WFP. Higher river flows could occur during one or more months of the March through June period during the drier years. Conversely, Lower American River flows could be somewhat lower in years when higher fall releases from Folsom Reservoir (due to higher end-of-September storage) could result in lower releases from Folsom during one or more months of the February through May period in order to replenish storage in the reservoir. Overall, the potentially significant flow-related impacts to splittail identified for the WFP under this alternative would remain essentially equivalent to the WFP.

Under the Future Cumulative Condition, in addition to the American River system impacts discussed above (which would occur due to the increased diversions under the WFP regardless of other future actions), impacts were identified to Shasta and Trinity reservoir warmwater fisheries, Sacramento River salmonids (winter-run and spring-run chinook salmon), and Bay-Delta fisheries. Operations of Shasta and Trinity reservoirs at 2030 could change slightly under Alternative 1, relative to that which would occur at 2030 under the WFP. Therefore, potentially significant impacts to the warmwater fisheries of Shasta and Trinity reservoirs would remain essentially equivalent under this alternative. Because operations of Shasta and Trinity reservoirs and Sacramento River flows would be expected to change only slightly under this alternative, the potentially significant cumulative temperature-related impact to chinook salmon using the Sacramento River under this alternative would remain essentially equivalent to the WFP.

Delta outflow and the position of X2 could occasionally change slightly under Alternative 1, relative to that which would occur at 2030 with the WFP. Nevertheless, the potentially significant cumulative impact identified to Bay-Delta fisheries under the WFP would remain essentially equivalent under this alternative.

## **Flood Control**

Under Alternative 1, use of “surplus water” from the Sacramento River coupled with the additional releases that might occur from Shasta Reservoir to meet part of the demand placed on the Sacramento River would not affect the manner with which USBR would operate CVP

reservoirs for flood control. Flood control operations, consistent with the flood control diagrams for each reservoir would be maintained regardless of alternative. Under Alternative 1, flood control impacts would be essentially equivalent to the WFP.

### **Power Supply**

Under Alternative 1, impacts to CVP energy production could be slightly less relative to the WFP due to the decrease in CVP exports and increased reservoir contents at Folsom. Due to greater storage at Folsom, impacts to CVP generation capacity could also be slightly less under Alternative 1 relative to the WFP. Although purveyors that continue to pump from Folsom Reservoir could experience a slightly reduced economic impact, those purveyors taking water from the Sacramento River are expected to have substantially increased costs to pump water from the Sacramento River to their treatment plants.

### **Vegetation and Wildlife**

Because less water would be diverted from the American River, impacts to vegetation and wildlife associated with Folsom Reservoir and the Lower American River would be similar to or slightly improved under this alternative, relative to WFP. Operations at Shasta and Trinity reservoirs under Alternative 1 would not be substantially different from those under the WFP. Lower Sacramento River flows would be the same under Alternative 1, so impacts to vegetation and wildlife, relative to the WFP, would be the same.

### **Recreation**

As noted above, Alternative 1 would result in essentially equivalent to slightly higher Lower American River flows and in Folsom Reservoir surface water elevations during the summer months. Therefore, adverse effects on rafting in the Lower American River and boating and swimming in Folsom Reservoir would be reduced to some degree under Alternative 1. Because lower Sacramento River flows would be the same under Alternative 1, impacts to recreational activities would be the same as the WFP. Operations at Shasta and Trinity reservoirs, under Alternative 1, would not be substantially different from those under the WFP.

### **Land Use and Growth-Inducing Impacts**

Because the total volume of surface water and groundwater diverted and used under Alternative 1 would essentially equal that of the proposed WFP, impacts to land use would be similar to the proposed WFP.

### **Aesthetics**

Because less surface water would be diverted from the Lower American River under this alternative, aesthetic impacts on Folsom Reservoir and the Lower American River would be similar or slightly reduced under this alternative. Although lower Sacramento River flows would be somewhat reduced under Alternative 1, these reductions would not be of a magnitude or

frequency that would have a visual effect. Because operations at Shasta and Trinity reservoirs would not be substantially different, aesthetic effects at these reservoirs would be similar to those of the WFP.

### **Cultural Resources**

As described above, Alternative 1 would result in higher seasonal storage in Folsom Reservoir, which would act to shift the zone of fluctuation to a higher position on the reservoir shoreline. The extent and frequency of such seasonal storage changes, relative to the WFP, however, would likely be insignificant and result in impacts to cultural resources similar to those under the WFP.

Under the current implementation of AFRP flows, higher seasonal storage in Folsom Reservoir could prescribe the release of higher flows to the Lower American River. With a portion of the future demands shifted to the Sacramento River under Alternative 1, these two factors could result in higher flows in the Lower American River during some months in some years. In such years where this flow increase would occur and be of sufficient magnitude to inundate currently exposed cultural resources, such affects would be slightly worse under Alternative 1, relative to the WFP. Overall, impacts on cultural resources would be similar to or slightly worse than those under the WFP.

### **Soils and Geology**

Impacts on soils and geology would be negligible under Alternative 1, similar to the impacts of the proposed WFP.

### **Conclusions - Alternative 1**

By transferring approximately 78,000 AF/Yr of surface water diversions from the American River to the Sacramento River, Alternative 1 would result in somewhat reduced impacts on resources of the American River watershed. WFP impacts to Folsom Reservoir warmwater fisheries and Lower American River fall-run chinook salmon would be reduced to some degree. Future cumulative impacts to Shasta and Trinity reservoir warmwater fisheries, Lower American River splittail, and Sacramento River salmonids and Delta fisheries would remain similar under this alternative. Similarly, recreation impacts at Folsom Reservoir and the Lower American River would be somewhat reduced in terms of the frequency and duration of flow and water elevation impacts. Impacts with regard to CVP hydropower could be slightly less, whereas impacts to water quality, flood control, vegetation and wildlife, land use, aesthetics, cultural resources, and soils and geology would be essentially equivalent, relative to WFP. Water supply impacts would be somewhat worse.

In addition, implementation of this alternative would require construction of new water diversion, pumping, treatment, and transmission facilities. Because of the lower quality of the Sacramento River water as a raw municipal and industrial water supply, treatment costs would likely be somewhat higher than under the WFP, as would energy costs to pump the water from the point of diversion on the Sacramento River to end users upstream.

### **5.3.2 Alternative 2 - Increased Groundwater Pumping**

This alternative would involve the use of greater amounts of groundwater in lieu of surface water from the Lower American and Sacramento rivers to satisfy future demands for Sacramento County. Expanded use of groundwater, as part of the increased efforts to implement inter-regional conjunctive use programs under this alternative could reduce the relative magnitude and/or frequency of certain flow-related impacts to the Lower American River. The amount of groundwater used to supplement surface water supplies would vary from year to year, although groundwater pumping, as modeled, would increase over time. Approximately 17,000 AF of groundwater would be supplied annually to new developments in the north area in lieu of water diverted from the American River system. Similarly, approximately 75,000 AF of groundwater would be supplied to the Zone 40 area in lieu of surface water diversions from the Sacramento River.

#### **Groundwater Resources**

Increased groundwater pumping under Alternative 2 would result in groundwater elevations stabilizing at lower levels than the proposed WFP. Decreased groundwater levels could result in continued deterioration of groundwater quality in the South Sacramento and Galt areas to a degree substantially greater than accommodated with the WFP. Water quality could decline due to a further reduction in groundwater levels that would exceed 80 feet from pre-development levels. This larger decline would also occur over a larger area than with the WFP. It is likely that more extensive groundwater treatment would be required under Alternative 2 in order for all wells to continually meet Title 22 (California Code of Regulations) drinking water quality standards.

More wells could become inoperable, may require deepening, or higher pumping costs to maintain the higher proposed yields. Existing wells could require replacement and additional wells may have to be constructed. Increased groundwater pumping may also result in land subsidence, in-migration of poorer-quality water from the deep aquifer system or adjacent areas, and increased rate of movement of groundwater contamination (Montgomery Watson, 1997). Without the WFP, groundwater management entities may not be formed and thereby deficiencies in groundwater systems may not be addressed.

#### **Water Supply**

Under Alternative 2, a substantial portion of the increased water demand projected to fulfill the future demands of Sacramento County would be provided through groundwater. This would increase the surface water supply to the Delta and likely increase surface water availability to CVP customers both north and south of the Delta as well as to SWP customers, resulting in slightly less impacts relative to the WFP.

## **Water Quality**

Increased use of groundwater under Alternative 2 could result in somewhat higher flows in the Lower American River and lower Sacramento River during some months of the year, relative to the WFP, resulting in greater dilution capacity. Consequently, impacts to Sacramento River and Delta water quality identified for the WFP could be slightly reduced under this alternative due to increased surface water flows and, therefore, greater dilution capacity. In terms of groundwater quality, with few exceptions, raw municipal and industrial water supplies within the region obtained from groundwater pumping are of higher quality than those obtained via diversion of surface waters. For example, THM production in treated drinking water obtained from groundwater supplies is generally lower than that produced from treating raw surface water. As a result, treatment costs for groundwater would be the same or lower than costs for treating diverted surface water, and the overall quality of the treated groundwater would be similar to or better than that which would result from treating diverted surface water under the WFP.

## **Fisheries Resources and Aquatic Habitats**

Reduced surface water diversions from the American River system and the Sacramento River would result in somewhat higher Folsom Reservoir storage and water surface elevations during the summer and early fall months, particularly in below normal and drier years. Consequently, the impact identified to Folsom Reservoir's warmwater fisheries for the WFP would be slightly less under this alternative in some years.

As discussed above under Alternative 1, higher seasonal storage in Folsom Reservoir could prescribe higher flows in the Lower American River during one or more of the summer and fall months in some years. Thus, the flow-related impacts to fall-run chinook salmon spawning/incubation identified for the WFP would be somewhat less, and possibly substantially less, in some years under this alternative. It also is possible that higher river flows could occur during some portion of the March through June period during the driest years. This also would benefit juvenile fall-run chinook salmon rearing in the river during these months. With regard to river temperatures, the essentially equivalent or higher seasonal Folsom Reservoir storage and essentially equivalent or higher Lower American River flows that could occur under this alternative during the summer and fall months could result in similar or cooler water temperatures in the Lower American River during these periods. On a long-term average basis, impacts to Lower American River fall-run chinook salmon could be somewhat less under Alternative 2, relative to the WFP.

Lower American River flows under this alternative would often be essentially equivalent to those under the WFP. Higher river flows could occur during one or more months of the March through June period during the drier years. Conversely, Lower American River flows could be somewhat lower in years when higher fall releases from Folsom Reservoir (due to higher end-of-September storage) could result in lower releases from Folsom during one or more months of the February through May period in order to replenish storage in the reservoir. Overall, the flow-related impacts to splittail identified for the WFP would remain essentially equivalent under this alternative.

Under the Future Cumulative Condition, in addition to the American River system impacts discussed above (which would occur due to the increased diversions under the WFP regardless of other future actions), impacts were identified to Shasta and Trinity reservoir warmwater fisheries, Sacramento River salmonids (winter-run and spring-run chinook salmon), and Bay-Delta fisheries. The reduced diversion of water from the American and Sacramento rivers under this alternative could be expected to slightly change operations of Shasta and Trinity reservoirs at 2030, relative to that which would occur at 2030 with the WFP. Alternative 2 could result in slightly higher storage and water surface elevations in Shasta Reservoir, and possibly Trinity Reservoir, in some years. Consequently, impacts to the warmwater fisheries of Shasta Reservoir, and possibly Trinity Reservoir, could be slightly less under this alternative in those years, relative to the WFP. Changes to Shasta and Trinity reservoir operations anticipated under this alternative could result in slightly less temperature-related impacts to Sacramento River chinook salmon in some of those same years.

Delta outflow and the position of X2 could occasionally change slightly under Alternative 2, relative to that which would occur at 2030 with the WFP. Nevertheless, the potentially significant cumulative impact identified to Bay-Delta fisheries for the WFP would remain essentially equivalent under this alternative.

### **Flood Control**

Under Alternative 2, increased groundwater pumping would not affect the manner with which USBR would operate CVP reservoirs for flood control. Flood control operations, consistent with the flood control diagrams for each reservoir would be maintained regardless of alternative. Under Alternative 2, flood control impacts would be essentially equivalent to the WFP.

### **Power Supply**

Increased use of groundwater would result in more water being available for the production of CVP hydropower. Due to increased storage at Folsom, impacts to energy production and generation capacity could be slightly less under this alternative relative to the WFP.

Substantial increases in power generation requirements to supply groundwater pumping facilities would be expected. Should groundwater levels fall significantly, and water quality degrade to the point where significant resources are required for treatment economic impacts to purveyors pumping groundwater could be potentially greater under this alternative. Because Folsom Reservoir levels are predicted to remain higher during the spring and summer months in below normal and drier years, relative to the WFP, economic impacts to the EID and/or Folsom pumping plants should be slightly less under this alternative.

### **Vegetation and Wildlife**

Because less water would be diverted from the American River, impacts to vegetation and wildlife would be the similar or slightly improved under this alternative. Because water storage levels and surface water elevations at Folsom, Shasta, and Trinity Reservoirs would increase

somewhat under this alternative, impacts to vegetation and wildlife would be similar to or slightly improved, relative to the WFP.

### **Recreation**

Because Lower American River flows would generally be higher during the spring and summer months in below normal and drier years, it is expected that adverse impacts on recreational activities on the Lower American River (rafting) and Folsom Reservoir (boating, swimming) would be somewhat reduced. Because water storage levels and surface water elevations at Folsom, Shasta, and Trinity Reservoirs would increase, impacts to recreational activities at these reservoirs would be similar to or slightly improved, relative to WFP.

### **Land Use and Growth-Inducing Impacts**

The total volume of water (surface and groundwater) used for municipal, industrial, and agricultural uses would be the same under this alternative, so land use impacts of this alternative would be the same as the WFP.

### **Aesthetics**

Because less water would be diverted from the American River, visual effects would be the similar or slightly improved under this alternative. Because water storage levels and surface water elevations at Folsom, Shasta, and Trinity Reservoirs would increase somewhat under this alternative, visual effects at these reservoirs would be similar to or slightly improved, relative to WFP.

### **Cultural Resources**

Under Alternative 2, increased groundwater pumping would reduce the amount of diversions from Folsom Reservoir and the Lower American and Sacramento rivers. With higher reservoir storage in Folsom Reservoir and higher flows in the Lower American and Sacramento rivers, exposure and/or deterioration of cultural resources in these waterbodies would be less than those under the WFP. For water-related potential cultural resource impacts, Alternative 2 would be essentially equivalent to or slightly better than the WFP.

With new pumping, treatment, and conveyance facilities required to pump additional amounts of groundwater in the region, potential impacts to cultural resources could occur at those sites. These facilities, however, would be subject to separate individual environmental review and would, through those review and approval processes, address and mitigate, as appropriate, all potential impacts to cultural resources at that time. Overall, impacts to water-related cultural resources under Alternative 2 would be essentially equivalent to those under the WFP.

### **Soils and Geology**

Impacts to soils and geology would likely be similar to those discussed for the WFP.

## **Conclusions - Alternative 2**

Using groundwater to meet most of Sacramento County's growth needs through the year 2030 would reduce diversions from the Lower American and Sacramento rivers. Most of the increased use of groundwater would be in the south Sacramento County area, where substantial urbanization is projected to occur. Growth within the City of Folsom would still be accommodated by surface water supplies.

Impacts to warmwater fisheries of Folsom Reservoir, and to fall-run chinook in the Lower American River would be somewhat reduced under this alternative. Impacts to warmwater fisheries of Shasta and Trinity reservoirs, splittail in the American River, and Delta fisheries would be similar to those under the WFP. Temperature-related impacts to upper and lower Sacramento River salmonids also would be similar to those under the WFP, with slight reductions in lower Sacramento River temperatures expected during the late spring and summer months in some years. Recreation impacts at Folsom Reservoir and the Lower American River would be slightly reduced due to higher river flows and lake levels during the summer months. Other flow-related impacts including water supply, water quality, power supply, vegetation and wildlife, and aesthetics would also be somewhat reduced under Alternative 2. Impacts to flood control, land use, and soils and geology would be essentially equivalent to those of the WFP.

Although implementation of this alternative would reduce flow-related impacts on the American River, it would adversely affect groundwater resources. Groundwater would be maintained at lower levels increasing yield of the aquifer system, but may result in land subsidence, increased pumping costs, in-migration of poorer-quality water from the deep aquifer system or adjacent areas, decline in well productivity, and increased rate of movement of groundwater contamination. These impacts would have associated costs (water treatment costs, pumping costs, and well rehabilitation costs).

### **5.3.3 Alternative 3 - Increased Water Reclamation**

Alternative 3 would involve the use of increased amounts of reclaimed water, totaling approximately 336,000 AF/Yr by 2010, in Sacramento County, the City of Roseville, and western El Dorado County. Water reclamation under this alternative would substantially reduce groundwater pumping and also allow for some reductions in surface water diversions from the American and Sacramento rivers. Reclaimed water could be used for non-potable consumptive uses such as landscape irrigation (i.e., golf courses, roadway medians). Use of reclaimed water for irrigation in Zone 40 would reduce surface water diversions from the Sacramento River by approximately 15,000 AF per year. The city of Roseville's plan to return up to 40,000 AF per year of reclaimed water to Lake Natoma would effectively reduce the diversions from the American River system by up to 40,000 AF per year. However, this alternative would reduce return flows to the Sacramento River (below the confluence with the Lower American River) by approximately 200,000 AF or more per year.

## **Groundwater Resources**

A reduction in groundwater extraction would occur under this alternative, which could benefit the overall groundwater conditions in Sacramento County. Consequently, impacts to groundwater under this alternative would be somewhat reduced relative to the WFP.

## **Water Supply**

The increased use of reclaimed water proposed under Alternative 3 would result in decreased return flows to the Sacramento River. The magnitude of the potential reduction in return flows could precipitate changes in CVP operations. Change in impacts would depend on how the system responds to such conditions. If it is assumed that north of the Delta operations would not be modified to compensate for the decrease in return flows, diminished supply available to CVP and SWP water users south of the Delta could be expected. If, on the other hand, reservoir releases are increased to make up for the reduced return flows, the frequency of increased impacts relative to the WFP could decrease, but the magnitude of impacts in drier years could increase for water users both north and south of the Delta. Consequently, Alternative 3 could have substantially greater impacts to CVP and SWP water users relative to the WFP.

## **Water Quality**

Increased reclamation would reduce, to some degree, the amount of surface water diverted from the American and Sacramento rivers and would substantially reduce the amount of wastewater discharged from the Sacramento Regional Wastewater Treatment Plant (SRWTP) into the Sacramento River at Freeport. Rather than using groundwater or diverted surface water to irrigate golf courses, roadway and medians, reclaimed water would meet much of this need. A substantial portion of effluent otherwise discharged to the Sacramento River would be treated to a higher level and used for these irrigation purposes. Substantial reductions in return flows through the SRWTP would substantially reduce loading of various constituents from this point-source discharge. Sacramento River flows upstream of Freeport would either remain similar to slightly higher than flows which would occur for the WFP, or could increase substantially if CVP/SWP operations are modified to “make-up” the lost return flows at Freeport through additional releases from upstream reservoirs. Substantially reduced wastewater discharges from the SRWTP, coupled with similar or higher Sacramento River flows (upstream of Freeport), would result in reduced seasonal water quality impacts to the Lower Sacramento River and Delta, relative to the WFP, particularly in drier years.

The Roseville project (i.e., returning up to 40,000 AF per year of reclaimed water to Lake Natoma) is considered a low-priority project in the near term (3 to 5 years), and is inconsistent with existing Regional Water Quality Control Board (RWQCB) standards for the Lower American River and DHS policy regarding use of reclaimed water.

## **Fisheries Resources and Aquatic Habitats**

Alternative 3 would primarily reduce annual groundwater pumping and, to a lesser degree, surface water diversions from both the American and Sacramento river systems. In addition, this alternative would reduce return flows to the Sacramento River (below the confluence with the Lower American River) by approximately 200,000 AF or more per year. The effects of this alternative on fisheries impacts identified for the WFP would depend on how operations of the CVP/SWP would change in response to this substantial increase in use of reclaimed water.

One possibility would be that CVP/SWP operations north of the Delta would not react directly to this substantial increase in use of reclaimed water, and the associated reduction in returns flows to the Sacramento River through the SRWTP. A discussion of how impacts to fisheries identified for the WFP would change under this alternative and CVP/SWP operational scenario is provided below.

As part of this alternative, the City of Roseville proposes to return up to 40,000 AF per year of reclaimed water to Lake Natoma, thereby effectively reducing its annual demand on the American River system. Releases from Folsom Reservoir into Lake Natoma could be cut by the amount of reclaimed water returned to Lake Natoma without reducing flows released from Nimbus Dam into the Lower American River. This would result in seasonally higher Folsom Reservoir storage, thereby resulting in somewhat lesser impact to Folsom Reservoir warmwater fisheries, relative to the WFP.

The addition of reclaimed water to Lake Natoma in lieu of releases from Folsom Reservoir could substantially increase Nimbus release temperatures in some years during October and November and again during the March through May period, with less temperature increases expected during June. Under current AFRP implementation, the higher storage achieved in Folsom Reservoir during the summer and fall months could prescribe higher Lower American River flows in one or more months of these periods, in some years. Higher river flows during October and November would result in somewhat lesser flow-related impacts to fall-run chinook salmon spawning and incubation. However, some of this benefit would be offset by the higher temperatures of water released from Nimbus Dam during October and November, due to discharges of reclaimed water into Lake Natoma. Overall, impacts to fall-run chinook salmon would be essentially equivalent to those identified for the WFP in most years, and possibly slightly less in some years.

Higher river flows could occur during one or more months of the February through May period, particularly during the drier years. Conversely, Lower American River flows could be somewhat lower during one or more months of this period in years when higher fall releases from Folsom Reservoir (due to higher end-of-September storage) could result in lower releases from Folsom in order to replenish storage in the reservoir. Overall, the potentially significant flow-related impacts to splittail identified for the WFP would remain essentially equivalent under this alternative.

Under the Future Cumulative Condition, in addition to the American River system impacts discussed above (which would occur due to the increased diversions under the WFP regardless of other future actions), impacts were identified to Shasta and Trinity reservoir warmwater fisheries, Sacramento River salmonids (winter-run and spring-run chinook salmon), and Bay-Delta fisheries. Operations of Shasta and Trinity reservoirs would be expected to change little, but could change slightly in some years, relative to that which would occur at 2030 with the WFP. Implementation of Alternative 3 under this CVP/SWP operational scenario would, therefore, be expected to result in essentially equivalent impacts to Shasta and Trinity reservoir warmwater fisheries and Sacramento River chinook salmon, relative to those identified for the WFP.

Under this alternative and operational scenario, CVP/SWP Delta exports would have to be reduced, and further reductions in Delta outflow (and thus upstream shifts in the position of X2) would be expected to occur, relative to the WFP. Reductions in Delta outflow and corresponding upstream shifts in the position of X2 could be substantial in some months of the drier years. Hence, the potentially significant impact identified to Bay-Delta fisheries for the WFP would generally be somewhat greater under this alternative, and possibly substantially greater during some of the drier years.

A second CVP/SWP operational scenario that could occur with implementation of Alternative 3 would involve “making-up” the lost return flows at Freeport with additional releases from upstream reservoirs. This could cause the potentially significant impacts identified for the WFP to the warmwater fisheries of Folsom, Shasta, and Trinity reservoirs and Sacramento River chinook salmon to be somewhat greater under this alternative. Conversely, the potentially significant flow-related impacts to Lower American River splittail could be somewhat less, and possibly eliminated in some years. Because releases from Folsom Reservoir would generally be higher throughout the spring and summer months to make-up, in part, the reduction in return flows, fall storage in Folsom Reservoir could be lower, relative to that for the WFP, in some years. Lower fall storage in Folsom Reservoir would trigger lower releases into the Lower American River under current implementation of AFRP. The flow-related impacts to Lower American River fall-run chinook salmon could, therefore, be somewhat greater than those identified for the WFP in some of the years when fall storage in Folsom Reservoir is lower. By definition of this operational scenario, inflow to the Delta would remain essentially equivalent to that which would occur for the WFP. Consequently, impacts to Bay-Delta fisheries identified for the WFP would remain essentially equivalent for this alternative under this CVP/SWP operational scenario.

## **Flood Control**

Under Alternative 3, increased water reclamation would not affect the manner with which USBR would operate CVP reservoirs for flood control. Flood control operations, consistent with the flood control diagrams for each reservoir would be maintained regardless of alternative. Under Alternative 3, flood control impacts would be essentially equivalent to the WFP.

## **Power Supply**

Change in impacts would depend on how the system responds to the reduction of return flows to the Sacramento River. If reservoir operations are not modified to compensate for the loss of return flows, CVP energy and pumping impacts could be somewhat less relative to the WFP. Conversely, if the system is operated to make up the loss of return flows, net energy production and generation capacity could experience somewhat greater impacts under this alternative relative to the WFP, due to potentially lower reservoir contents. Similarly, economic impacts of pumping could be somewhat greater under this alternative than under the WFP.

## **Vegetation and Wildlife**

Because increased reclamation would not significantly reduce reliance on surface water impacts to vegetation and wildlife along the Lower American and Sacramento Rivers are likely to be the same, or similar, relative to the WFP. Operations at Folsom, Shasta, and Trinity Reservoirs, under this Alternative would be similar to the WFP.

## **Recreation**

Because increased reclamation would not significantly reduce reliance on surface water impacts to recreational activities along the Lower American and Sacramento Rivers are likely to be the same, or similar, relative to the WFP.

## **Land Use and Growth-Inducing Impacts**

The total volume of water (surface and groundwater) used for municipal, industrial, and agricultural uses would be the same under this alternative, so land use impacts of this alternative would be the same as the WFP.

## **Aesthetics**

Because increased reclamation would not significantly reduce reliance on surface water impacts to visual impacts of this alternative along the Lower American River and Sacramento River are likely to be similar to the WFP.

## **Cultural Resources**

Under Alternative 3, increased use of reclaimed water (i.e., up to 336,000 AF/Yr by 2010) would substantially reduce the need for groundwater pumping and surface water diversions from Folsom Reservoir, the Lower American River, and Sacramento River. With increased return flow to Lake Natoma (e.g., up to 40,000 AF/Yr) via the City of Roseville reclaim water proposal, higher Lower American River flows could result, relative to the WFP. Additionally, releases from Folsom Reservoir into Lake Natoma would be reduced thereby also increasing seasonal storage within the reservoir. Higher reservoir storage might provide a slightly better hydrologic environment for existent cultural resources in that the risk of exposure and the resulting

deterioration due to physical forces (i.e., wave action) would be less than that under the WFP. However, changing reservoir elevations would simply alter the zone with which water fluctuations would be most prevalent but would not necessarily result in impacts different than those determined under the WFP.

The effects of this alternative on cultural resources, however, would be contingent upon CVP/SWP operations north of the Delta. While this alternative could reduce return flows to the Sacramento River by up to 200,000 AF/Yr or more, the manner with which coordinated CVP/SWP operations would facilitate meeting Delta requirements would dictate the extent to which Folsom Reservoir would be relied upon and, therefore, affect reservoir storage and elevation. Overall, impacts to water-related cultural resources under Alternative 3 would be essentially equivalent to those under the WFP.

### **Soils and Geology**

Impacts to soils and geology associated with increased water reclamation under Alternative 3 are likely to be similar to WFP.

### **Conclusions - Alternative 3**

Use of reclaimed water to meet some of Sacramento County's non-potable water demand would primarily reduce groundwater pumping and would also reduce some diversions from the Lower American and Sacramento rivers. Impacts relative to groundwater and water quality would be reduced. Impacts to warmwater fisheries of Folsom Reservoir would be somewhat reduced, while impacts to other fisheries resources including warmwater fisheries of Shasta and Trinity reservoirs, and fall-run chinook, and splittail in the American River would be essentially equivalent to the WFP. Impacts to Delta fisheries resources would be somewhat worse. Cumulative temperature-related impacts to upper Sacramento River salmonids and lower Sacramento River fisheries would be similar to those under the WFP. Recreation impacts at Folsom Reservoir and the Lower American River would be slightly reduced due to higher river flows and lake levels during the summer months. Other impacts including vegetation and wildlife, aesthetics, flood control, recreation, land use, cultural resources, and soils and geology would be essentially the same as the WFP. Impacts to water supply and CVP power would depend on how the system is operated under Alternative 3.

Implementation of Alternative 3 would slightly reduce demands on surface and groundwater resources in the project area. Constraints to reclamation on the scale contemplated in Alternative 3 are many, however, and lend uncertainty to its ultimate implementation. Such constraints include regulatory permits and approvals, institutional agreements between producers of reclaimed water and other agencies, identification of markets for the resource, and construction of treatment, storage, and conveyance facilities. Alternative 3 could not entirely substitute for any element of the WFP in any case, however, due to the limited uses of reclaimed water. Provision for additional surface water supplies to meet growing demands for potable water would still be required. However, nothing in the WFP would preclude

implementation of large-scale reclamation to reduce overall demands on groundwater and surface water in the region.

### **5.3.4 Alternative 4 - More Frequent Reductions in Surface Water Diversion**

Alternative 4, More Frequent Reductions in Surface Water Diversion, assumes a reduction in the diversions of surface water during the driest 43% of years by diverters upstream of Nimbus Dam, while allowing deliveries similar to those described under the WFP in the remaining years, considered normal and wet years.

#### **Groundwater Resources**

In the drier years when self-imposed deficiencies are taken by the Water Forum participants under this alternative, groundwater pumping would be assumed to increase to maintain water supply. In normal years, groundwater pumping would be similar to the WFP levels. Given that increased groundwater pumping would occur in 30 years of the 70 year period of hydrologic record (43% of the time), the decline of groundwater levels would be slightly greater in magnitude under this alternative than under the WFP. It is likely that well pumping depths would need to be increased. The magnitude of these impacts, although unlikely to be substantial, is speculative because the increases in groundwater pumping would not be continuous and the magnitude of the increase in pumping would vary from year to year as required to supplement available surface water supplies.

#### **Water Supply**

Alternative 4 would place additional limits on the amount of surface water diverted from the American River in the year 2030, relative to the WFP. Although the maximum deficiencies imposed on American River purveyors diverting upstream of Nimbus would not be changed, the frequency of deficiencies would increase. This could limit potential future development in portions of the service area that have no access to alternative water supplies. Given current development pressures in the service area, however, and the possibility that anticipated population growth levels would be maintained, Alternative 4 could result in additional water shortages for existing users, relative to the WFP. Impacts on CVP and SWP water supply deliveries outside of the American River Basin would not be substantially different from impacts under the WFP because the magnitude of the additional American River deficiencies would be small in comparison to these deliveries.

#### **Water Quality**

Alternative 4 would reduce surface water diversions in the American River system in the drier years, but would have no effect in the average/wet and driest years, relative to the WFP. As a result, higher flows could occur seasonally in both the American and Sacramento Rivers, in some of the drier years, thereby slightly increasing the dilution capacity of these water bodies. Moreover, the reduced level of water deliveries defined under this alternative could contribute to slowing future growth, thereby indirectly reducing future increases in constituent loading to

the Sacramento River relative to that which would occur under the WFP. These two factors together would be expected to result in somewhat less impacts to Sacramento River and Delta water quality, relative to the WFP, particularly in below normal and dry water years.

### **Fisheries Resources and Aquatic Habitats**

Alternative 4 would reduce surface water diversions in the American River system in many of the drier years (18%) and some of the average (18-43%) years, but would have essentially no effect in the driest and wetter years, relative to the WFP. Folsom Reservoir storage would, therefore, be seasonally higher in the years when diversions would be reduced. Consequently, the impact identified to Folsom Reservoir's warmwater fisheries for the WFP would be slightly less under this alternative in some years.

Higher seasonal storage in Folsom Reservoir could prescribe higher flows in the Lower American River during the summer and fall months in some years. Thus, the potentially significant flow-related impact to fall-run chinook salmon spawning/incubation identified for the WFP would be somewhat reduced in some years under this alternative. Flow impacts would be expected to be reduced in some of the drier years, but not in the driest years when the magnitude of such impacts would be greatest. Higher river flows that could occur during one or more months of the March through June period during the drier years also could benefit juvenile fall-run chinook salmon rearing in the river during these months. With regard to river temperatures, the essentially equivalent or higher seasonal Folsom Reservoir storage and essentially equivalent or higher Lower American River flows that would occur under this alternative during some of the summer and fall months would result in similar or cooler water temperatures in the Lower American River during these periods. On a long-term average basis, impacts to Lower American River fall-run chinook salmon would be slightly less under Alternative 4, relative to the WFP.

Lower American River flows under this alternative would often be essentially equivalent to those under the WFP. Higher river flows could occur during one or more months of the March through June period during the drier years. Conversely, Lower American River flows could be somewhat lower in years when higher fall releases from Folsom Reservoir (due to higher end-of-September storage) could result in lower releases from Folsom during one or more months of the February through May period in order to replenish storage in the reservoir. Overall, the potentially significant flow-related impacts to splittail identified for the WFP would remain essentially equivalent under this alternative.

Under the Future Cumulative Condition, in addition to the American River system impacts discussed above (which would occur due to the increased diversions under the WFP regardless of other future actions), impacts were identified to Shasta and Trinity reservoir warmwater fisheries, Sacramento River salmonids (winter-run and spring-run chinook salmon), and Bay-Delta fisheries. The reduced diversion of water from the American River system in some years under this alternative would be expected to result in essentially equivalent operations of Shasta and Trinity reservoirs, but could result in slight changes in some years, relative to that which would occur at 2030 with the WFP. Alternative 4 could result in seasonally higher

storage and water surface elevations in Shasta Reservoir, and possibly Trinity Reservoir, in some years; however, such changes in storage would be expected to be small. Consequently, impacts to the warmwater fisheries of Shasta and Trinity reservoirs would be essentially equivalent under this alternative, relative to the WFP. Similarly, the relatively infrequent and minor changes to Shasta and Trinity reservoir operations anticipated under this alternative would be expected to result in essentially equivalent temperature-related impacts to Sacramento River chinook salmon, with the possibility of slightly less impacts in some years.

Delta outflow and the position of X2 could occasionally change slightly under Alternative 4, relative to that which would occur at 2030 with the WFP. Nevertheless, the potentially significant cumulative impact identified to Bay-Delta fisheries for the WFP would remain essentially equivalent under this alternative.

### **Flood Control**

Under Alternative 4, reductions in diversions of surface water during the driest 43% of years by purveyors upstream of Nimbus Dam would not affect the manner with which USBR would operate CVP reservoirs for flood control. Flood control operations, consistent with the flood control diagrams for each reservoir would be maintained regardless of alternative. Under Alternative 4, flood control impacts would be essentially equivalent to the WFP.

### **Power Supply**

Under Alternative 4, impacts to net CVP energy production and CVP generation capacity are expected to remain essentially equivalent to the WFP. Folsom Reservoir levels are predicted to remain slightly higher during the spring and summer months in below normal and drier years, relative to the WFP. Therefore, economic impacts to EID and/or Folsom pumping plants regarding increased power requirements for raw water pumping should be slightly reduced under this alternative, relative to the WFP.

### **Vegetation and Wildlife**

Because Lower American and Sacramento river flows under this alternative would not vary substantially, relative to the WFP, impacts to vegetation and wildlife are not expected to change substantially. Because water storage levels at Folsom, Shasta, and Trinity reservoirs would increase somewhat under this Alternative, impacts to vegetation and wildlife would be similar or slightly improved, relative to the WFP.

### **Recreation**

Lower American and Sacramento river flows under this alternative would typically be similar to or greater than those under the WFP in most months. This would reduce to some degree, but not eliminate, the relative frequency of inadequate recreation flows on the Lower American River. Because water storage and surface water elevations at Folsom, Shasta, and Trinity reservoirs would increase somewhat under this Alternative, impacts to recreation activities

would be similar to or slightly improved, relative to the WFP. Overall, none of the adverse impacts to recreation resources identified under the WFP would be eliminated under this alternative; however, the relative frequency of some of these impacts could be somewhat reduced.

### **Land Use and Growth-Inducing Impacts**

Under this alternative land use impacts are would be similar to those described under the WFP.

### **Aesthetics**

Because Lower American and Sacramento river flows under this alternative would not vary substantially, relative to the WFP, visual impacts are not expected to change substantially. Because water storage levels at Folsom, Shasta, and Trinity reservoirs would increase somewhat under this Alternative, visual impacts would be similar or slightly improved, relative to the WFP.

### **Cultural Resources**

Under Alternative 4, reductions in surface water diversions from Folsom Reservoir and the Lower American River would occur in many of the drier (18%) and some of the average years (18-43%). This would result in higher seasonal storage in Folsom Reservoir in some years which could prescribe higher flows in the Lower American River in some of the drier years, relative to the WFP. Lower American River flows would be essentially equivalent to those under the WFP although seasonal variations depending on water year type would occur (i.e., higher flows during drier years and lower flows in years when higher releases during the preceding autumn are needed to replenish storage in the reservoir). Changing reservoir elevations would simply alter the zone with which water fluctuations would be most prevalent but would not necessarily result in impacts different than those determined under the WFP. Overall, impacts to water-related cultural resources under Alternative 4 would be similar to those under the WFP.

### **Soils and Geology**

Under this alternative impacts to soils and geology would be similar to those described under the WFP.

### **Conclusions - Alternative 4**

Imposing drier year cutbacks in a greater percentage of years would result in reduced diversions from the Lower American River. Alternative 4 would slightly reduce some but not eliminate any of the fisheries impacts identified for the WFP, however. Other flow-related impacts would be the same or slightly reduced, including Lower American River and Folsom Reservoir recreation opportunities and water quality, while impacts to flood control, power supply, vegetation and wildlife, land use, visual resources, cultural resources, and soils and geology would be essentially the same as the WFP. Water supply impacts would be worse, relative to the WFP within the basin, as local purveyors would be subject to cutbacks in 43% of years, but would be essentially equivalent out of the basin. Impacts on groundwater could be substantially worse, relative to

the WFP, as purveyors turn to groundwater in a greater number of years to make up for the shortfall in surface water supplies. This could result in increased pumping costs, in-migration of poor quality water, and decline in well productivity.

### **5.3.5 Alternative 5 - No Project Alternative—Independent Actions**

In the absence of the WFP, it is reasonable to expect that each water purveyor would independently pursue actions to secure infrastructure and water supply necessary to fulfill its needs for projected growth. Alternative 5 assumes that all purveyors would perfect existing entitlements and secure additional entitlements and facilities to meet their projected growth and demands.

#### **Groundwater Resources**

The projected water demands under Alternative 5 could be met through a combined use of ground and surface water. However, under this alternative, water purveyors are assumed to seek surface water entitlements rather than increase their groundwater use above current levels. Groundwater pumping is unlikely, therefore, to increase as much under this alternative. Comparison of the projected impacts for both Alternative 5 and the WFP indicate that these do not vary substantially, if at all, in their potential to impact groundwater resources.

#### **Water Supply**

Water supplies to the various identified contractor classifications would be differentially affected by this alternative depending on location and priority. By definition, this alternative would deliver more water to American River purveyors because the WFP-negotiated reductions in diversions during dry years would not apply. Water rights holders on the American River would only be constrained by their water rights and thus could sometimes take delivery of water in excess of that agreed to in the WFP.

With increased deliveries to American River purveyors, a reduction in available water supply to users outside of the basin is likely. CVP and SWP contractors water deliveries north and south of the Delta would be susceptible to slightly greater reductions due to the redistribution of the limited future condition water supply. Because CVP agricultural contractors are contractually afforded the least protection from reductions, they would potentially be most affected under this alternative. CVP M&I and water settlement contracts would not be expected to experience delivery reductions significantly different than with the WFP. SWP contract supplies are dependent in part on surplus water in the Delta. Increased demands associated with this alternative would reduce water supply contribution from the American River to the Delta and thus diminish SWP deliveries from the Delta.

#### **Water Quality**

Implementation of Alternative 5 would result in higher levels of diversion on the Sacramento and American rivers, as purveyors would be constrained only by their water rights. No Water

Forum-negotiated dry year cut-backs would be required, although CVP deficiencies would still apply. Therefore, Alternative 5 would result in generally reduced Lower American River flows and occasionally reduced Lower Sacramento River flows (below Freeport), relative to the WFP. This would result in slightly reduced capacity to dilute urban runoff and stormwater discharges in both water bodies, and wastewater discharges in the Lower Sacramento River. In addition, greater future water diversions could, in part, facilitate additional urban growth beyond that which would be expected to occur under the WFP. Additional urbanization of the region would increase constituent loading to the American and Sacramento rivers. Seasonal reductions in Lower Sacramento River flows, coupled with potential increases in constituent loading to the river due to additional urban growth, would result in the potentially significant impact to Sacramento River and Delta water quality identified for the WFP being somewhat greater under this alternative.

### **Fisheries Resources and Aquatic Habitats**

On the average, implementation of Alternative 5 would result in lower Folsom Reservoir storage in all months of the year relative to WFP. Consequently, the potentially significant impact to Folsom Reservoir warmwater fisheries identified for the WFP would be somewhat greater under this alternative.

Lower American River flows during the spring and summer months could be reduced, relative to the WFP. Lower American River flows would tend to be similar, or slightly reduced during the fall and winter months. Seasonal reductions in Folsom Reservoir storage, coupled with reduced Lower American River flows, would result in warmer water temperatures during the late spring, summer, and fall months in some years. Overall, seasonal changes to river flows and temperatures under this alternative would be expected to result in somewhat greater impacts to Lower American River fall-run chinook salmon, relative to that identified for the WFP. Similarly, the potential flow-related impacts to splittail identified for the WFP would generally be slightly greater under this alternative.

Under the Future Cumulative Condition, in addition to the American River system impacts discussed above (which would occur due to the increased diversions under the WFP regardless of other future actions), impacts were identified to Shasta and Trinity reservoir warmwater fisheries, Sacramento River salmonids (winter-run and spring-run chinook salmon), and Bay-Delta fisheries. The somewhat higher level of diversion from the American River system under this alternative could change, to some degree, operations of Shasta and Trinity reservoirs, relative to that which would occur at 2030 with the WFP. In some years, Shasta and Trinity reservoir storage would be lower under Alternative 5, relative to the WFP. Consequently, impacts to the warmwater fisheries of Shasta and Trinity reservoirs would be slightly greater than those identified for the WFP.

To meet increased demand downstream of Keswick Dam, flows in the Upper Sacramento River could be higher, relative to WFP. Although Upper Sacramento River flow conditions may be improved, lower storage in Shasta Reservoir could reduce the reservoir's available coldwater pool. As a result, the temperature of water released from Shasta Reservoir, and subsequently

from Keswick Dam into the Sacramento River, could be somewhat higher during the summer and fall months in some years. Hence, effects of this alternative on Shasta Reservoir could result in slightly greater temperature-related impacts to Sacramento River chinook salmon, relative to the WFP.

On the average, Delta outflow would be reduced from that under the WFP during the spring and summer, and the X2 position would, therefore, shift farther upstream. Thus, the potentially significant cumulative impact identified to Bay-Delta fisheries for the WFP would be slightly greater under this alternative.

### **Flood Control**

Under Alternative 5, independent pursuit of actions to secure the necessary infrastructure and water supplies required to meet projected future growth would not affect the manner with which USBR would operate CVP reservoirs for flood control. Flood control operations, consistent with the flood control diagrams for each reservoir would be maintained regardless of alternative. Under Alternative 5, flood control impacts would be essentially equivalent to the WFP.

### **Power Supply**

Increased American River deliveries in this alternative will slightly affect energy and capacity production as well as pumping energy requirements. Annual CVP energy production would diminish slightly due to increased diversions from Folsom Reservoir and the resulting reduction in water releases through the Folsom powerplant. This could decrease CVP electrical capacity by virtue of lower head on the generating units. Pumping costs for water delivered from Folsom Reservoir under this alternative would be somewhat greater because of lowered reservoir storage and increased diversions from the reservoir.

Over a prolonged number of years, the differences in available CVP capacity and available CVP energy under Alternative 5 will likely be slightly less than those modeled with the WFP.

### **Vegetation and Wildlife**

Because Alternative 5 would result in generally reduced Lower American and Sacramento river flows, impacts to vegetation and wildlife would be similar to or slightly worse, relative to the WFP. Because water storage and surface water elevations at Folsom, Shasta, and Trinity reservoirs would be somewhat lower under this alternative, impacts to vegetation and wildlife would be similar to or slightly worse than those under the WFP.

### **Recreation**

Because Alternative 5 would result in generally reduced American and Sacramento River flows, impacts to recreational activities would be similar to or slightly worse relative to the WFP. Because water storage and surface water elevations at Folsom, Shasta, and Trinity reservoirs

would be somewhat lower under this Alternative, impacts to reservoir recreation opportunities would be similar to or slightly worse, relative to the WFP.

### **Land Use and Growth-Inducing Impacts**

Because the total volume of surface water and groundwater diverted and used under Alternative 5 would not be substantially different from that of the proposed WFP, and because land use decisions in the water service study area would continue to be made by city and county government decision-makers with guidance by adopted general plans, land use impacts would be similar to the proposed WFP.

### **Aesthetics**

Because Alternative 5 would result in generally reduced Lower American and Sacramento river flows, impacts to visual resources would be similar to or slightly worse relative to the WFP. Because water storage and surface water elevations at Folsom, Shasta, and Trinity reservoirs would be somewhat lower under this Alternative, impacts to these visual resources would be similar to or slightly worse than those under the WFP.

### **Cultural Resources**

Under Alternative 5, it is assumed that each water purveyor would independently pursue actions to secure the necessary infrastructure and/or water supply entitlements required to fulfill their needs to accommodate projected growth. This alternative assumes that each purveyor would perfect their existing entitlements and seek to secure additional infrastructure (i.e., facilities) in the future. It is reasonable to expect that under such conditions, seasonal reductions in Folsom Reservoir storage would occur, relative to the WFP. Furthermore, reductions in Lower American River flows would also be expected to occur, relative to the WFP. Such reductions in reservoir storage and reduced flows in the Lower American River, however, would unlikely result in additional adverse effects to cultural resources in either waterbody. Changing reservoir elevations would alter the zone with which water fluctuations would be most prevalent but would not necessarily result in impacts additional to those determined under the WFP. Overall, impacts to water-related cultural resources under Alternative 5 would be similar or essentially equivalent to those under the WFP.

### **Soils and Geology**

Geology and soil-related impacts discussed under the WFP would be similar to those resulting from implementation of this alternative.

### **Conclusions - Alternative 5**

Implementation of Alternative 5 would result in more surface water diversions from the Lower American and Sacramento rivers, with no Water Forum-negotiated dry year restrictions as developed by the WFP. Alternative 5 would be worse for fisheries resources. Other flow-related

impacts would be similar to or worse than the WFP, including Lower American River and Folsom Reservoir recreation opportunities, vegetation and wildlife, water quality, power supply, non-American River water supply, and visual resources. Impacts to American River water supply, groundwater, land use, flood control, soils and geology, and cultural resources would be essentially the same as the WFP.

In the absence of the WFP, it is expected that water purveyors would independently pursue individual actions to perfect their existing water entitlements and secure water supplies necessary to meet projected growth in their service areas. This scenario would not only result in greater environmental impacts due to increased surface water diversions, but it would not carry with it the series of linked actions that comprise the remainder of the WFP: dry year restrictions to protect Lower American River resources; the multi-agency Habitat Management Program to address ecosystem health of the Lower American River; water conservation best management practices; groundwater management; and a successor effort to ensure implementation.

### **5.3.6 Alternative 6 - No Project—Constrained Surface Water and Groundwater**

Under Alternative 6, diversion and delivery of water to all purveyors would be limited to what could be accommodated with existing surface and groundwater infrastructure, water entitlements, or demand, whichever is less. This alternative most closely represents the continuation of existing conditions, as required by the State CEQA Guidelines.

#### **Groundwater Resources**

Under Alternative 6, water deliveries to purveyors would be constrained by existing surface and groundwater infrastructures, existing water entitlements, or demand, whichever is less. This would result in reduced surface water diversions and would be accompanied by reductions in groundwater pumping. Impacts to groundwater resources would be substantially less than those under the WFP as 115,000 AF/Yr of additional groundwater pumping would not occur, primarily in the South Sacramento Area. Overall, this alternative would result in improved conditions for the groundwater aquifers in all three basins, relative to the WFP.

#### **Water Supply**

Alternative 6 would limit the amount of surface water diverted. This could limit potential future development within the service area.

Water storage in Folsom Reservoir could remain higher under Alternative 6 throughout the spring and summer period, particularly in dryer years when compared to the WFP because of the constraints on surface water diversions. Also, flows in the Lower American and lower Sacramento rivers would increase during certain portions of the year relative to the WFP. These increased flows could result in slightly reduced impact to CVP and SWP exports from the Delta.

## **Water Quality**

Implementation of Alternative 6 would result in reduced American River system diversions (from surface and groundwater combined), relative to the WFP, in all but the driest years. With the exception of the driest years, the result would be seasonally higher flows in the American River, but relatively little change in Sacramento River flows in most years. These flow changes would result in greater dilution capacity in the American River, but similar dilution capacity in the Sacramento River compared to the WFP. The substantially reduced level of water deliveries defined under this alternative would contribute to slowing future growth, thereby indirectly reducing future increases in constituent loading relative to that which would occur under the WFP. This factor, together with slight increases in Sacramento River flows in some years, would be expected to result in substantially less impacts to Sacramento River and Delta water quality, relative to the WFP.

## **Fisheries Resources and Aquatic Habitats**

The determination of potential impacts to fisheries resources and aquatic habitats under Alternative 6 is based on modeling output from USBR's PROSIM, temperature and salmon mortality models (see Appendix K). In general, a portion of the additional future regional demands not served because of water supply constraints of this alternative could be met during the winter and spring period via "surplus water" in the Sacramento River. Surplus water is defined under the fisheries impact discussion for Alternative 1 above. Modeling output for this alternative shows that the 70-year average storage and water surface elevation in Folsom Reservoir would be higher, relative to the WFP, throughout all months of the year (see Appendix K; Section 1). This increase in elevation would correlate to an increase in littoral habitat availability during all months of the March through September period, with increases of up to 62% in September under Alternative 6, relative to WFP. Consequently, impacts Folsom Reservoir warmwater fisheries would be substantially less under this alternative.

The 70-year average flow in the Lower American River at Watt Avenue under this alternative would be somewhat higher than those under the WFP during all months of the year, and would be substantially higher during October and November in some years. As a result, the flow-related impact to Lower American River fall-run chinook salmon identified for the WFP would be substantially less under this alternative. Similarly, higher flows would generally occur during the February through May period under this alternative, relative to the WFP. The higher flows during these months would result in somewhat less flow-related impacts to Lower American River splittail (Appendix K; Section 7).

Under Alternative 6, the 70-year average littoral habitat availability within Shasta and Trinity reservoirs would not substantially change, relative to the WFP. Therefore, impacts to the warmwater fisheries of these reservoirs identified for the WFP would remain essentially equivalent under this alternative (Appendix K; Sections 13 and 15).

Although measurable changes in both flow and temperature would occur in some individual years, average flow and temperature conditions in the Upper Sacramento River would change

little, if at all, under Alternative 6, relative to the WFP (Appendix K; Sections 17-20). Similarly, Sacramento River temperatures at Freeport under this alternative during the summer months would differ little, if at all, from those under the WFP. Temperature reductions under this alternative of 0.5°F or more, relative to Freeport temperatures under the WFP, would occur infrequently throughout the summer months (Appendix K; Section 22). The potentially significant temperature-related impacts to chinook salmon using the Sacramento River identified for the WFP would be essentially equivalent or slightly less under this alternative.

On the average, Delta outflow and the position of X2 would not change substantially from that under the WFP in any month of the year (Appendix K; Sections 23 and 24). Although the position of X2 under Alternative 6 could shift up to about 1 kilometer both downstream and upstream of the X2 position for the WFP, shifts of this magnitude would occur infrequently. Thus, the potentially significant cumulative impact identified to Bay-Delta fisheries for the WFP would remain essentially equivalent under this alternative.

### **Flood Control**

Under Alternative 6, constrained diversions of both surface water and groundwater would not affect the manner with which USBR would operate CVP reservoirs for flood control. Flood control operations, consistent with the flood control diagrams for each reservoir would be maintained regardless of alternative. Under Alternative 6, flood control impacts would be essentially equivalent to the WFP.

### **Power Supply**

Constraining the diversion of surface water under Alternative 6 would result in slightly more CVP hydropower production. Further, because Folsom Reservoir levels are predicted to remain higher during the spring and summer months in below normal and drier years, relative to the WFP, impacts to the EID and Folsom pumping plants regarding increased power requirements for raw water pumping could be slightly reduced under this alternative.

### **Vegetation and Wildlife**

Folsom Reservoir water surface elevations and Lower American River flows would generally be somewhat higher during the spring and summer period in below normal and drier years, and would remain essentially equivalent during normal and wet years, relative to conditions with the WFP. As a result, impacts to vegetation and wildlife at Folsom Reservoir and along the Lower American River would be similar to or slightly better, relative to the WFP. Under Alternative 6, operations at Shasta and Trinity reservoirs, as well as Sacramento River flows, would be similar to the WFP.

### **Recreation**

Folsom Reservoir water surface elevations and Lower American River flows would generally be somewhat higher during the spring and summer period in below normal and drier years, and

would remain essentially equivalent during normal and wet years, relative to conditions with the WFP. As a result, impacts to recreation activities at Folsom Reservoir and along the Lower American River would be similar to or slightly better relative to the WFP. Under Alternative 6, operations at Shasta and Trinity reservoirs, as well as Sacramento River flows, would be similar to the WFP.

### **Land Use and Growth-Inducing Impacts**

Alternative 6 would limit the amount of surface water diverted, relative to the WFP. Limited surface water supplies could act as a constraint to development in the water service study area. Development anticipated to occur in accordance with the various general plans could be somewhat constrained, and increased pressure would be placed on other water supplies, such as groundwater.

### **Aesthetics**

Folsom Reservoir water surface elevations and Lower American River flows would generally be somewhat higher during the spring and summer period in below normal and drier years, and would remain essentially equivalent during normal and wet years, relative to conditions with the WFP. As a result, impacts to visual aesthetics at Folsom Reservoir and along the Lower American River would be similar to or slightly better relative to the WFP. Under Alternative 6, operations at Shasta and Trinity reservoirs, as well as Sacramento River flows, would not be substantially different, relative to the WFP.

### **Cultural Resources**

Under Alternative 6, water deliveries to purveyors would be constrained by existing surface and groundwater infrastructures, existing water entitlements, or demand, whichever is less. The evaluation of potential impacts to cultural resources under this alternative is based on PROSIM modeling output (Appendix K). Relative to the WFP, reductions in deliveries, as revealed in PROSIM modeling, indicated that under Alternative 6, storage and water surface elevation in Folsom Reservoir would be higher throughout all months of the year (Appendix K; Section 1). Additionally, flows in the Lower American River would be somewhat higher than those under the WFP during all months of the year, and would be substantially higher during a few months (i.e., October and November) in some years (Appendix K; Section 7). Such hydrologic conditions would not expose or result in the deterioration of cultural resources in these waterbodies additional to those identified under the WFP. Overall, impacts to water-related cultural resources under Alternative 6 would be similar to those under the WFP.

### **Soils and Geology**

Impacts to soils and geology would likely be similar to those discussed for the WFP.

## **Conclusions - Alternative 6**

Limiting future diversions to existing entitlements or to what can be accommodated by existing surface and groundwater infrastructure would result in reduced diversions within the American River basin. Impacts to fisheries resources including flow and temperature related impacts to fall-run chinook, and splittail in the American River would be reduced under Alternative 6. Impacts on the warmwater fishery of Folsom Reservoir would also be reduced, while impacts on warmwater fisheries of Shasta and Trinity reservoirs, Sacramento River fisheries, and Delta fisheries would be essentially the same. Other flow-related impacts would be the same or reduced, including Lower American River and Folsom Reservoir recreation opportunities, vegetation and wildlife, and visual resources. Water supply impacts would be worse relative to WFP, within the basin, but could be slightly reduced out of the basin. Impacts on groundwater would be reduced, relative to WFP, as groundwater supplies would be constrained and remain at relatively higher levels. Impacts on water quality and power supply may be somewhat reduced; impacts on flood control, cultural resources, and soils and geology would be essentially equivalent to the WFP.

### **5.3.7 Alternative 7 - No Project—Constrained Surface Water, Unconstrained Groundwater**

Under Alternative 7, surface water diversions would be restricted to the lesser of future demands, existing surface water capacity, or existing water entitlements. Future demands would, therefore, be met through increased groundwater pumping where sufficient groundwater is available.

#### **Groundwater Resources**

Under Alternative 7, unconstrained groundwater pumping would similarly follow Alternative 2 - Increased Groundwater Pumping. With constrained surface water diversions, purveyors would likely rely on continued and expanded groundwater pumping efforts to meet their projected future demands. To accommodate future projected growth without the benefit of additional surface water supplies (as constrained), impacts to the existing groundwater aquifers would be substantially worse, relative to the WFP.

#### **Water Supply**

Alternative 7 would limit the amount of surface water diverted. In many years, water storage in Folsom Reservoir could remain higher under Alternative 7 when compared to the WFP because of the constraints on surface water diversions. Also, flows in the Lower American and lower Sacramento rivers would increase during certain portions of the year relative to the WFP. These increased flows could result in slightly reduced impact to CVP and SWP exports from the Delta.

## **Water Quality**

Under Alternative 7, surface water diversions from the American River system would be substantially lower compared to the WFP in all but the driest years. As a result, Nimbus releases would be seasonally higher in most years, although increased seepage losses would occur in the Lower American River. This alternative would have less effects on Sacramento River flows, relative to the WFP, although some seepage losses would be expected to occur. Overall, these changes would result in slightly greater dilution capacity in the American River, but similar dilution capacity in the Sacramento River compared to the WFP. Moreover, because most of the anticipated future demand would be met through increased groundwater pumping, future urban growth would be similar under this alternative compared to that which would occur under the WFP. Hence, neither Sacramento River dilution capacity nor constituent loading to the river (due to urban runoff and stormwater and wastewater discharges) would change substantially relative to the WFP. Consequently, the potentially significant impact to Sacramento River and Delta water quality identified for the WFP would be essentially equivalent under this alternative, with possibly slightly less impacts in some of the drier years.

In terms of groundwater quality, with few exceptions, raw municipal and industrial water supplies within the region obtained from groundwater pumping are of higher quality than those obtained via diversion of surface waters. For example, THM production in treated drinking water obtained from groundwater supplies is generally lower than that produced from treating raw surface water. As a result, treatment costs for groundwater would be the same or lower than costs for treating diverted surface water, and the overall quality of the treated groundwater would be similar to or better than that which would result from treating diverted surface water under the WFP.

## **Fisheries Resources and Aquatic Habitats**

Alternative 7 would have similar effects on fisheries impacts to those discussed for Alternative 6 (i.e., substantially less impacts to fisheries resources of the American River system, with essentially equivalent or slightly less impacts to the warmwater fisheries of Shasta and Trinity reservoirs, Sacramento River chinook salmon, and Bay-Delta fisheries resources). However, because higher levels of groundwater pumping would affect American River flows to some degree, reductions in the relative magnitude and/or frequency of impacts to Lower American River fisheries under this alternative would be somewhat lesser than that discussed above for Alternative 6.

## **Flood Control**

Under Alternative 7, restrictions of surface water diversions to the lesser of demands, existing surface water infrastructural capacity, or existing water entitlements would not affect the manner with which USBR would operate CVP reservoirs for flood control. Flood control operations, consistent with the flood control diagrams for each reservoir would be maintained regardless of alternative. Under Alternative 7, flood control impacts would be essentially equivalent to the WFP.

## **Power Supply**

Constraining the diversion of surface water under Alternative 7 would result in slightly more CVP hydropower production. Further, because Folsom Reservoir levels are predicted to remain higher during the spring and summer months in many years, relative to the WFP, impacts to the EID and Folsom pumping plants associated with power requirements for raw water pumping could be slightly reduced under this alternative.

## **Vegetation and Wildlife**

Folsom Reservoir water surface elevations and Lower American River flows would generally be somewhat higher during the spring and summer period in below normal and drier years, and would remain essentially equivalent during normal and wet years, relative to conditions with the WFP. As a result, impacts to vegetation and wildlife at Folsom Reservoir and along the Lower American River would be similar to or slightly better, relative to the WFP. Under Alternative 7, operations at Shasta and Trinity reservoirs, as well as Sacramento River flows, would be similar to the WFP.

## **Recreation**

Folsom Reservoir water surface elevations and Lower American River flows would generally be somewhat higher during the spring and summer period in below normal and drier years, and would remain essentially equivalent during normal and wet years, relative to conditions with the WFP. As a result, impacts to recreation activities at Folsom Reservoir and along the Lower American River would be similar to or slightly better relative to the WFP. Under Alternative 7, operations at Shasta and Trinity reservoirs, as well as Sacramento River flows, would be similar to the WFP.

## **Land Use and Growth-Inducing Impacts**

Because the total volume of surface water and groundwater diverted and used under Alternative 7 would essentially equal that of the proposed WFP, impacts to land use would be similar to the proposed WFP.

## **Aesthetics**

Folsom Reservoir water surface elevations and Lower American River flows would generally be somewhat higher during the spring and summer period in below normal and drier years, and would remain essentially equivalent during normal and wet years, relative to conditions with the WFP. As a result, impacts to visual aesthetics at Folsom Reservoir and along the Lower American River would be similar to or slightly better relative to the WFP. Under Alternative 7, operations at Shasta and Trinity reservoirs, as well as Sacramento River flows, would not be substantially different, relative to the WFP.

## **Cultural Resources**

Under Alternative 7, surface water diversions would be constrained by the lesser of existing surface water infrastructure capacity, existing surface water entitlements, or demand. Future demands would, therefore, be primarily met through increased groundwater pumping to the extent feasible. This alternative would result in similar impacts to water-related cultural resources as Alternative 6 as no change in the anticipated level of surface water diversions would exist between the two alternatives. Overall, therefore, impacts to water-related cultural resources would be similar to those under the WFP.

## **Soils and Geology**

Soils and geology resources would remain unaffected by this alternative. Impacts to soils and geology, therefore, would be similar to those under the WFP.

## **Conclusions - Alternative 7**

Limiting future surface water diversions to existing entitlements or to what can be accommodated by existing infrastructure would result in reduced diversions within the American River basin. Impacts to fisheries resources including flow and temperature related impacts to fall-run chinook, and splittail in the American River would be reduced under Alternative 7. Impacts on the warmwater fishery of Folsom Reservoir would also be reduced, while impacts on warmwater fisheries of Shasta and Trinity reservoirs, Sacramento River fisheries, and Delta fisheries would be essentially the same. Other flow-related impacts would be the same or reduced, including Lower American River and Folsom Reservoir recreation opportunities, vegetation and wildlife, and visual resources. Water supply impacts would be similar relative to the WFP, within the basin, but could be slightly reduced out of the basin. Impacts on groundwater would be worse, relative to WFP, as groundwater supplies would be unconstrained and would be used to make up the shortfall in surface water supplies. Impacts on water quality and power supply may be somewhat reduced; impacts on flood control, cultural resources, and soils and geology would be essentially equivalent to the WFP.

## **5.4 ENVIRONMENTALLY SUPERIOR ALTERNATIVE**

Pursuant to the Guidelines, the EIR discusses the ways in which each alternative could be considered “environmentally superior” to the WFP. As described in more detail in the following discussion, each of the alternative solutions would involve environmental trade-offs. Thus, the EIR identifies aspects of the environmental advantages and disadvantages of each alternative.

***Alternative 1 - Increased Sacramento River Diversions***, would somewhat improve instream flow conditions for recreation, for fisheries of the Lower American River, and warmwater fisheries of Folsom Reservoir, and to that extent would be considered environmentally advantageous. However, drinking water quality impacts would be worse under this alternative, because of the lower quality of Sacramento River water as compared to American River water. In addition, this

alternative would involve construction of new water diversion, treatment, pumping, and transmission facilities, which may involve impacts beyond the scope of this analysis.

**Alternative 2 - Increased Groundwater Pumping** would reduce surface water diversions and therefore have the effect of reducing adverse impacts to recreation, fisheries on the Lower American River, and water supply, and to that extent would be environmentally advantageous. It would also cause groundwater elevations to decline, increase potential for groundwater contamination, and result in more wells becoming unusable, all adversely affecting groundwater resources.

**Alternative 3 - Increased Water Reclamation**, would involve the use of increased amounts of reclaimed water to offset new surface water diversions for non-potable consumptive uses such as irrigation, industrial use, and wetlands management. This alternative would have beneficial effects primarily on groundwater supplies and to a lesser degree on surface water supplies. However, the need to “make-up” lost return flows to the Sacramento River by additional releases from Folsom or Shasta reservoirs could worsen effects to warmwater fisheries in the reservoirs and salmon in the Sacramento and American rivers. Although the analysis is included in this discussion of alternatives in order to provide a basis for comparison, nothing in the WFP would preclude adoption of plans for increased water reclamation.

**Alternative 4 - More Frequent Reduction in Surface Water Diversions**, was designed to analyze the impacts of a scenario in which the cutbacks on American River diversions by diverters upstream of Nimbus Dam during dry year conditions were triggered more frequently. Under this alternative, cutbacks would be required in approximately 43% of the years of hydrologic record, as compared with 18% under the WFP. Although these increased cutbacks would reduce the frequency or magnitude of some of the potential impacts to fisheries, it would not eliminate them. Similarly, this alternative would not significantly increase CVP or SWP deliveries outside of the basin. Increased groundwater pumping is assumed to occur under this alternative, with a concomitant small increase in the migration of groundwater contaminants and decline in groundwater levels predicted. Although this alternative could be considered environmentally advantageous to the WFP based on the slight improvements in conditions for fall-run chinook salmon and steelhead, it fails to eliminate any of the potential impacts to fisheries resources under the WFP. Moreover, this alternative would cause additional water shortages for existing users.

**Alternative 5 - No Project Independent Actions**, an alternative required by CEQA, fails to reduce significant impacts. Under this scenario, in the absence of the WFP, each water purveyor would independently pursue actions to secure the infrastructure and surface water diversions to accommodate its projected water demands. Alternative 5 would render impacts on fisheries resources slightly worse than the WFP. Similarly, other flow related impacts would be somewhat worse than under the WFP, including Lower American River and Folsom Reservoir recreation opportunities, water quality, power supply, vegetation and wildlife, and visual resources.

**Alternative 6 - No Project - Constrained Surface Water and Groundwater**, would approximate a continuation of existing conditions on the Lower American River and groundwater basins. It

is considered environmentally advantageous because, although it would not altogether eliminate adverse impacts to fisheries, it would reduce certain significant impacts related to the increased diversions contemplated by the WFP, particularly impacts on fisheries (fall-run chinook, steelhead and splittail) and recreation and although not identified as significant, would preclude further lowering of the groundwater table. This alternative could, however, result in water shortages for existing water users, and as such, would not meet the basic objective of the project.

**Alternative 7 - No Project - Constrained Surface Water, Unconstrained Groundwater** would have an effect similar to that of Alternative 6, in reducing surface water diversions and adverse flow-related impacts to recreation and fisheries on the Lower American River, and to that extent would be environmentally advantageous. However, because groundwater would be unconstrained, it would cause groundwater elevations to decline, increase potential for groundwater contamination, and result in more wells becoming unusable.

Table 5-1 shows in matrix form, a relative comparison of each alternative by issue, to the WFP. Impacts of each alternative as compared to the WFP are determined to be: somewhat or substantially better; slightly better; similar or equivalent; slightly worse; or somewhat or substantially worse.

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## Exhibit 5-1 Alternatives Comparison Matrix

	Alternative 1					Alternative 2					Alternative 3					Alternative 4					Alternative 5					Alternative 6					Alternative 7									
	↑↑	↑	=	↓	↓↓	↑↑	↑	=	↓	↓↓	↑↑	↑	=	↓	↓↓	↑↑	↑	=	↓	↓↓	↑↑	↑	=	↓	↓↓	↑↑	↑	=	↓	↓↓	↑↑	↑	=	↓	↓↓	↑↑	↑	=	↓	↓↓
Groundwater			■							■		■								■					■		■									■				
Water Supply																																								
North of Delta			■				■								■					■					■					■										■
South of Delta				■			■								■					■					■					■										■
Water Quality			■				■							■						■					■					■										■
Fisheries																																								
Folsom Reservoir		■					■								■					■					■		■													■
Lower American River Chinook		■					■								■					■					■		■													■
Lower American River Splittail			■					■							■					■					■			■												■
Shasta & Trinity Reservoirs			■				■								■					■					■					■										■
Sacramento River Chinook			■				■								■					■					■					■										■
Bay-Delta			■					■							■					■					■					■										■
Flood Control			■					■						■						■					■					■										■
Power Supply																																								
Generation and Capacity		■					■								■					■					■			■												■
Pumping					■					■					■					■					■					■										■
Vegetation and Wildlife			■							■					■					■					■					■										■
Recreation					■					■					■					■					■					■										■
Land Use & Growth Inducing			■					■							■					■					■					■										■
Aesthetics			■							■					■					■					■					■										■
Cultural Resources					■					■					■					■					■					■										■
Soils & Geology			■					■							■					■					■					■										■

↑↑ Better or Substantially Better (i.e., Reduced or Substantially Reduced Impact)  
↑ Slightly Better (i.e., Slightly Reduced Impact)  
 = Similar or Equivalent  
↓ Slightly Worse (i.e., Slightly Greater Impact)  
↓↓ Worse or Substantially Worse (i.e., Greater or Substantially Greater Impact)

■ Indicates, by column position, impact relative to WFP.  
 Indicates range of possible impacts, relative to WFP, given uncertainty in CVP/SWP operations, or other factors.

Sources: EDAW 1998; SWRI 1998